School of Engineering and Technology

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Master of Engineering, Two Year Programme

Semester System

(w.e.f. session 2013-14)

Revised and approved in the year 2019 (13th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO 1 To provide a strong foundation in advanced engineering principles, enabling students to develop innovative and efficient solutions for complex problems in their chosen field of specialization.

PEO 2 To foster research capabilities, encouraging students to explore emerging technologies, conduct independent research, and contribute to the development of new methodologies in engineering practices.

PEO 3 To develop critical thinking, analytical abilities, and problem-solving skills, equipping students to effectively apply engineering concepts to real-world challenges and deliver optimized solutions in professional environments.

PEO 4 To provide in-depth knowledge in specialized areas like Artificial Intelligence, Machine Learning, IoT, Robotics, and renewable energy, preparing students to lead advancements in these cutting-edge technologies.

PEO 5 To instill a strong sense of professional ethics, responsibility, and social consciousness, ensuring that graduates make informed decisions that positively impact society, the environment, and industry standards.

PEO 6 To enhance leadership, teamwork, and communication skills, preparing students to work collaboratively in multidisciplinary teams and effectively lead projects in diverse engineering and technology domains.

PEO 7 To ensure graduates are industry-ready by providing hands-on learning experiences, internships, and exposure to current industry practices, equipping them with practical skills for immediate contributions to engineering projects.

PEO 8 To promote lifelong learning and adaptability, preparing graduates to stay current with technological advancements and continuously upgrade their knowledge and skills throughout their professional careers in engineering.

Programme Specific Objectives (PSO's)

PSO 1 To equip students with advanced knowledge in core engineering subjects, enabling them to design, develop, and optimize systems and solutions for complex engineering challenges.

PSO 2 To develop expertise in emerging technologies such as Artificial Intelligence, Machine Learning, Internet of Things, and Robotics, preparing students to lead innovations in these high-demand fields.

PSO 3 To provide in-depth skills in research methodology, enabling students to conduct independent research, contribute to technological advancements, and develop novel solutions in their specialized areas.

PSO 4 To enhance problem-solving capabilities through practical applications, fostering the ability to analyze, design, and implement engineering systems that meet real-world technical and environmental challenges.

PSO 5 To instill a strong understanding of industry standards, quality control, and sustainable engineering practices, ensuring that students can contribute to projects with environmental and societal considerations.

PSO 6 To improve leadership, teamwork, and project management skills, preparing students to lead multidisciplinary teams and manage engineering projects efficiently in dynamic and diverse work environments.

PSO 7 To ensure mastery of advanced computational tools, simulation techniques, and design software, enabling students to model, analyze, and optimize engineering systems across various industries.

PSO 8 To promote ethical practices, professional integrity, and social responsibility, ensuring graduates understand the broader impact of engineering decisions and contribute positively to society, technology, and the environment.

Programme Outcome Objectives (POO's)

POO 1 Graduates will have a deep understanding of advanced engineering principles, enabling them to apply theoretical and practical knowledge to solve complex engineering problems across various domains.

POO 2 Graduates will demonstrate strong analytical, critical thinking, and problem-solving abilities, applying appropriate methodologies to design, analyze, and optimize solutions for real-world engineering challenges.

POO 3 Graduates will possess advanced research skills, enabling them to conduct independent research, contribute to innovation, and stay at the forefront of technological developments in their field.

POO 4 Graduates will be proficient in the use of modern engineering tools, software, and technologies to model, simulate, and optimize engineering systems and processes across diverse industries.

POO 5 Graduates will be able to design and develop engineering systems and solutions with an understanding of sustainability, environmental impact, and societal considerations, contributing to ethical engineering practices.

POO 6 Graduates will demonstrate strong leadership qualities, effective communication skills, and the ability to work collaboratively in multidisciplinary teams, ensuring successful project management and execution.

POO 7 Graduates will understand and apply industry best practices, standards, and ethical considerations, ensuring their engineering solutions adhere to regulatory requirements and contribute positively to society and the environment.

POO 8 Graduates will be capable of effectively managing engineering projects, demonstrating proficiency in planning, budgeting, resource management, and risk assessment to achieve project goals within deadlines and constraints.

POO 9 Graduates will engage in lifelong learning, adapting to evolving technologies and continuously upgrading their knowledge and skills to remain competitive and contribute meaningfully to the engineering profession.

POO 10 Graduates will demonstrate professional and ethical responsibility, making informed decisions with a focus on the long-term impact of engineering solutions, and positively influencing society and the global engineering community.

Shobhit University, Gangoh, Saharanpur

Department of Computer Engg.

M.Tech. (Computer Engineering)

(Teaching Scheme)

First Semester

Course No	Subject	L T P	Cr
CE- 501	Software Engineering Methodologies	**3 – 1 – 0**	**4**
CE- 503	Analysis and Design of Algorithms	**3 – 1 – 0**	**4**
CE- 505	Advanced Database Management Systems	**3 – 1 – 0**	**4**
CE- 507	Computer Communication and Networks	**3 – 1 – 0**	**4**
CE- 509	Fundamental of Computer Programming (Audit)	**2 – 1 – 0**	**0**
CE- 511	Fundamental of Mathematics (Audit)	**2 – 1 – 0**	**0**
CE- 511 A	Mathematics /		
CE- 511 B	Basic Mathematics /		
CE- 511 C	Mathematics-I		
CE- 551	Algorithms Lab	**0 – 0 – 4**	**2**
CE- 581	Seminar-I	**0 – 0 – 3**	**2**
		Total: 20	

Second Semester

CE- 502	Resource Management of Computer Systems	**3 – 1 – 0**	**4**
CE- 504	Soft Computing	**3 – 1 – 0**	**4**
CE- 506	High Performance Computer Architecture	**3 – 1 – 0**	**4**
	Elective –I (Choose any one)	**3 – 1 – 0**	**4**
CE-522	Mobile & Wireless Communication		
CE-524	Embedded System		
CE-526	Cloud Computing		
CE-552	Operating systems Lab	**0 – 0 – 4**	**2**
CE-582	Seminar-II	**0 – 0 – 3**	**2**
		Total: 20	

Third Semester

CE- 601	Data Mining and Warehousing	**3 – 1 – 0**	**4**
CE- 603	Internet and Web Technology	**3 – 1 – 0**	**4**
CE- 605	Medical Image Processing	**3 – 1 – 0**	**4**
CE- 607	Software Verification, Validation and Testing	**3 – 1 – 0**	**4**
	Elective –II (Choose any one)	**3 – 1 – 0**	**4**
CE-623	Security of Information System		
CE-625	Network Security		
CE-671	Minor Project	**0 – 0 – 8**	**2**
CE-681	Seminar-III	**0 – 0 – 3**	**2**
		Total: 20	

Fourth Semester

CE- 692	Dissertation	**0 – 0 – 28 14**

Total: 14
Grand Total: 74

Software Engineering Methodologies

CE- 501	L	T	P	Credits
	3	1	0	4

Unit-I

The software crisis, principles of software engineering, programming-in-the-small vs. programming-in-the-large, The Software Lifecycle, Software and systems engineering: overview, examples and industrial realities Project Management - Project Planning and Scheduling, Team organization.

Unit-II

SRS (Software requirement specification). Design for reuse, design for change, design notations, design evaluation and validation, coding and testing, software maintenance and reliability.

Unit-III

Software Economics, Software Quality and standards, Software Metrics - Measurement, Estimation and Prediction, Requirements Management, Configuration Management., Risk Management Testing and Inspection Architecture Description Languages, Pattern-Oriented Software Architecture, Component-based Development, Aspect-oriented development

Unit-IV

CASE (Computer Aided Software Engineering): CASE and its Scope, CASE support in software life cycle, documentation, project management, internal interface, Reverse Software Engineering, Architecture of CASE environment.

Unit-V

Issues in project management-team structure, scheduling, software quality assurance. Object

Oriented methodology: object oriented paradigm, OO analysis and design, examples of methodologies

Suggested Readings:

1. Shari Lawrence Pfleeger, "Software Engineering, Theory and Practice," Prentice-Hall 1998.
2. Merlin Dorfman and Richard H. Thayer, "Software Engineering, Edited ," IEEE Computer Society Press, 1997.
3. Sommerville: Software Engineering 8th Edition. Addison Wesley. 2006
4. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001
5. Schulmeyer, Zero Defect Software, McGraw-Hill, 1992.

Analysis and Design of Algorithms

CE- 503	L	T	P	Credits
	3	1	0	4

Unit-I: Analyzing Algorithms & Problems

Introduction to algorithms, Time and Space Complexity, Basic elements of data structures like linked lists, stacks and queues, trees, graphs, recursion. Different types of sorting algorithms and their complexities

Unit-II: Dynamic Sets, Searching and Graphs

Introduction, Array, amortized time analysis, red black trees, hashing, heaps, dynamic equivalence relations and union-find programs, priority queues with decrease key operations, traversing graphs, DFS, strongly connected components, biconnected complaints, minimum spanning tree algorithm, single source shortest paths, all pair shortest paths

Unit - III: Greedy and Dynamic Methods

Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Dynamic programming with examples such as Kanpsack, All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem.

Unit - IV: Backtracking and NP – Hard and NP Complete problems

General backtracking and Branch and Bound Methods, 8 queen, sum of subset, graph coloring, Hamilton cycles, 0/1 knapsack problem, NP – Hard and NP Complete problems: Basic Concepts, cooks theorem, NP – Hard graph problems, NP hard Scheduling.

Unit - V: Parallel Algorithms and Approximation Algorithms

Introduction, parallelism, PRAM and other models, some simple PRAM algorithms, handling write conflicts, Merging and Sorting, Finding Connected Components, Approximation Algorithms: Introduction, Absolute Approximation, e-approximation, polynomial time approximation schemes, fully polynomial time approximation schemes. String matching algorithms.

Suggested Readings:

1. V. Aho , J. E. Hopcroft and J. D. Ullman, "The Design and Analysis of Algorithms", Addison-Wesley, 1974.
2. T. H. Cormen , C. E. Leiserson and R. L. Rivest, "Introduction to Algorithms 2nd edition", PHI. 2009.
3. M. R. Garey and D. S. Johnson, "Computers and Intractability: A Guide to the Theory of NPCompleteness",Freeman, 1979.
4. J. Van Leuween ed, Handbook of Theoretical Computer Science, Vol A., Elsevier, 1990.

Advanced Database Management Systems

CE- 505	L	T	P	Credits
	3	1	0	4

Unit -I: Introduction

An overview of database management system, database system Vs file system, Architecture, Advantages, Disadvantages, data models, relational algebra, SQL, Normal forms.

Unit-II: Query Processing

General strategies for query processing, transformations, expected size, statistics in estimation, query improvement, query 'evaluation, view processing, query processor

Unit-III: Recovery

Reliability, transactions, recovery in centralized DBMS, reflecting updates, Buffer management, logging schemes, disaster recovery.

Unit - IV: Concurrency

Introduction, serializability, concurrency control,-locking schemes, timestamp based order, optimistic scheduling, multiversion techniques, deadlocks Object Oriented Data base Development: Introduction, Object definition language, creating object instances, Object query language

Unit - V: Distributed Databases and Data Warehousing

Basic concepts, options for distributing a database, distributed DBMS, Data warehousing: Introduction, basic concepts, data warehouse architecture, data characteristics, reconciled data

layer, data transformation, derived data layer, user interface, Object Relational Databases: Basic concepts enhanced SQL, advantages of object relational approach.

Suggested Readings:

1. An Introduction to database systems by Bipin C. Dcsai, Galgolia Publications,1997.
2. Principles of distributed database systems, by M. Tamer & Valduricz, 2" edition, LPE Pearson Education,2009.
3. Database system concepts by Korth,2008.

Computer Communication and Networks

CE- 507	L	T	P	Credits
	3	1	0	4

Unit -I

Review of data communication techniques, Data transmission, line coding, error control coding. Data switching, circuit switching, message and packet switching. Network model ISO-OSI model, primitives and services.

Unit -II

Elements of queuing. Data link control Simplex, pipelined and sliding window protocols, simplex performance analysis. X 25 data link layer. Random access techniques. Pure, slotted and finite population ALOHAs. Stability in ALHOAs.

Unit -III

Routing and congestion control static, adaptive, centralized and distributed routing procedures,

Congestion control, Local Area Networks LAN topologies and protocols, IEEE 802.x protocols, implementation and performance issues, High speed LANs.

Unit -IV

Transport layer. Quality of service transport classes. Design issues, buffer management, synchronization.

Unit - V

Session and presentation layer synchronization issues, formatting data compression data security, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography.

Suggested Readings:

1.Forouzen, "Data Communication and Networking", TMH 2006.

2.A.S. Tanenbaum, “Computer Networks”, 3rd Edition, Prentice Hall India, 1997.

3.S. Keshav, “An Engineering Approach on Computer Networking”, Addison Wesley, 1997

4.W. Stallings, “Data and Computer Communication”, Macmillan Press, 1989.

Fundamental of Computer Programming

CE-509

Unit 1:

Introduction to Programming Overview of computer programming, history of programming languages, types of programming languages, and the role of algorithms in programming. Basic concepts of software development and the software development life cycle.

Unit 2:

Basic Concepts of Programming Understanding data types, variables, constants, and operators. Introduction to expressions and statements. Importance of input and output in programming.

Unit 3:

Control Structures Exploration of control flow mechanisms such as conditionals (if, else, switch) and loops (for, while, do-while). Understanding the significance of flowcharts and pseudocode in representing logic.

Unit 4:

Functions and Modular Programming Introduction to functions, parameters, return values, and the concept of modular programming. Importance of code reusability and organization. Overview of function overloading and recursion.

Unit 5:

Data Structures Basic data structures including arrays, lists, stacks, and queues. Understanding how to store and manipulate data effectively. Introduction to strings and their manipulation.

Fundamental of Mathematics

CE-511

Unit 1: Number Systems
Introduction to various number systems including natural numbers, whole numbers, integers, rational numbers, and irrational numbers. Understanding real numbers and their properties.

Unit 2: Algebraic Expressions and Equations
Exploration of algebraic expressions, like terms, and polynomials. Understanding linear equations and inequalities in one variable, as well as methods for solving them.

Unit 3: Functions and Graphs
Introduction to the concept of functions, types of functions (linear, quadratic, exponential), and their properties. Understanding how to represent functions graphically and analyze their behavior.

Unit 4: Trigonometry
Fundamental concepts of trigonometry, including the study of angles, sine, cosine, and tangent functions. Introduction to trigonometric identities and their applications in solving problems.

Unit 5: Geometry
Basic concepts of geometry, including points, lines, angles, and shapes. Exploration of properties and theorems related to triangles, quadrilaterals, circles, and polygons.

Mathematics

CE- 511 A

Unit 1: Number Systems
Introduction to natural numbers, whole numbers, integers, rational numbers, and irrational numbers. Exploration of the properties of real numbers and their applications.

Unit 2: Algebra
Study of algebraic expressions, equations, and inequalities. Understanding polynomials, factoring, and the basics of quadratic equations. Introduction to functions and their graphs.

Unit 3: Geometry
Basic concepts of points, lines, angles, and geometric shapes. Exploration of properties and theorems related to triangles, quadrilaterals, and circles. Introduction to coordinate geometry.

Unit 4: Trigonometry
Fundamental concepts of trigonometric ratios, functions, and identities. Applications of trigonometry in solving problems involving angles and triangles.

Unit 5: Calculus
Introduction to limits, derivatives, and integrals. Understanding the basic principles of differentiation and integration, along with their applications in real-world scenarios.

Basic Mathematics

CE-511 B

Unit 1: Number Systems
Introduction to different types of numbers including natural numbers, whole numbers, integers, rational numbers, and irrational numbers. Understanding place value and number representation.

Unit 2: Arithmetic Operations
Fundamental operations such as addition, subtraction, multiplication, and division. Introduction to order of operations and properties of numbers.

Unit 3: Fractions and Decimals
Understanding fractions, types of fractions, and operations with fractions. Introduction to decimals, conversion between fractions and decimals, and operations with decimals.

Unit 4: Ratios and Proportions
Concept of ratios and their applications. Understanding proportions, solving problems involving direct and inverse proportions.

Unit 5: Percentages
Understanding percentages and their applications. Calculating percentage increases and decreases, and solving problems related to discounts and interest.

Mathematics-I

CE-511 C

Unit 1: Sets and Functions
Introduction to sets, types of sets, and operations on sets. Understanding functions, domain, range, and types of functions including one-to-one, onto, and inverse functions.

Unit 2: Algebra
Study of real numbers, algebraic expressions, and polynomials. Operations on polynomials, factorization techniques, and solving quadratic equations.

Unit 3: Trigonometry
Fundamental trigonometric ratios, identities, and equations. Applications of trigonometry in right triangles and the unit circle. Introduction to inverse trigonometric functions.

Unit 4: Coordinate Geometry
Basics of the Cartesian coordinate system. Study of lines, slopes, distance formula, and midpoints. Introduction to conic sections such as circles, parabolas, ellipses, and hyperbolas.

Unit 5: Calculus - Limits and Continuity
Introduction to limits, properties of limits, and techniques for evaluating limits. Understanding the concept of continuity and its implications in calculus.

Algorithms Lab

CE-551

1. Write a program to find the factorial of a number using recursion.
2. Create a program to implement binary search on a sorted array.
3. Develop a program to sort an array using the bubble sort algorithm.
4. Write a program to find the nth Fibonacci number using iteration.
5. Implement a program to check if a string is a palindrome.
6. Create a program to perform matrix addition.
7. Write a program to implement the insertion sort algorithm.
8. Develop a program to reverse an array using pointers.
9. Implement a program to calculate the greatest common divisor (GCD) using the Euclidean algorithm.
10. Create a program to perform linear search on an array.
11. Write a program to implement the selection sort algorithm.
12. Develop a program to count the number of vowels in a given string.
13. Implement a program to generate prime numbers within a specified range.
14. Create a program to find the sum of digits of a number.
15. Write a program to merge two sorted arrays into a single sorted array.
16. Develop a program to implement quicksort on an array.
17. Implement a program to check if two strings are anagrams of each other.
18. Create a program to calculate the power of a number using recursion.
19. Write a program to print the Pascal's triangle up to a given number of rows.
20. Develop a program to perform depth-first search (DFS) on a graph represented using an adjacency list.

Seminar-I

CE- 581

1. Create a program to implement a simple calculator that performs addition, subtraction, multiplication, and division.
2. Develop a program to convert temperature between Celsius and Fahrenheit.
3. Write a program to generate random numbers within a specified range.
4. Create a program to find the maximum and minimum values in an array.
5. Implement a program to count the number of occurrences of a character in a string.
6. Write a program to check if a number is prime.
7. Develop a program to display the first n prime numbers.
8. Create a program to implement a basic to-do list using an array.
9. Write a program to sort a list of names alphabetically.
10. Implement a program to find the longest word in a sentence.
11. Create a program to convert a decimal number to binary.
12. Write a program to count the number of words in a given sentence.
13. Develop a program to remove duplicates from an array.
14. Create a program to implement a simple text-based game (e.g., guess the number).
15. Write a program to calculate the area of different shapes (circle, rectangle, triangle) based on user input.
16. Implement a program to perform basic file operations (read, write, append).
17. Create a program to validate an email address format.
18. Write a program to simulate a simple banking system with deposit and withdrawal functions.
19. Develop a program to implement a basic Tic-Tac-Toe game.
20. Create a program to find the intersection of two arrays.

Resource Management of Computer Systems

CE- 502	**L**	**T**	**P**	**Credits**
	3	**1**	**0**	**4**

Unit -I

Historical perspectives, interrupt mechanism, Loader, linker, assembler, command interpreter, compiler, operating system, interpreters, Hardware Resources, Resource management, Virtual Computers, The Hardware Interface, The CPU, Memory and Addressing, Interrupts, I/O Devices, The Operating System Interface, Information and Meta-Information

Unit -II

Concurrent processes; mutual exclusion and synchronization, system calls and protection, Context switching and the notion of a process and threads; synchronization and protection issues; scheduling.

Unit -III

Memory management including virtual memory and paging techniques; i/o architecture and device management.

Unit -IV

File systems; distributed file systems, Issues in the design of distributed file systems, Examples of distributed systems, deadlock detection and protection.

Unit -V

Protection and Security. Architecture of the UNIX operating system ,Case Study of Unix,, Windows, and Real-Time OS.

Suggested Readings:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, Inc., 2001.
2. Uresh Vahalia, “UNIX Internals: The New Frontiers”, PEARSON Education,1996.
3. J. Mauro and R. McDougall, “Solaris Internals: Core Kernel Architecture”, Sun Microsystems Press, 2001.
4. Daniel P. Bovet and Marco Cesati, “Understanding the Linux kernel”, O'Reilly & Associates, Inc.,1998.

Soft Computing

CE- 504	L	T	P	Credits
	3	1	0	4

Unit –I : Neural Networks

History, overview of biological Neuron-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit –II : Fuzzy Logic

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership

Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Unit –III : Fuzzy Arithmetic

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit -IV : **Applications of Fuzzy Logic**

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Unit –V: An Introduction to Genetic Algorithms

Neural network approaches in engineering analysis, design and diagnostics problems; applications of probabilistic reasoning approaches. Theoretical Foundations of Genetic Algorithms, Genetic Algorithms in Engineering.

Suggested Readings:

1. Goldberg, "Genetic Algorithms," Addison Wesley, ISBN 0-201-15767-5,1989,

2. Golden, "Mathematical Methods for Neural Network Analysis and Design," MIT Press, 1996

3. Ahmad Lotfi, Jonathan Garibaldi, "Applications and Science in Soft Computing", Springer,2004.

4. Rajkumar Roy, Mario Koppen "Soft Computing and Industry: Recent Applications", Springer,2002.

High Performance Computer Architecture

	L	T	P	Credits
CE- 506	**3**	**1**	**0**	**4**

Unit –I

Introduction to High Performance Computing: Overview, Pipeline vs. Parallel Processing Parallel Architectures: Classification and Performance. Pipeline Processing: Pipeline Performance, design of arithmetic pipelines, multifunction pipes.

Unit -II

Concept of reservation table, collision vector and hazards. Instruction Processing Pipes: Instruction and data hazard, hazard detection and resolution, delayed jumps, delayed execution. RISC Philosophy.

Unit –III

Pipeline scheduling Theory: Greedy pipeline scheduling algorithm, state diagram, modified state diagram, Latency cycles, Optimal cycles, scheduling of static & dynamic Pipelines. Implementation of pipeline schedulers.

Unit –IV

Interconnection Networks: Interconnection network classification, Single stage/ Multistage Networks, crossbars, clos Networks, Benes Networks, Routing algorithms. Omega, Cub-connected and other networks.

Unit -V

High performance memory system; Shared memory multiprocessors and cache coherence; Multiprocessor interconnection networks; Performance modeling.

Suggested Readings:

1. M. R. Bhujade, "Parallel Computing", Newage International Pvt. Ltd., 1995.

2. Stallings, William, "Computer organization and architecture, designing for performance", Prentice Hall of India, 1997

3. J. L. Hennessy and D. A.Patterson,"Computer architecture: a quantitative approach",Harcourt Asia, Singapore 1996.

Mobile & Wireless Communication

CE- 522	L	T	P	Credits
	3	1	0	4

Unit –I

Introduction: Applications, history, market, reference model and overview. Wireless Transmission— Frequencies, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular system.

Unit –II

MAC and Telecommunication system: Specialized MAC, SDMA, FDMA, TDMA- fixed TDM, classical ALOHA, slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibit sense multiple access.('CDMA, comparison, GSM- mobile services, architecture radio interlace, protocol, localization, calling, handover, security, new data services, Introduction to W'LL.

Unit –III

Satellite and Broadcast Systems: History, Applications, GEO, LEO, MEO, routing, localization, handover in satellite system. Digital audio and video broadcasting, Wireless LAN: IEEE 802.11- System and protocol architecture, physical layer. MAC layered management. Bluetooth--- User scenarios, physical layer, MAC layer, networking, security and link management.

Unit -IV

Mobile network Layer: Mobile IP- goals, assumption, requirement, entities, terminology, IP packet delivery, Agent advertisement and discovery, registration, tunneling, encapsulation, optimization, reverse tunneling, IPV6. DHCP, Adhoc Networks- routing, destination sequence distance vector, dynamic source routing, hierarchical algorithm, alternative metric Mobile, Transport Layer:

Traditional TCP, Indirect 'TCP, Snooping 'TCP, Mobile TCP fast retransmission recovery, transmission/timeout freezing, selective retransmission, Transaction oriented TCP.

Unit -V

Support for Mobility: File System, WWW-HIT, HTML, system architecture. WAP architecture, wireless datagram, protocol, wireless transport layer security, wireless transaction protocol, application environment, telephony application.

Suggested Readings:

1. Jochen Schiller," Mobile Communication" , Pearson Education,2002.

2. Lee, " Mobile Cellular Telecommunications" McGRAW- WILL, 2nd Edition,1990.

Real Time System

	L	T	P	Credits
CE- 524	**3**	**1**	**0**	**4**

Unit -I

Introduction: Issues in Real-Time Computing, Structures of Real-Time System, Task Classes, Performance Measures for Real-Time Systems, Estimating Program Run Times

Unit -II

Task Assignment and Scheduling : Classical Uni-processor Scheduling algorithm, Uni-processor Scheduling of IRIS Tasks, Task Assignment, Mode Changes, Fault Tolerant Scheduling.

Real-Time Database **:** Basic Definitions, Real-Time Vs General-Purpose Databases, Main Memory Databases, Transaction Priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling algorithm, A Two Phase Approach To Improve Predictability, Maintain Serialization Consistency, Databases for Hard Real Time Systems.

Unit -III

Programming Languages and Tools : Desired Language characteristics, Data Typing , Control Structures , Facilitating Hierarchical Decomposition, Packages, Runtime Error (Exception) Handling, Overloading and Generics, Multitasking ,Low-Level Programming, Task Scheduling, Timing Specifications, Some experimental Languages, Programming Environments, Run-Time Support.

Unit -IV

Real-Time Communication : Network Topologies ,Protocols ,Clocks , A Non Fault Tolerant Synchronization

Algorithm, Impact of Faults , Fault Tolerant Synchronization in Hardware, Synchronization in Software

Unit -V

Fault Tolerant Techniques Fault Types , Fault Detection, Fault and error Containment, Redundancy, Data Diversity, Reversal Checks, Malicious or Byzantine Failures, Integrated Failure Handing, Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models, Taking Time into Account

Suggested Readings:

1. C.M. Krishna, Kang G. Shin, "Real-Time Systems", Tata McGraw Hill,1997.
2. Hermann Kopetz, "Real-Time Systems" Design Principles for Distributed Embedded Applications Springer-Verlag New York Inc. 2011.

Cloud Computing

	L	T	P	Credits
CE- 526	**3**	**1**	**0**	**4**

Unit –I : Understanding Cloud Computing

Cloud Computing – History of Cloud Computing, Cloud Architecture, Cloud Storage, Why Cloud Computing Matters, Advantages of Cloud Computing, Disadvantages of Cloud Computing, Companies in the Cloud Today, Cloud Services.

Unit –II : Developing Cloud Services

Web-Based Application, Pros and Cons of Cloud Service Development, Types of Cloud Service Development, Software as a Service , Platform as a Service, Web Services, On-Demand Computing, Discovering Cloud Services Development Services and Tools, Amazon Ec2, Google App Engine, IBM Clouds.

Unit –III : Cloud Computing For Everyone

Centralizing Email Communications, Collaborating on Schedules, Collaborating on To-Do Lists, Collaborating Contact Lists, Cloud Computing for the Community, Collaborating on Group Projects and Events, Cloud Computing for the Corporation.

Unit –IV : Using Cloud Services

Collaborating on Calendars, Schedules and Task Management, Exploring Online Scheduling Applications, Exploring Online Planning and Task Management, Collaborating on Event Management, Collaborating on Contact Management, Collaborating on Project Management, Collaborating on Word Processing, Collaborating on Databases, Storing and Sharing Files.

Unit –V : Other Ways To Collaborate Online

Collaborating via Web-Based Communication Tools, Evaluating Web Mail Services, Evaluating Web Conference Tools, Collaborating via Social Networks and Groupware, Collaborating via Blogs and Wikis.

Suggested Readings:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

Operating systems Lab

CE- 552

1. Create a program to simulate the First-Come, First-Served (FCFS) CPU scheduling algorithm.
2. Implement a program to demonstrate the Round Robin (RR) scheduling algorithm.
3. Write a program to simulate the Shortest Job First (SJF) scheduling algorithm.
4. Develop a program to implement process creation and termination using fork and exec in C.
5. Create a program to demonstrate inter-process communication using pipes.
6. Write a program to simulate the Banker's algorithm for deadlock avoidance.
7. Implement a program to demonstrate the production-consumer problem using semaphores.
8. Develop a program to simulate memory management using paging.
9. Create a program to implement the Least Recently Used (LRU) page replacement algorithm.
10. Write a program to demonstrate file handling operations (create, read, write, delete) in a simulated file system.
11. Implement a program to showcase the concept of threads and thread synchronization.
12. Create a program to simulate the allocation of memory using the best-fit and worst-fit strategies.
13. Write a program to demonstrate the use of mutexes in thread synchronization.
14. Develop a program to simulate the elevator algorithm for disk scheduling.
15. Create a program to implement a simple shell that can execute commands.
16. Write a program to demonstrate the use of condition variables in thread synchronization.
17. Implement a program to simulate the FIFO page replacement algorithm.
18. Create a program to perform a basic network socket communication between a client and server.
19. Write a program to demonstrate the concept of file permissions in a UNIX-like environment.
20. Develop a program to implement a simple job scheduling system with priorities.

Seminar-II

CE-582

1. Develop a program to scrape data from a website using web scraping techniques.
2. Write a program to create a simple RESTful API using a web framework.
3. Implement a program to analyze text files and count word frequency.
4. Create a program to generate QR codes from user input.
5. Write a program to implement basic user authentication using a database.
6. Develop a program to visualize data using charts and graphs.
7. Create a program to convert audio files from one format to another.
8. Write a program to send automated emails using an email library.
9. Implement a program to parse and manipulate JSON data.
10. Create a program to monitor system resource usage (CPU, memory) in real time.
11. Write a program to perform sentiment analysis on text data.
12. Develop a program to simulate a simple chatbot using predefined responses.
13. Create a program to perform image processing tasks like resizing and filtering.
14. Write a program to implement a task scheduling system with deadlines.
15. Implement a program to manage a simple inventory system with CRUD operations.
16. Create a program to encrypt and decrypt text using a basic algorithm.
17. Write a program to generate random passwords with specific criteria.
18. Develop a program to simulate a simple voting system with user input.
19. Create a program to implement a URL shortener service.

Data Mining and Warehousing

	L	T	P	Credits
CE- 601	**3**	**1**	**0**	**4**

Unit -I

Data Mining: Data Mining Functionalities, Data Preprocessing, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

Association Rule Mining: Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit -II

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor, Ensemble Methods, Model Section.

Unit -III

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

Unit -IV

Data Warehousing and Business Analysis: Data warehousing Components, Building a Data warehouse, Mapping the Data Warehouse to a Multiprocessor Architecture, DBMS Schemas for Decision Support, Data Extraction, Cleanup, and Transformation Tools, Metadata, reporting,

Query tools and Applications, Online Analytical Processing (OLAP), OLAP and Multidimensional Data Analysis.

Unit -V

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Suggested Readings:

1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2008.
2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.

Prentice Hall of India, 2006.

Internet and Web Technology

	L	T	P	Credits
CE- 603	**3**	**1**	**0**	**4**

Unit –I : Introduction

Internet Protocol model, Internet Addresses, IP routing concepts, Table Driven and next hop routing, other routing related protocols, Internet Access through PPP, SLIP, WWW, Web servers, Browsers.

Unit –II : Router Technology

Hubs, Bridges, Routers, Routing Protocols, Routing Security, Switch based routing, routing in unicast environment, multicasting, mobile routing.

Unit –III : Web Server Technology

Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secure HTTP, Secure Sockets Layer, WWW Proxies, IIS, Case study of apache web server.

Unit –IV : Browsing Systems

Searching and web casting Technique, Popular web servers, basic features, bookmarks, cookies, progress indicators, customization of browsers, browsing tricks, next generation web browsing, search engines, architecture of search engines, search tools, web crawlers, types of crawlers, scalable web crawler, incremental crawler, parallel crawler, focused crawler, agent based crawler, case study of IE.

Unit –V : Website Development

HTML, XHTML, DHTML, XML, Structuring data, namespaces, XML schema Documents, Document Object Model, DOM methods, Simple API for XML, XSL, SOAP, ASP.Net. Security and management issues for creating a web site

Suggested Readings:

1. Chuck Musciano & Bill Kennedy, HTML & XHTML [SPD],2008.
2. D. Hunter, et. Al. Beginning XML [WROX],2000.
3. Douglas E. Comer; Computer Networks and Internets - PE,2012.
4. Mike Thelwall: Web Crawlers And Search Engines - Emerald Group Publishing Limited,2011.

Medical Image Processing

	L	T	P	Credits
CE- 605	**3**	**1**	**0**	**4**

Unit –I : Fundamentals of Image Processing

Introduction, Elements of visual perception, Steps in Image Processing Systems, Image Acquisition, Sampling and Quantization, Pixel Relationships, Colour Fundamentals and Models, File Formats. Introduction to the Mathematical tools.

Unit –II : Image Enhancement and Restoration

Spatial Domain: Gray level Transformations Histogram Processing Spatial Filtering, Smoothing and Sharpening, Frequency Domain: Filtering in Frequency Domain, DFT, FFT, DCT, Smoothing and Sharpening filters – Homomorphic Filtering., Noise models, Constrained and Unconstrained restoration models.

Unit –III : Image Segmentation and Feature Analysis

Detection of Discontinuities, Edge Operators, Edge Linking and Boundary Detection, Thresholding, Region Based Segmentation, Motion Segmentation, Feature Analysis and Extraction.

Unit –IV : Medical Imaging

Biological Imaging, Magnetic Resonance Imaging, Nuclear medicine, Tactile Imaging, Tomography, Echocardiography, Radiography, Magnetic Resonance Imaging (MRI), Ultrasound, Endoscopy, Elastography, Image, Compression of medical images, Use of Medical Imaging in pharmaceutical clinical trials.

Unit –V : Applications of Image Processing

Representation and Description, Image Recognition, Image Understanding ,Image Classification, Video Motion Analysis, Image Fusion, Steganography, Colour Image Processing.

Suggested Readings:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Third Edition, Education, 2008.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Third Edition, Third Edition, Brooks Cole, 2008.
3. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice-Hall India, 2007.
4. Madhuri A. Joshi, 'Digital Image Processing: An Algorithmic Approach", Prentice-Hall 33 India, 2006.
5. Rafael C.Gonzalez , Richard E.Woods and Steven L. Eddins, "Digital Image Processing Using MATLAB", First Edition, Pearson Education, 2004.

Software Verification, Validation and Testing

	L	T	P	Credits
CE- 607	**3**	**1**	**0**	**4**

Unit –I

Introduction, Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing, Defs. Of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation, testing life cycle model, testing techniques, testing principles.

Unit –II

Verification and validation: Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, intro. to validation activities.

Unit –III

Black Box testing : Boundary value analysis, equivalence class portioning, state table based testing, decision table based, grappling, error guessing, White Box testing: Logic coverage criteria, basic path testing, graph matrices, loop testing, data flow testing, mutation testing.

Unit -IV

Static Testing: Types of static testing, technical reviews, inspections, inspection process, structured walk through, walk through process, adv. Of static testing, Validation Testing: Unit testing, drivers, stubs, integration testing, methods, effect of module coupling and cohesion, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing.

Unit -V

Test Automation and debugging: S/w measurement and testing, testing metrics, tools debugging, design of practical test cases, reducing no. of test cases, regression testing and test case mgmt.

Suggested Readings:

1.Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.

2. Aditya Mathur, Foundations of software testing, Pearson Education, 2008

3. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – principles and practices , Pearson education, 2006

4. Ron Patton, Software testing , second edition, Pearson education, 2007

5. Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, Second edition, 2003

Security of Information System

	L	T	P	Credits
CE- 623	**3**	**1**	**0**	**4**

Unit –I

Encryption and De-encryption: Terminology and Background: and De-encryption cryptosystems, Plain Text and cipher. Encryption algorithm, crypto analysis. Introduction to ciphers, Monoalphabetic, substitutions, ploy alphabetic.

Unit -II

Secure encryption systems: Hard problems: complexity NP-complete problems, characteristics of NP complete, the meaning of NP completeness, NP completeness and cryptography, properties of arithmetic operations, inverse, primes, GCD, modular arithmetic, properties of modular arithmetic, computing the inverse, Fermat's theorem, algorithm for computing inverses, random number generation.

Unit -III

Public key encryption systems: concept and characteristics, introduction to merkle-hellman knapsacks, RSA, Digital signatures, DSS, Hash Algorithms: hash concept, description of hash algorithms, MD4, MD5, SHA1, SHA2, Secure Secret key systems: DES, AES.

Unit -IV

Applied cryptography, protocols, practices, key management protocols Operating system, database, program security.

Unit -V

Electronic Commerce Security: Network Security with IPSec, Web Security using SSL, E-cash and Secure Electronic Transaction (SET), System Security: System Security using Firewalls and VPN's. * Worms and Viruses Case Studies, Miscellaneous, Smart Cards and security, Digital Watermarking and Steganography.

Suggested Readings:

1. Wenbo Mao, Modern Cryptography: Theory and Practice, Prentice Hall, 2004
2. William Stallings, “Cryptography and Network Security (4th Edition)”, PEARSON Education,2006.
3. Behrouz A. Forouzan, “Cryptography and Network Security”, McGraw-Hill Education,2007.

Network Security

	L	T	P	Credits
CE- 625	**3**	**1**	**0**	**4**

Unit -I

Introduction: The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Internetwork Security, Internet Standards the Internet Society, Symmetric Encryption and Message Confidentiality, Symmetric Encryption Principles, Symmetric Encryption Algorithms, Cipher Block Modes of Operation, Location of Encryption Devices, Key Distribution.

Unit -II

Public-Key Cryptography: Public-Key Cryptography and Message Authentication, Approaches to Message Authentication, Secure Hash Functions and HMAC, Public Key Cryptography Principles, Public-Key Cryptography Algorithms , Digital Signatures, Key Management.

Unit -III

Security applications: Authentication Applications, Kerberos, X.509 Directory Authentication Service, Public Key Infrastructure, Electronic Mail Security, Pretty Good Privacy (PGP), S/MIME, IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management Web Security, Web Security Requirements, Secure Sockets Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Unit -IV

Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility,8.3

SNMPv3.SYSTEM SECURITY, INTRUDERS, Intruders, Intrusion Detection, Password Management.

Unit -V

Malicious Software, Viruses and Related Threats, Virus Countermeasures Distributed Denial of Service Attacks. FIREWALLS, Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

Suggested Readings:

1. Wenbo Mao, Modern Cryptography: Theory and Practice, Prentice Hall, 2004.
2. William Stallings, "Cryptography and Network Security (4th Edition)", PEARSON Education,2006.
3. Behrouz A. Forouzan, "Cryptography and Network Security", McGraw-Hill Education,2008.

Minor Project

CE-671

Unit 1: Project Introduction
Overview of project objectives, scope, and significance. Discussion of project ideas and selection process. Importance of planning and requirements gathering.

Unit 2: Literature Review
Research and review of existing work related to the project topic. Analysis of methodologies, technologies, and frameworks relevant to the project.

Unit 3: Project Planning
Development of a project plan, including timeline, milestones, and resource allocation. Creation of a detailed project proposal outlining goals and deliverables.

Unit 4: System Design
Design of the system architecture, including user interface, database schema, and overall functionality. Preparation of design documents and diagrams.

Unit 5: Implementation
Coding and development of the project according to the design specifications. Use of appropriate programming languages and tools to build the system.

Seminar-III

CE-681

1. Create a program to analyze and visualize climate data over the last decade.
2. Develop a program to implement a basic machine learning model for classification.
3. Write a program to perform data cleaning and preprocessing on a dataset.
4. Create a program to simulate a simple financial calculator for loans and investments.
5. Implement a program to automate the backup of files to a specified location.
6. Write a program to generate a word cloud from a given text input.
7. Develop a program to create a simple budgeting application.
8. Create a program to scrape and analyze product reviews from an e-commerce website.
9. Implement a program to track and visualize personal fitness activities.
10. Write a program to create an interactive quiz application.
11. Develop a program to simulate a simple event management system.
12. Create a program to implement a text-based adventure game.
13. Write a program to perform image classification using a pre-trained model.
14. Implement a program to analyze network traffic and visualize it.
15. Create a program to build a simple content management system (CMS).
16. Write a program to automate data entry tasks using a graphical user interface (GUI).
17. Develop a program to monitor social media sentiment on a specific topic.
18. Create a program to generate personalized reading recommendations based on user preferences.
19. Write a program to implement basic cryptography for secure messaging.
20. Develop a program to create a virtual assistant that can answer simple queries.

Dissertation

CE- 692

Unit 1: Introduction to Dissertation
Overview of dissertation objectives, significance, and structure. Discussion on the importance of original research and academic integrity.

Unit 2: Topic Selection
Guidance on selecting a relevant and feasible research topic. Methods for narrowing down ideas and defining research questions.

Unit 3: Literature Review
Conducting a comprehensive review of existing literature related to the chosen topic. Techniques for analyzing and synthesizing previous research.

Unit 4: Research Methodology
Overview of different research methodologies (qualitative, quantitative, mixed methods). Selection of appropriate research design, sampling techniques, and data collection methods.

Unit 5: Presentation and Defense
Preparation for presenting the dissertation findings to an academic committee. Strategies for effectively defending the research and addressing questions.

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Master of (MCA), Two Year Programme

Semester System

(W.e.f. session 2013-14)

Revised and approved in the year 2021 (17th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO 1 To provide a strong foundation in computer science and software engineering, enabling students to develop, design, and implement advanced IT solutions for complex challenges.

PEO 2 To enhance critical thinking and problem-solving abilities, allowing graduates to analyze, design, and optimize algorithms and systems for real-world applications in diverse domains.

PEO 3 To develop leadership skills, effective communication, and teamwork capabilities, preparing students to manage projects and lead multidisciplinary teams in delivering innovative IT solutions.

PEO 4 To foster research skills and encourage innovation, enabling students to explore emerging technologies and contribute to advancements in software development and computer science.

PEO 5 To promote ethical behavior, professional integrity, and continuous learning, ensuring graduates stay adaptable and contribute positively to the evolving IT industry throughout their careers.

PEO 6 To nurture leadership qualities, communication skills, and teamwork, preparing students to manage projects and collaborate effectively within multidisciplinary teams, ensuring success in software development and IT management.

PEO 7 To instill a sense of ethical responsibility, professionalism, and integrity, ensuring that graduates understand the societal impact of technology and contribute positively to the global IT community.

PEO 8 To promote lifelong learning and adaptability, preparing graduates to continually update their skills, stay current with emerging technologies, and remain competitive in an ever-evolving IT landscape.

Programme Specific Objectives (PSO's)

PSO 1 To develop proficiency in designing, implementing, and testing software applications using modern programming languages, frameworks, and tools to address complex computational problems.

PSO 2 To equip students with advanced knowledge of computer networks, protocols, and cybersecurity, enabling them to design secure, scalable, and efficient networked systems.

PSO 3 To provide expertise in database management, data structures, and data analysis, empowering students to design efficient data-driven applications for real-world business and scientific solutions.

PSO 4 To explore emerging technologies such as Artificial Intelligence, Machine Learning, Cloud Computing, and Big Data, preparing students to innovate and apply these technologies in various domains.

PSO 5 To cultivate strong analytical and problem-solving skills, enabling students to conduct research and develop innovative solutions to complex problems in software engineering and IT.

PEO 6 To develop expertise in software testing methodologies, debugging, and quality assurance processes, ensuring that software applications meet industry standards and perform reliably in diverse environments.

PEO 7 To enhance students' communication and interpersonal skills, preparing them for effective teamwork, leadership, and technical presentations in multidisciplinary, collaborative software development environments.

PEO 8 To instill a strong sense of professional ethics and a commitment to lifelong learning, ensuring students can adapt to technological advancements and contribute positively to the IT industry

Programme Outcome Objectives (POO's)

POO 1 Graduates will demonstrate a solid understanding of computer science fundamentals, software engineering principles, and IT solutions to address complex real-world problems across various domains.

POO 2 Students will possess advanced problem-solving skills, applying analytical and computational methods to design efficient algorithms and software solutions for technical challenges.

POO 3 Graduates will be proficient in designing, developing, testing, and deploying software applications using modern programming languages, frameworks, and software engineering methodologies.

POO 4 Students will gain expertise in database design, management, and optimization, and will be able to create efficient database systems for storing and retrieving data.

POO 5 Graduates will be adept in utilizing emerging technologies such as AI, Machine Learning, Cloud Computing, and Big Data to innovate and solve modern-day challenges.

POO 6 Students will understand networking protocols, communication models, and security principles to design and manage secure, efficient computer networks and distributed systems.

POO 7 Graduates will adhere to ethical standards and demonstrate professional conduct in their practice, ensuring responsibility, accountability, and respect in all computing-related endeavors.

POO 8 Students will develop strong research skills, contributing to the advancement of technology through innovative solutions and exploration of new computational techniques and methodologies.

POO 9 Graduates will possess effective communication skills, enabling them to work collaboratively in multidisciplinary teams, share ideas clearly, and present technical information effectively to stakeholders.

POO 10 Graduates will engage in lifelong learning, continuously updating their knowledge and adapting to new technologies, methodologies, and industry trends to remain competitive in the evolving IT landscape.

I semester

Code	Course Title	Cr.	L	T	P
MCA-101	Java	4	3	1	0
MCA-102	Advanced DBMS	4	3	1	0
MCA-103	Advanced DAA	4	3	1	0
MCA-104	Network Fundamentals	4	3	1	0
MCA-133 MCA-133 A/ MCA-133 B/ MCA-133 C/ MCA-133 D	Optimization Techniques / Elements of Statistics / Combinatorial Optimization Multi-objective Optimization Biostatistics	4	3	1	0
MCA-151	Lab JAVA	2	0	0	2
MCA-152	Lab Advanced DBMS	2	0	0	2
MCA-153	Lab Design and analysis of Algorithm	24	15	5	4

PROFESSIONAL ELECTIVE-I

1. MCA-131 Mobile Computing
2. MCA-132 Theory of Computation
3. MCA-133 Optimization techniques
4. MCA-134 Data Warehousing and Data Mining

II semester

Code	Course Title	Cr.	L	T	P
MCA-201	Software Engineering & Project Management	4	3	1	0
MCA-202	ASP .Net	4	3	1	0
MCA-203	Python	4	3	1	0
MCA-204	Artificial Intelligence	4	3	1	0
MCA-231	Distributed Operating System	4	3	1	0
MCA-251	Lab Software Engineering and Project Management	2	0	0	2
MCA-252	Lab ASP. Net	2	0	0	2
MCA-253	Lab Python	2	0	0	2
	Total	26	15	5	6

PROFESSIONAL ELECTIVE-II

1. MCA-231 Distributed Operating System
2. MCA-232 Embedded System
3. MCA-233 Linux/ Unix

OPEN ELECTIVE

1. MCA-241 Cloud Computing
2. MCA-241 A Digital Electronics
3. MCA-241 B Business Communication

4. MCA-241 C Research Methodologies
5. MCA-241 D Cognitive Analytics and social skills for Professional Development

III semester

Code	Course Title	Cr.	L	T	P
MCA-301	PHP	4	3	1	0
MCA-302	Data Science	4	3	1	0
MCA-304	Cryptography and Network Security	4	3	1	0
MCA-332	Compiler Design	4	3	1	0
MCA-351	Lab PHP	2	0	0	2
MCA-352	Lab Data Science	2	0	0	2
MCA-353	Lab Cryptography and Network Security	2	0	0	2
MCA-354	Minor Project	4	0	0	2
MCA-355	Seminar Based on Learning	2	0	0	2
	Total	24	9	3	10

PROFESSIONAL ELECTIVE-III

1. MCA-331 Soft Computing
2. MCA-332 Compiler Design

OPEN ELECTIVE

1. MCA-303 Android Programming
2. MCA-304 Cryptography and Network Security
3. MCA-304 A Professional Ethics and Social Responsibility for Sustainability
4. MCA-304 B Enterprise Resource Planning
5. MCA-305 C Software Project Planning and Management
6. MCA-306 D Internet of Everything

IV semester

Code	Course Title	Cr.	L	T	P
MCA-462	MAJOR PROJECT PRESENTATION & VIVA	24	-	-	-

JAVA

MCA-101 **L – 3 T – 1 P-0**

Module I: Introduction to Java

Introduction, Java Virtual Machine and their architecture, JDK & JRE, Environment Variable, Features and differences with C++, Data Types, Identifiers and Variables, Operators and Expressions, Type Conversion, Control flow, arrays, Constants, Methods. Java Class Libraries: java.lang, java.io, java.math, java.text and java.util package.

Module II: Java with Object Orientated Features

Class & Objects: Introducing Classes, A Closer look at Methods and Classes, constructor, static members. **Inheritance**: Types and use of super keyword, Final method and classes. **Interfaces and Packages**: Definition and their implementation, defining class path. **Exception Handling**: Errors and Exceptions, Exception Handling Mechanism, caught and uncaught exceptions, Exception class hierarchy, handling exceptions with try, catch, finally block, defining custom exception. **Multithreading**: Thread life cycle, creating and controlling threads.

Module III: I/O and Applets

Run time input/output operations, io classes and their methods implementation, Applets life cycle, Applets program and their execution, Displaying various geometric shapes using 2D Graphics.

Module IV: GUI components using AWT and Event Handling

AWT: Making Windows, Frames, Panels, and Forms. Working with command buttons, text fields, labels, list boxes, layout manager, menus etc. **Event Handling**: Event Handling, Delegation Model, Event Classes, Event Listener interfaces, Adapter Classes.

Text & References:

Text:

- Patrick Naughtn and Herbert Schildt The Complete Reference, Java 2, TMH
- Douglas E.Cmer, Computer Networks & Internet, Pearson.

References:

- The Internet :By- Douglas E.Cmer: TMH

ADVANCED DATABASE MANAGEMENT SYSTEM

MCA-102 **L – 3 T –1 P -0**

Module -I: Basics of PL/SQL
PL/SQL basics, blocks, architecture, variables, constants, attributes, character set, PL/SQL, data types, control structure, conditional and sequential control statements.

Module -II: PL/SQL
PL/SQL precompiler, cursors, type of cursors, exceptions, Indexing, View, triggers, PL/SQL Stored procedures and packages

Module -III: Distributed Databases
Introduction, Advantages, Architecture, Homogeneous & Heterogeneous DDBMS, Distributed Data Storage (Fragmentation & Replication), Distributed Transactions, Commit protocol, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing

Module-IV: Parallel Databases
Introduction, Architecture, I/O Parallelism and Skew, Inter-query Parallelism, Intra-query Parallelism, Intra-operation Parallelism (Parallel Sort, Parallel Join), Interoperation Parallelism, Design of Parallel Systems.

Module-V: Object Oriented Database Management System
Introduction, Object-Oriented Data Model, Object Oriented Languages, Persistent Programming Languages, Object-Relational Databases: Nested Relations, Complex Types, Inheritance, Reference Types, Querying with Complex Types, Functions and Procedures Storage for Object Databases.

TEXT BOOKS:

1. H. F. Korth and A. Silberschatz: Database System Concepts, McGraw Hill, New Delhi, 1997.
2. Raghu Ramkrishnan, Johannes Gehrke , “Database Management Systems”, McGraw Hill International, 2007
3. Abraham Silberschatz, Henry Korth, S, Sudarshan,, “Database System Concepts”, McGraw Hill International, 2005
4. C.J.Date, Longman, “An Introduction to Database System”, Pearson Education, 2003

REFERENCE BOOKS:

1. R. A. Elmasri and S. B. Navathe: Fundamentals of Database Systems, 3rd ed., Addison-Wesley, 1998.
2. R. Ramakrishnan: Database Management Systems, 2nd ed., McGraw Hill, New York, 1999.
3. Elmasri R and Navathe SB, “Fundamentals of Database Systems”, Addison Wesley, 2000.
4. Thomas Connolly, Carolyan Begg,, “Database Systems,: A Practical Approach to Design,
5. Implementation and Management, Addison Wesley, 2014 10
6. Ceri Pelagatti, “Distributed Database: Principles and System” , Addison Wesley, 1999.

ADVANCED DESIGN & ANALYSIS OF ALGORITHMS

MCA-103 **L -3 T – 1 P - 0**

Module I: Algorithm Analysis
Introduction Algorithms Complexity measures, Best, worst and average-case complexity functions, problem complexity, quick review of basic data structures and algorithm design principles.

Module II: Sorting and searching Order statistics
Sorting by selection, insertion and bubble, Divide & Conquer Strategy, Heap Sort, Quick Sort Data Sorting in Linear time. other sorting algorithms— radix sort, merge sort, sternsons Matrix Multiplication.
Searching in static table— binary search, path lengths in binary trees and applications, optimality of binary search in worst cast and average-case Binary search trees, construction of optimal weighted binary search trees; Searching in dynamic table -randomly grown binary search trees, AVL and (a, b) trees. Hashing: Basic ingredients, analysis of hashing with chaining and with open addressing.

Module III: Advanced Design and Analysis Techniques
Dynamic programming- Elements of dynamic programming, Chain-matrix multiplication, All pair shortest path (Flayed -algorithm), Optimal Binary Search Tree.
Greedy algorlthms- Elements of the greedy strategy, Huffman codes, Single-source shortest path in a directed graph, Knapsack problem.

Module IV: Graph Algorithms
Elementary graphs Algorithms, Minimum spanning Trees minimum spanning trees— Kruskal's and Prim's algorithms— Johnson's implementation of Prim's algorithm using priority queue data structures, Single source Shortest paths, All Pair Shortest Paths. *String processing* : String searching and Pattern matching, Knuth-Morris-Pratt algorithm and its analysis**.**

Module V : NP-completeness
Informal concepts of deterministic and nondeterministic algorithms, P and NP **,** NP-completeness, statement of Cook's theorem, some standard NP-complete problems, approximation algorithms.

Text Books:

- T. H. Cormen, C. E. Leiserson and R. L. Rivest: Introduction to Algorithms, Prentice Hall of India, New Delhi, 1998.
- E. Horowitz and S. Sahani: Fundamental of Computer Algorithms, Galgotia Pub. /Pitman, New Delhi/London, 1987/1978.

References Books:

- Aho, J. Hopcroft and J. Ullman; The Design and Analysis of Computer Algorithms, A. W. L, International Student Edition, Singapore, 1998
- S. Baase: Computer Algorithms: Introduction to Design and Analysis, 2nd ed., Addison-Wesley, California, 1988.
- K. Mehlhom: Data Structures and Algorithms, Vol. 1 and Vol. 2, Springer-Verlag, Berlin, 1984.
- Borodin and I. Munro: The Computational Complexity of Algebraic and Numeric Problems, American Elsevier, New York, 1975.
- S. Winograd: The Arithmetic Complexity of Computation, SIAM, New York, 1980.

NETWORK FUNDAMENTALS

MCA-104 **L-3 T-1 P-0**

Introduction to Computer Networks
Need to share resources, Concepts of Layering, Distributed System and Networks, Prerequisites, Definition, Categories and Components, Connections, Layers and Services, Applications of Computer Networks, Data Communication Fundamentals- Introduction, Frequency and Band, Analog and Digital Signals and Transmission, Coding Mechanism, Modulation, Multiplexing and De-multiplexing, TDM, FDM, Switching and Routing, Transmission and Errors

Physical Layer
Introduction, Duties of Physical Layer, Infrared and Millimeter Waves, ISM Bands, Optical Lights and Free Space Optics, Wired Physical Layer, Wireless Physical Layer

The Data Link Layer Duties of Data Link Layer, The Error, The Protocols

The Medium Access Sub layer
Introduction, Wired MAC Layer, The LLC Layer, Wireless MAC, The MAC Layer, The Generic Frame Structure, Connecting Device at Data Link Layer, Virtual LAN.

The Network Layer
Introduction, Duties of Network Layer, Connection Oriented Forwarding using Virtual Circuits, Connection Less Forwarding using Datagram, Connection Oriented Vs Connectionless Forwarding, Forwarding Examples, Routing Algorithms, Congestion, Network Layer Switching

The Transport Layer
Introduction, Duties of Transport Layer Connection Management at Transport Layer, Congestion Control, Comparison with Data Link Layer

The Application Layer
Introduction, Domain Name System: Name Space, Registration Process, Name Servers, Resource Records, Types of Resource Records, Dynamic DNS, WWW and HTTP, Bluetooth

Text:
1. Bhushan H Trivedi ,“Computer Networks”, Oxford University Press

Reference:
1. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth Edition
2. Andrew S. Tanenbaum, "Computer Networking", Prentice Hall, Fourth Edition

MOBILE COMPUTING

MCA-131 **L -3 T – 1 P - 0**

Course Contents:

Module I:

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling. GSM Additional services: Teletext, Facsimile, Videotext services.

Module II: (Wireless) Medium Access Control

Motivation for a specialized

MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Module III: Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Module IV: Mobile Data Communication

W LANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Module V: Global Mobile Satellite Systems

Mobile Satellite Systems (GEO, MEO and LEO), case studies of the IRIDIUM and GLOBALSTAR systems.

Text & References:

Text:

- "Mobile Communications", 2nd Edition, Jochen Schiller,2003

References:

- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.
- "Third Generation Mobile Telecommunication systems", by P. Stavronlakis, Springer Publishers, 2001.

THEORY OF COMPUTATION

MCA-132 **L -3 T – 1 P - 0**

UNIT-I

Theory of Automata: Definition of an Automaton, Description of a Finite Automation, Transition Systems, Properties of Transition Functions, Acceptability of a String by a Finite ,Automation, Nondeterministic Finite State Machines, The Equivalence of DFA and NDFA, Mealy and Moore Models, Minimization of Finite Automata Exercises

UNIT-II

Formal Language: Basic Definitions and Examples, Chomsky Classification of Languages, Languages and Their Relation, Recursive and Recursively Enumerable Sets, Operations on Languages, Languages and Automata

UNIT-III

Regular Sets and Regular Grammars: Regular Expressions ,Finite Automata and Regular Expressions, Pumping Lemma for Regular Sets, Application of Pumping lemma, Closure Properties of Regular Sets, Regular Sets and Regular Grammars

UNIT-IV

Context-Free languages and Pushdown Automata: Context-free languages and Derivation Trees, Ambiguity in Context free Grammars, Simplification of Context-free Grammars, Normal Forms, Pumping Lemma and Decision Algorithms for context free languages, Basic Definitions of Pushdown Automata, Acceptance by pda , Pushdown Automata and Context free Languages, Parsing and Pushdown Automata

UNIT-IV

Turing Machines and Linear Bounded Automata: Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines, Design of Turing Machines, Universal Turing Machines and Other modifications, The Model of Linear Bounded Automaton, Turing Machines and Type 0 Grammars, Linear Bounded Automata and languages, Halting Problem of Turing Machines, NP-Completeness.

Text Books:

- Mishra K.L.P. and N. Chandrasekaran : Theory of Computer Science (Automata, Languages and Computation), Prentice Hall of India, New Delhi, 2005.
- John C Martin, "Introduction to Languages and the Theory of Computaiton", Third Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007. (UNIT 4, 5)
- Hop croft J.E. Motwani R. and Ullman J.D. "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008. (UNIT 1, 2, 3)

References Books:

- Mishra K L P and Chandrasekaran N, "Theory of computer Science-Automata, Languages and Computation", Third Edition, Prentice Hall of India, 2004.
- Harry R Lewis and Christos H Papadimitriou, "Elements of the Theory of Computation", Second Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.
- Peter Linz, "An introduction to Formal Language and Automata", Third Edition, Narosa Publications, New Delhi, 2002.
- Kamla Krithivasan and Rama. R, "introduction to Formal languages, Automata Theory and Computation", Pearson Education 2009.

OPTIMIZATION TECHNIQUES

MCA-133 **L-3 T-1 P-0**

Module I: Introduction of OR and Linear Programming
Basic Deification, Nature and Significance of OR, feature of OR Approach Application and Scope of OR, General Methods for Solving Or Models. General Structure of Linear Programming, Advantages and Limitations of Linear Programming, Application Areas of Linear Programming.
Linear Programming Solutions: Mathematical formulation of LPP, Standard form of LPP, Multiple Solution, Unbounded Solutions, Infeasible Solution of LPP.

Module II: Simplex Method
Maximization and Minimization Problem, Solution of LPP using Graphical method, Simplex Method, two Phase Method, Big M Method.

Module III: Duality in LPP
Dual Linear Programming Problem, Rules for Constructing the Dual from Primal, Feature of Duality

Module IV: Transportation Problem
Mathematical Model of Transportation Problem, Transportation Method, North West Corner Method, Linear Cost Method, Vogel's Approximation Method, Unbalanced Supply and Demand, Degeneracy Problem, Alternative Optional Solution, Maximization Transportation Problem..

Module V: Queueing Models
Markovian queues – Birth and Death processes – Single and multiple server queueing models (M/M/1 & M/M/S) – Little‟s formula – Queues with finite waiting rooms – Queues with impatient customers: Balking and reneging.

Module VI: Theory of Games
Two Person Zero-Sum Games, Pure Strategies, Game with Saddle Point, Games without Saddle Point, Rule of Dominance, Methods for Solving Problems without Saddle Point.

Module VII: Project Management
Basic Idea of PERT & CRM, Difference between PERT & CPM, PERT/CPM Network Components and Precedence Relationship Critical Path Analysis, Project Scheduling, Project Time-Cost, Trade-Off, Resource Allocation.

Text & References:
Text:
- Operations Research, J K Sharma, Macmillan Publication

References:
- Operations Research, H. A. Taha
- Operations Research, Kanti Swaroop, Macmillan Publication

Elements of Statistics

MCA-133 A **Cr L T P 4 3 1 0**

Unit 1
BASIC STATISTICS AND INDEX NUMBERS: Definition - Nature - Scope - Role and Importance of Statistics, Index Numbers: Definition - Uses - Problems in Construction - Methods - Simple and Weighted, Index Numbers in Economics: Laspeyer's and Paache's Index Numbers - Fishers Ideal Index Number - Marshall and Edgeworths Index Numbers.

Unit 2
CENSUS AND SAMPLING: Census and Sampling: Meaning - Features - Population and Sample. Sampling: Meaning - Types of Sampling, Sampling Design: Meaning - Types – Challenges, Design of Questionnaire, Sampling Errors.

Unit 3
COLLECTION AND TABULATION OF DATA: Collection of Data: Meaning - Types of Data: Primary and Secondary - Qualitative and Quantitative, Tabulation of Data: Meaning - Objectives - Classification of Tabulation - Types of Tables - Presentation of Tables.

Unit 4
MEASURES OF CENTRAL TENDENCY, DISPERSION AND DIAGRAMMATICS: Measures of Central Tendency: Characteristics - Median - Mode - Harmonic Mean - Geometric Mean - Simple Problems, Measures of Dispersion-I: Features - Quartile Deviation - Mean Deviation - Standard Deviation - Its usefulness.

Unit 5
Measures of Dispersion-II: Range - Quartiles - Deciles - Percentiles - Characteristics - Simple Problems, Diagrammatic and Graphic Representation - Bar Diagrams - Pie Diagrams - Histograms - Pictograms - Cartograms - Frequency Graphs - Ogives – LorenzCurve.

Reference Books:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals Of Mathematical Statistics, 4 thEdition (Reprint), Sultan Chand &Sons.
3. Miller, Irwin and Miller, Marylees(2006): John E.Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia

Combinatorial Optimization

MCA-133 B **Cr L T P 4 3 1 0**

Unit 1
Linear and Integer Programs, Formulating real world problems as linear and integer linear programs, formulating combinatorial optimization problems as integer linear programs, recap of important concepts in linear algebra

Unit 2
Geometry of Polyhedra: Feasible region of LPs and polyhedra, Convexity, Extreme points, Faces and facetsIII. Solving linear programs: Possible outcomes (infeasibility, unboundedness, and optimality) and their certificates, bases and canonical forms, the Simplex method and its geometric interpretation, the ellipsoid method and separation oracles.

Unit 3
Duality Weak duality, strong duality, complementary slackness, Farkasâ LemmaV. Combinatorial Optimization Primal-dual method for exact and approximation algorithms, Shortest paths, Minimum cost perfect matchings, Max-Flow Min-Cut Theorem, Totally Unimodular Matrices

Unit 4
Additional topics (if time permits)Interior-point methods, Randomized/Online algorithms for LPs, Integer Programs, Convex Optimization, Matroids, T-joins, Applications to Game Theory.

Unit 5
Range of optimization techniques, including divide and conquer, local optimization, dynamic programming, branch and bound, simulated annealing, genetic algorithms, approximation algorithms, integer and linear programming, and greedy algorithms.

Reference Books:

1. Cook, Cunningham, Pulleyblank and Schrijver. Combinatorial Optimization. Wiley-Interscience, 1998
2. Schrijver. Combinatorial Optimization. Springer, 2003.
3. Grotschel, Lovasz and Schrijver. Geometric Algorithms and Combinatorial Optimization. Springer, 1993

Multi-Objectives Optimization

MCA-133 C **Cr L T P 4 3 1 0**

Unit 1
Methods for multi-objective optimization and their combination with multi-criteria decision-making techniques, classical methods for treating multi-objective problems will be presented, and their deficiencies will be clarified

Unit 2
Advanced methods, which are based on Pareto-optimality, will be presented. The major part of the course will be based on evolutionary techniques for optimization problems with and without constraints.

Unit 3
Leading algorithms will be presented and compared, such as: NSGA-II, SPEA-2, and MO-CMA-ES. Methods to compare algorithms will be detailed including test functions and measures to analyze the obtained approximated Pareto-optimal set and front. The numerical limitations of the presented algorithms will be clarified.

Unit 4
Methods to cope with such limitations will be described and in particular how to handle the course of dimensionality of the Pareto-front.

Unit 5
Multi-criteria decision-making approaches will be presented, and their combination with multi-objective optimization

Reference Books:

1. Multi-Objective Optimization in Theory and Practice I: Classical Methods, Andre A. Keller
2. Schrijver. Combinatorial Optimization. Springer, 2003.
3. Extended Multi-Objective Optimization Problems, Andre A. Keller

Biostatistics

MCA-133 D **Cr L T P 4 3 1 0**

Unit 1

Introduction: Statistics, Biostatistics, Frequency distribution, Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples, Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems, Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation.

Unit 2

Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples Probability:Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties – problems Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples Parametric test: t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Unit 3

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, KruskalWallis test, Friedman Test, Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit 4

Blocking and confounding system for Two-level factorials Regression modeling: Hypothesis testing in Simple and Multiple regression models Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit 5

Design and Analysis of experiments: Factorial Design: Definition, 22, 23 design. Advantage of factorial design Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Reference Books:

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
3. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C.Montgomery

DATA WAREHOUSING AND DATA MINING

MCA-134 **L -3 T – 1 P - 0**

Module I: Data Warehousing
Introduction to Data Warehouse, its competitive advantage, Data warehouse vs Operational Data, Things to consider while building Data Warehouse

Module II: Implementation
Building Data warehousing team, Defining data warehousing project, data warehousing project management, Project estimation for data warehousing, Data warehousing project implementation

Module III: Techniques
Bitmapped indexes, Star queries, Read only tablespaces, Parallel Processing, Partition views, Optimizing extraction process

Module IV: Data Mining
From Data ware housing to Data Mining, Objectives of Data Mining, the Business context for Data mining, Process improvement, marketing and Customer Relationship Management (CRM), the Technical context for Data Mining, machine learning, decision support and computer technology.

Module V: Data Mining Techniques and Algorithms
Process of data mining, Algorithms, Data base segmentation or clustering, predictive Modeling, Link Analysis, Data Mining Techniques, Automatic Cluster Detection, Decision trees and Neural Networks.

Module VI: Data Mining Environment
Case studies in building business environment, Application of data ware housing and Data mining in Government, National Data ware houses and case studies.

Text & References:

Text:

- Data Warehousing, Data Mining & OLAP, Alex Berson, Stephen J. Smith, Tata McGraw-Hill Edition 2004.
- Data Mining: Concepts and Techniques, J. Han, M. Kamber, Academic Press, Morgan Kanf man Publishers, 2001
- Data Ware housing: Concepts, Techniques, Products and Applications, C.S.R. Prabhu, Prentice Hall of India, 2001.

References:

- Mastering Data Mining: The Art and Science of Customer Relationship Management, Berry and Lin off, John Wiley and Sons, 2001.
- Data Mining", Pieter Adrians, Dolf Zantinge, Addison Wesley, 2000.
- Data Mining with Microsoft SQL Server, Seidman, Prentice Hall of India, 2001.

MCA-151 **Lab JAVA lab**

L T P 0 0 2

S.No	List of programs
1.	Print "Hello, World!" to the console.
2.	Take two integers as input and print their sum.
3.	Check if a given number is even or odd.
4.	Compute the factorial of a non-negative integer.
5.	Generate the Fibonacci series up to a specified number.
6.	Determine if a given number is prime.
7.	Reverse and print a given string.
8.	Convert Celsius to Fahrenheit and vice versa.
9.	Perform addition, subtraction, multiplication, and division.
10.	Count the number of vowels and consonants in a string.
11.	Check if a given string is a palindrome.
12.	Calculate simple interest given principal, rate, and time.
13.	Sort an array of integers in ascending order.
14.	Find the maximum and minimum values in an array.
15.	Implement linear search to find an element in an array.

MCA-152 Advanced Database Management lab

L T P 0 0 2

S.No	List of programs
1.	Write a program to create table insert sample records, update a record, delete a record, and retrieve records from the table.
2.	Write a Program that defines two variables and a constant, then calculates the sum and area of a circle.
3.	Write a Program to find the greatest of three numbers using IF-THEN-ELSE
4.	Write a Program to calculate the factorial of a number using a FOR loop.
5.	Write a Program to handle an arithmetic exception for division by zero.
6.	Write a Program using an explicit cursor to fetch and display employee names.
7.	Write a Program to inserts a record and counts the total rows using an implicit cursor.
8.	Write a Program to create a trigger that automatically updates stock when a sale is made,
9.	Write a Program that creates a stored procedure to retrieve employee details by ID.
10.	Write a Program to create a package that includes a function to calculate factorial.
11.	Write a Program that simulates horizontal fragmentation by creating department-specific employee tables.
12.	Write a Program to perform a distributed transaction across two employee tables.
13.	Write a Program to simulate parallel query execution by splitting a large dataset into parts.
14.	Write a Program that simulates a parallel sort operation on a dataset.
15.	Write a Program that demonstrates various types of joins: Inner Join, Left Join, Right Join, and Full Outer Join.

Lab Design and analysis of Algorithm

MCA-153

1. Implement Bubble Sort to sort an array of integers.
2. Implement Selection Sort to sort an array of integers.
3. Implement Insertion Sort to sort an array of integers.
4. Implement Merge Sort to sort an array using the divide-and-conquer approach.
5. Implement Quick Sort to sort an array using the partitioning method.
6. Implement Binary Search to find an element in a sorted array.
7. Implement Linear Search to find an element in an unsorted array.
8. Calculate the time complexity of different sorting algorithms.
9. Find the longest common subsequence between two strings.
10. Solve the Knapsack problem using dynamic programming.
11. Implement Dijkstra's algorithm for shortest path in a weighted graph.
12. Implement Breadth-First Search (BFS) for traversing a graph.
13. Implement Depth-First Search (DFS) for traversing a graph.
14. Solve the N-Queens problem using backtracking.
15. Implement Prim's algorithm for minimum spanning tree.
16. Implement Kruskal's algorithm for minimum spanning tree.

SOFTWARE ENGINEERING & PROJECT MANAGEMENT

MCA-201 **L -3 T – 1 P - 0**

Module I: Introduction to Software Engineering and Project Management

Introduction to Software Engineering: Software, Evolving role of software, Three "R"-Reuse, Reengineering and Retooling, An Overview of IT Project Management: Define project, project management framework, the role of project Manager, Systems View of Project Management, Stakeholder management, Project phases and the project life cycle.

Module II: Software Development Life Cycle Models

Overview of Software Development Life Cycle, Process Models: Waterfall Model, Evolutionary Process Model: Prototype and Spiral Model, Incremental Process model: Iterative approach, RAD, JAD model, Concurrent Development Model, Agile Development: Extreme programming, Scrum.

Module III: Software Requirement Analysis and Specification

Types of Requirement, Feasibility Study, Requirement Analysis and Design: DFD, Data Dictionary, Requirement Elicitation: Interviews, Questionnaire, Brainstorming, Facilitated Application Specification Technique (FAST), Use Case Approach. SRS Case study, Software Estimation: Size Estimation: Function Point (Numerical). Cost Estimation: COCOMO (Numerical), COCOMO-II (Numerical), Earned Value Management.

Module IV: Software Project Planning

Business Case, Project selection and Approval, Project charter, Project Scope management: Scope definition and Project Scope management, Creating the Work Breakdown Structures, Scope Verification, Scope Control.

Module V: Project Scheduling and Human Resource management

Relationship between people and Effort: Staffing Level Estimation, Effect of schedule Change on Cost, Degree of Rigor & Task set selector, Project Schedule, Schedule Control, CPM (Numerical), Human Resource Planning, Acquiring the Project Team, Resource Assignment, Loading, Leveling, Developing the Project Team: Team Structures, Managing the Project Team.

Module VI: Software Quality and Risk Management

Software quality, software reliability models, Overview of ISO 9001, SEI Capability Maturity Model, McCalls Quality Model, Six Sigma, Formal Technical Reviews, Tools and Techniques for Quality Control, Quality Control Charts, Modern Quality Management, Risk Management: Identify IT Project Risk, Risk Analysis and Assessment, Risk Strategies, Risk Monitoring and Control, Risk Response and Evaluation.

Module VII: Software Maintenance

Maintenance Process, Maintenance Model, Estimation of maintenance cost, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management and Documentation.

Text & References:

Text

- Software Engineering, 5th and 7th edititon, by Roger S Pressman, McGraw Hill publication
- Software Engineering Project Management by Richard H. Thayer Wiley India Publication.

References: https://www.rgpvnotes.in/2018/01/cs-6003-software-engineering-project.html

ASP.NET

MCA-202 **L -3 T – 1 P - 0**

Module I: Introduction to .NET technologies
Features of .NET, .NET Framework, CLR, MSIL, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET.

Module II: Controls in ASP.NET
Overview of Dynamic Web page, Understanding ASP.NET Controls, Applications, Web servers, Installation of IIS.Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, validation Controls: Required Field Comparison Range. Calendarcontrol, Ad rotator Control, Internet Explorer Control.

Module III: Overview of ADO.NET and XML
What is ADO.NET, from ADO to ADO.NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets , using Command & Data Reader, binding data to data bind Controls, displaying data in data grid, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, The XML Data Document.

Module IV: ASP.NET Applications
Creating, tracking, caching, error handling, Securing ASP.NET applications- form based applications, window based application.

Module V: Web services
Introduction, State management- View state, Session state, Application state, Building ASP.NET web services, working with ASP.NET applications, creating custom controls.

Text & References:

Text:

- ASP.NET Unleashed by Stephen Walther, SAMS publications

References:

- ASP.NET, Wrox Publications
- ASP.NET and VB.NET, Wrox Publication
- ASP.NET and C#.NET, Wrox publication.

PYTHON

MCA-203 **L -3 T – 1 P - 0**

UNIT – I:
Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:
Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:
Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables,
Modules: Creating modules, import statement, from. Import statement, name spacing, Python Packages

UNIT – IV:
Data Structures: Lists- Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences, Comprehensions. **Exceptions:** Errors in a Python Program (Compile-Time Errors, Runtime Errors, Logical Errors), Exceptions, Exception Handling, Types of Exceptions, The Except Block, the assert Statement, User- Defined Exceptions, Logging the Exceptions. **Files:** Files, Types of Files in Python, Opening a File, Closing a File, Working with Text Files Containing Strings, Knowing Whether a File Exists or Not, Working with Binary Files, The with Statement, Pickle in Python, The seek() and tell() Methods

UNIT – V:
Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods **Regular Expressions:** Regular Expressions, Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expressions on Files, Retrieving Information from a HTML File

Data Science and Data Visualization using Python
Data Science Using Python: Data Frame (Creating Data Frame from an Excel Spreadsheet, Creating Data Frame from .csv Files, Creating Data Frame from a Python Dictionary, Creating Data from Python List of Tuples, Operations on Data Frames) **Data Visualization:** Bar Graph, Histogram, creating a Pie Chart, Creating Line Graph, **Plotting:** Plotting using PyLab, Plotting mortgages and extended examples

Text books
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson
3. Introduction to Python, Kenneth A. Lambert, Cengage

ARTIFICIAL INTELLIGENCE

MCA-204 **L -3 T – 1 P - 0**

Module I:

Fundamental Issues: Overview of AI problems, Examples of successful recent AI applications, Intelligent behaviour, The Turing test, Rational versus non-rational reasoning, Problem characteristics: Fully versus partially observable, Single versus multi-agent, Deterministic versus stochastic, Static versus dynamic, Discrete versus continuous, Nature of agents: Autonomous versus semi-autonomous, Reflexive, Goal-based, and Utility-based, Importance of perception and environmental interactions, Philosophical and ethical issues.

Module II:

Basic Search Strategies: Problem spaces (states, goals and operators), Problem solving by search, Factored representation (factoring state into variables), Uninformed search (breadth-first, depth-first, depth-first with iterative deepening), Heuristics and informed search (hill-climbing, generic best-first, A*), Space and time efficiency of search, Constraint satisfaction (backtracking and local search methods).

Module III:

Advanced Search: Constructing search trees, Dynamic search space, Combinatorial explosion of search space, Stochastic search: Simulated annealing, Genetic algorithms, Monte-Carlo tree search, Implementation of A* search, Beam search, Minimax Search, Alpha-beta pruning, Expectimax search (MDP-solving) and chance nodes.

Knowledge Representation: Propositional and predicate logic, Resolution in predicate logic, Question answering, Theorem proving, Semantic networks, Frames and scripts, conceptual graphs, conceptual dependencies.

Module IV:

Reasoning under Uncertainty: Review of basic probability, Random variables and probability distributions: Axioms of probability, Probabilistic inference, Bayes' Rule,
Conditional Independence, Knowledge representations using Bayesian Networks, Exact inference and its complexity, Randomized sampling (Monte Carlo) methods (e.g. Gibbs sampling), Markov Networks, Relational probability models, Hidden Markov Models, Decision Theory Preferences and utility functions, Maximizing expected utility.

Module V:

Agents: Definitions of agents, Agent architectures (e.g., reactive, layered, cognitive), Agent theory, Rationality, Game Theory Decision-theoretic agents, Markov decision processes (MDP), Software agents, Personal assistants, and Information access Collaborative agents, Information-gathering agents, Believable agents (synthetic characters, modelling emotions in agents), Learning agents, Multi-agent systems Collaborating agents, Agent teams, Competitive agents (e.g., auctions, voting), Swarm systems and Biologically inspired models.

Expert Systems: Architecture of an expert system, existing expert systems: MYCIN, RI. Expert system shells.

Text & References:

Text:

- Artificial Intelligence – II Edition, Elaine Rich, Kevin Knight TMH.

References:

- Foundations of Artificial Intelligence and Expert Systems, V S Janakiraman, K Sarukesi, P Gopalakrishan, Macmillan India Ltd.
- Introduction to AI and Expert System, Dan W. Patterson, PHI.

DISTRIBUTED OPERATING SYSTEM

MCA-231 **L -3 T – 1 P - 0**

Module I

Fundamentals: What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE).

Message Passing: Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.

Module II:

Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance, Case Studies: Sun RPC.

Module III

Distributed Shared Memory: Introduction, General Architecture of DSM systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. Synchronization: Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms

Module IV

Resource Management: Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach Process Management: Introduction, Process Migration, Threads.

Module V

Distributed File Systems: Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.

Text & References:

- Distributed Operating Systems 1st Edition by Andrew S. Tanenbaum
- Distributed Systems: Principles and Paradigms (2nd Edition) 2nd Edition, by Andrew S. Tanenbaum, Maarten Van Steen
-

CLOUD COMPUTING

MCA-241 **L -3 T – 1 P - 0**

MODULE I: CLOUD ARCHITECTURE AND MODEL
Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

MODULE II: VIRTUALIZATION
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

MODULE III: CLOUD INFRASTRUCTURE
Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

MODULE IV: PROGRAMMING MODEL
Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim

MODULE V: SECURITY IN THE CLOUD
Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Text & References:

- John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
- Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India,2011.
- James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
- Ronald L. Krutz, Russell Dean Vines, “Cloud Security – A comprehensive Guide to Secure Cloud Computing”, Wiley – India, 2010.

Digital Electronics

Subject Code- MCA- 241 A

UNIT-1:

Number System and Data Representation
Number System: Binary, Octal, Decimal and Hexadecimal Number System and Their Interconversion. Binary Codes: Bcd, Excess 3,Parity , Gray, Ascii And Ebcdic Codes , Their Advantages And Disadvantages. Data Representation: (Related To 8 Bit Number), Real Number Representation, Underflow, Overflow, Range and Accuracy of Numbers.

UNIT-2:
Binary Arithmetic
Binary Addition, Decimal Subtraction Using 9's And 10's Complement, Binary Subtraction Using 1's And 2'nd Compliment, Multiplication And Division .Logic Gates: Truth Table, Properties And Symbolic Representation Of NOT, AND ,OR,NOR,NAND ,EX-OR ,EX – NOR GATES, NOR and NAND GATES As A Universal Gates.

UNIT-3
Boolean algebra
Laws And Identities Of Boolean Algebra, Demorgan's Theorem, Use Of Boolean Algebra For Simplification Of Logic Expression, Karnaugh Map For 2,3,4 Variable, Simplification Of Sop And Pos Logic Expression Using K-Map.

UNIT-4:
Combinational / Sequential Circuits
Half Adder , Full Adder, Parallel Adder, Half Substractor, Full Substractor, 4 Bit Binary Adder/ Substractor, Multiplexer , demultiplexer, Decoder , Encoder ,Parity Detector.

UNIT-5:
Architecture Of 8086
Block Diagram Of 8086, Pin Diagram 0f 8086, Minimum And Maximum Mode,
Addressing Modes, Instruction Set: Data Transfer, Arithmetic, Logical , String Manipulation, Control Transfer, Unconditional Branch, Conditional Branch, Flag, Processor Control.

Business Communication

Subject Code- MCA- 241 B

Unit 1
Business Vocabulary – Writing: Drafting Notices, Agenda, and Minutes – Reading: Business news, Business articles.

Unit 2
Writing: Style and vocabulary – Business Memorandum, letters, Press Releases, reports – proposals – Speaking: Conversational practice, telephonic conversations, addressing a gathering, conducting meetings.

Unit 3
Active Listening: Pronunciation – information gathering and reporting – Speaking: Cross-Cultural Issues, Group Dynamics, and negotiation & persuasion techniques.

Unit 4
PROFESSIONAL WRITING: Letter writing – Types, Parts and Styles of Formal Letters – Language to be used in Formal Letters – Letters of Enquiry, Complaint, and Apology with Replies – Letter of Application -Resume – E-mail – Active and Passive Voice.

Unit 5
REPORT WRITING: Types of Reports – Formats of Reports – Memo Format – Letter Format and Manuscript Format- Parts of Technical Report – Informational, Analytical and Project Reports – Idioms and Phrases.

Research Methodologies

Subject Code- MCA- 241 C

Unit 1.
Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method - Understanding the language of Research - Concept, Construct, Definition, Variable. Research Process.

Unit 2.
Problem Identification & Formulation - Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance.

Unit 3.
Research Design: Concept and Importance in Research - Features of a good research design - Exploratory Research Design - concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

Unit 4.
Qualitative and Quantitative Research: Qualitative research - Quantitative research - Concept of measurement, causality, generalization, and replication. Merging the two approaches.

Unit 5.
Measurement: Concept of measurement- what is measured? Problems in measurement in research- Validity and Reliability. Levels of measurement Nominal, Ordinal, Interval, and Ratio.

Cognitive Analytics and Social Skills for Professional Development

Subject Code- MCA- 241 D

Unit I:

Cognitive Analytics and Social Cognition Understanding the self-preliminaries, Models of Understanding Self- T-E-A Model, Johari Window, PE Scale, Meaning and Importance of Self Esteem, Self-Efficacy, Self-Respect, Behavioral Communication- Assertive Skills, Technology adoption, Social Media Etiquettes, Creativity (ICEDIP Model), Visualization, Problem sensitivity, Problem Solving (Six Thinking Hats), Cognitive Flexibility, Cognitive Errors, Introduction to Social Cognition, Attribution Processes (Perceptual Errors), Social Inference, Stereotyping, Prejudice, Accepting Criticism.

Unit II:

Attitudes & Emotional Intelligence Understanding Attitudes , Characteristics of Attitude (valence, multiplicity, relation to needs, centrality, pervasiveness, invisible, acquired), Components of Attitudes (Affective, Cognitive, Behavioral), What are Emotions, Healthy and Unhealthy expression of emotions, Relevance of EI at workplace, Emotional Intelligence and Competence, Components of Interpersonal & Intrapersonal Intelligence, Relevance of EI at workplace

Unit III:

Leadership and Managing Excellence Team Design Features, Life Cycle of a Teams, Types and Development of Team Building, Issues in Team Performance , Types of leaders, Leadership styles in organizations, Situational Leadership , Strategic Leadership and Change Management- Mentoring, Building Trust, Building a Culture of Inclusion, Sociometry (Sociometry Criteria, Applications of Sociometry, Construction of sociogram), Personal Branding, Time Management, Work Life Integration, Relationship Management (Personal & Professional)

Unit IV:

Conflict Resolution and Negotiation Meaning, nature, sources, stages & types of conflicts, Factors affecting conflict, Impact of Conflict, Ethical Dilemmas in Conflict, Conflict Resolution Strategies, Comparison of conflict management styles, Matching conflict management approach with group conditions, Third Party Intervention- Mediation, mediation process, function of the mediator, preconditions for mediation, Intercultural communication and conflict resolution, Negotiation - Types, purpose, stages, Four pillars of negotiation, Strategies, Persuasion, Behavior and conduct during negotiation, closing the negotiation

Unit V:

Values & Ethics Meaning & its type, Difference between values and Ethics, Relationship between Values and Ethics, Significance of moral values, Practical Applications of Values & Ethics, Significance of moral values, Moral Icons, Its role in personality development , Character building- “New Self-awareness”, Personal values-Empathy, honesty, courage, commitment, Core Values - Respect, Responsibility, Integrity, Care, & Harmony, Resilience and Agility in Uncertainty, Overview of Resilience , Locus of control, Paradox of choice, Overcoming negative thinking- ABC technique (Adversity, believes and consequences), Personality & cognitive variables that promote resilience, Role of family and social networks, Models, Symptoms and consequences of stress.

EMBEDDED SYSTEMS

MCA-232 **L -3 T – 1 P - 0**

Module 1: INTRODUCTION

Introduction: Evolution of Computers, Technological Trends, Measuring performance Speed up, Computer organization: von Neumann Machine Architecture, Functional units and components, Program development tools. Instruction pipelining and parallel processing: Instruction pipeline, hazards, Data forwarding paths, RISC vs. CISC processors.

Module2: EMBEDDED SYSTEM

Introduction of embedded system, Processor: Embedded Processors in a System, Microprocessor, Microcontroller, Single Purpose Processors and Application specific system processors (ASSPs) in embedded systems. Embedded hardware units and devices

Module 3: INTERRUPTS HANDLER, EMBEDDED SOFTWARE

Interrupts handler, Embedded software, Final Machine Implement-able Software for a System, Coding of Software in Machine Codes, software in Processor Specific Assembly Language, Software in High Level Language, Program Models for Software Designing, Software for Concurrent Processing and Scheduling of Multiple Tasks and ISRs Using an RTOS, Software for the Device Drivers and Device Management using an Operating System, Software tools in designing of an Embedded System, Needed Software Tools in the Exemplary cases. Examples of Embedded System

Module 4: The Embedded Computing Platform

Embedded Computing Platform, CPU Bus, Memory Devices, I/O Devices, Component Interfacing

Module 5: Real-Time Operating Systems

Inter Process Communication & Synchronization of Processes, task and threads, multiple processes in an application, multiple threads in an application, task and states, task and data clear cut distinction between functions, ISRs and Tasks by their Characteristics.

Module 6: CONCEPT OF SEMAPHORES

Concept of semaphores, Use of a Single Semaphore as an event signalling variable or notifying variable (event flag), Use of a Single Semaphore as resource key and in critical Section, Mutex, Use of Multiple Semaphores, Use of Mutex, Counting Semaphores, P and V semaphores shared data: Problem of Sharing Data by Multiple Tasks and Routines, Shared Data, Deadlock Situations ,inter process Communication semaphores, Message Queues, Mailboxes, Pipes, Sockets, Remote Procedure Calls (RPCs).

LINUX/ UNIX

MCA-233 **L-3 T-1 P-0**

Unit-1 Introduction of UNIX and Shell:
Introduction, History, Architecture, Experience the Unix environment, Basiccommand sls, cat, cal, date, calendar, who, printf, tty, sty, uname, passwd, echo, tput, bc, script, spell and ispell, Introduction to Shell Scripting, Shell Scripts, read, Command Line Arguments, Exit Status of a Command, The Logical Operators && and||, exit, if, and case conditions, expr, sleep and wait, while, until, for,$,@, redirection, set and shift, trap.

Unit-2 UNIX File System:

The file, what's in a filename? The parent-child relationship, pwd, the Home directory, absolute path names, using absolute pathnames for a command, cd, mkdir, rmdir, Relative path names, The UNIX file system. Basic File Attributes: Is – l, the –d option, File Permissions, chmod, Security and File Permission, users and groups, security level, changing permission, changing ownership and group, File Attributes, More file attributes: hard link, symbolic link, umask, find.

Unit-3 Simple Filters:

Pr, head, tail, cut, paste, sort, uniq, tr commands, Filters using Regular Expression: grep, Regular Expression, egrep, fgrep, sed instruction, Line Addressing, Inserting and Changing Text, Context addressing, writing selected lines to a file, the– f option, Substitution, Properties of Regular Expressions.

Unit-4 Awk and Advanced Shell Programming:

Awk-Advanced Filters: Simple awk Filtering, Splitting a Line into Fields, printf, the Logical and Relational Operators, Number Processing, Variables, The –f option, BEGIN and END positional Parameters, getline, Built-invariables, Arrays, Functions, Interface with the Shell, Control Flow. The sh command, export, the Command, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, Exec Statement and Examples

Unit-5 Process and System Administration:

Process basics, PS, internal and external commands, running jobs in background, nice, at and batch, cron, time commands, Essential System Administration root, administrator's privileges, startup & shutdown, managing disk space, cpio, tar, Customizing the Environment : System Variables, profile, sty, Aliases, Command History, On-line Command Editing.

Software Engineering and Project Management lab

MCA-251 **L T P 0 0 2**

S.No	List of programs
1.	Write a program to take task names as input and display them.
2.	Write a program to updates a task's status (Pending/Done) and shows the result.
3.	Write a program to counts how many tasks have been inputted.
4.	Write a program to multiplies the number of hours by a fixed hourly rate to calculate the cost.
5.	Write a program that assigns a priority (High, Medium, Low) to a task and displays it.
6.	Write a program to checks if a task's due date has passed and displays a reminder.
7.	Write a program to marks specific tasks as milestones based on user input.
8.	Write a program to calculates how many tasks are completed out of the total.
9.	Write a program to assigns a person to a task and displays the assignment.
10.	Write a program to log defects with a status (Open/Closed).
11.	Write a program to multiplies the number of tasks by the estimated hours to give a total project effort.
12.	Write a program to input and display project risks.
13.	Write a program to prints task names with start and end dates in a simple list format.
14.	Write a program to simple First-Come-First-Serve (FCFS) scheduler that orders tasks by input time.
15.	Write a program to program that sums up task durations to calculate total project time.

Lab ASP. Net

MCA-252

1. Create a simple ASP.NET Web Form that displays "Hello, World!".
2. Build a contact form that captures user input and sends an email.
3. Develop a login page with user authentication using session management.
4. Create a registration form that saves user data to a SQL database.
5. Implement a product catalog page displaying data from a database.
6. Build a shopping cart application with add, remove, and checkout functionalities.
7. Create a CRUD (Create, Read, Update, Delete) application for managing a list of books.
8. Develop an employee management system with role-based access.
9. Implement a search feature for a blog with pagination.
10. Create a dashboard that visualizes data using charts (e.g., using Chart.js).
11. Build a simple API that returns JSON data for a list of users.
12. Implement file upload functionality with size and type validation.
13. Create a multi-language support page using resource files.
14. Develop a URL shortening service using ASP.NET MVC.
15. Implement session state management and demonstrate session tracking.
16. Build a survey application that saves responses to a database.
17. Create a forum page allowing users to post and comment on threads.
18. Develop a booking system for appointments with calendar integration.
19. Implement a real-time chat application using SignalR.
20. Create a blog platform with user roles for authors and admins.

Lab Python

MCA-253

1. Print "Hello, World!" to the console.
2. Calculate the sum of two numbers entered by the user.
3. Check if a given number is even or odd.
4. Compute the factorial of a non-negative integer.
5. Generate the Fibonacci series up to a specified number.
6. Determine if a given number is prime.
7. Reverse a string provided by the user.
8. Convert Celsius to Fahrenheit and vice versa.
9. Implement a basic calculator for addition, subtraction, multiplication, and division.
10. Count the number of vowels and consonants in a given string.
11. Check if a given string is a palindrome.
12. Calculate the area of a rectangle given width and height.
13. Sort a list of integers in ascending order.
14. Find the maximum and minimum values in a list.
15. Implement linear search to find an element in a list.
16. Create a program to read and write to a text file.
17. Generate a random number and create a guessing game.
18. Count the number of words in a sentence provided by the user.
19. Create a simple to-do list application using lists.
20. Implement a basic quiz application that asks questions and evaluates answers.

SOFT COMPUTING

MCA-331 **L -3 T – 1 P - 0**

Introduction to Soft Computing

Introduction, Fuzzy Computing, Neural Computing, Genetic Algorithms, Associative Memory, Adaptive Resonance Theory, Applications

Fundamentals of Neural Network

Introduction, Model of Artificial Neuron, Architectures, Learning Methods, Taxonomy of NN Systems, Single-Layer NN System, Applications.

Back Propagation Network

Background, Back-Propagation Learning, Back-Propagation Algorithm.

Associative Memory

Description, Auto-associative Memory, Bi-directional Hetero associative

Fundamentals of Genetic Algorithms

Introduction, Encoding, Operators of Genetic Algorithm, Basic Genetic Algorithm.

Swarm Intelligent System

Introduction to swarm intelligence, Background, ACO, ABC, Cuckoo search algorithms.

Text & References:

- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S. Rajasekaran, G. A. Vijayalakshami, PHI.
- Chin Teng Lin, C. S. George Lee, Neuro-Fuzzy Systems, PHI
- Tomthy Ross,Fuzzy Logic and Engineering Application, TMH
- Kishan Mehrotra,Elements of Artificial Neural Network, MIT Press
- E. Goldberg,Genetic Algorithms: Search and Optimization, Addision-Wesley
- Recent Articles and Research papers

PHP

MCA-301 **L -3 T – 1 P - 0**

Module I: Introduction to PHP Servers : Introducing Apache, PHP, MySql, Installing XAMPP, PHP, MySql, Configuring Apache for PHP, Introduction to PHP, Syntax, Common PHP Script Elements, Variables, String, Operators, If...Else, Switch, Arrays, Looping, Functions, Forms, $_GET, $_POST, Date, Include, Error, Exception, Filter, PHP ODBC, Working With Forms, Processing Forms, Form Validation, Addressing the Stateless Nature of HTTP, Hidden Form Fields.

Module II: File Handling :File and Directory Handling, Including Files, File Access, Displaying directory files, Coping and renaming files, Deleting files, Opening and closing files, Reading files, Writing files, Logging visitor details, Enabling file uploads, Creating and upload form, Creating an upload script, Uploading a file

Module III: PHP and My SQL:Introducing databases Connect MySQL, Creating new database MySQL Create, Creating database table MySQL Insert, SQL data types, Inserting table data, Altering an existing table, Updating records, Deleting data, tables and databases, SQL Queries MySQL Select, MySQL Where, MySQL Order By, MySQL Update, MySQL Delete,, Creating Mysql user and password, Connecting a user to Mysql, Listing databases, Listing table names, Creating a database, Deleting a database, Creating a database table, Inserting table data, Altering tables, Retrieving data from a table

Module IV: Advance PHP : Declaring a class and Objects, The new keyword and constructor, Destructor, Access method and properties using $this variable, Public ,private, protected properties and methods, Static properties and method, Class constant, Introducing cookies, Set a cookie, Access limitation, Introducing sessions, Starting session, Session without cookies, Setting session persistence, Cookies or session, Sending plain text E-mail, Sending html E-mail, Creating an attachment form, Sending attachment with E-ma**il**

Module – V: Content Management System
Introduction of Content Management System, Introduction about WordPress, WordPress.org vs. WordPress.com Introduction about drupal, Drupal installation, Maintenance mode, Working with plugins, Working with themes, Updation and deletion plugins, Upgrade the drupal versions, Forum Social media buttons, Slide show, Comments, Audio and video file in drupe, You tube in your drupal site

Text & References:
Text:
Atkinson, Leon. *Core PHP Programming, 2nd Edition*. New York: Prentice Hall

References:

- http://www.zend.com
- http://www.php.net
- http://www.mysql.com
- http://www.phpbuilder.com
- http://www.useit.com
- http://www.devshed.com
- http://www.webmonkey.com

COMPILER DESIGN

MCA-332 **L -3 T – 1 P - 0**

Module I: Introduction
Introduction to Compliers, Classification of grammars, Context free grammars, Regular grammars, Deterministic finite State Automata (DFA) & Non-DFA.

Module II: Syntax Analysis
Scanners, Top down parsing, LL grammars, Bottom up parsing, Polish expression Operator Precedence grammar, IR grammars, Comparison of parsing methods, Error handling.

Module III: Symbol Table
Symbol table handling techniques, Organization for non-block and block structured languages.

Module IV: Code Generation/Intermediate Code Generation
Run time storage administration, Static and dynamic allocation, Intermediate forms of source program, Polish N-tuple and syntax trees, Semantic analysis and code generation.

Module V: Code Optimization
Code optimization, Folding, redundant sub-expression evaluation, Optimization within iterative loops.

Text & References:

Text:

- Principles of Compiler Design, Alfred V. Aho, Jeffrey D. Ullman, Narosa Publishing House
- Compilers Principles, Techniques & Tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Pearson Education (Singapore)

References:

- The Theory and Practice of Compiler Writing, Tremblay, et. al., McGraw Hill, New York, 1985.

ANDROID PROGRAMMING

MCA-303 **L -3 T – 1 P - 0**

Module –I: Basics of Android

What is Android, History and Version, Installing softwares , Setup Eclipse, Hello Android example,Internal Details, Dalvik VM , Software Stack , Android Core Building Blocks , Android Emulator , AndroidManifest.xml , R.java file , Hide Title Bar , Screen Orientation

Module –II: UI Widgets

Working with Button, Toast, Custom Toast, Button, Toggle Button, Switch Button, Image Button, CheckBox, AlertDialog, Spinner, AutoCompleteTextView, RatingBar, DatePicker, TimePicker, ProgressBar, Quick Contact Budge, Analog Clock and Digital Clock, Working with hardware Button, File Download

Module –III: Activity, Intent & Fragment

Activity Lifecycle, Activity Example, Implicit Intent, Explicit Intent, Fragment Lifecycle, Fragment Example, Dynamic Fragment

Module –IV: Android Menu & Layout Manager

Option Menu, Context Menu, Popup Menu , Relative Layout, Linear Layout, Table Layout, Grid Layout

Module –V: Adaptor & Views

Array Adaptor, ArrayList Adaptor, Base Adaptor, GridView , WebView , ScrollView , SearchView , TabHost , DynamicListView , ExpandedListView

Text & Reference:

- Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) (By: Bill Philips & Brian Hardy
- Android Recipes: A Problem-Solution Approach, Dave Smith & Jeff Friesen

Data Science

MCA-302 **L -3 T – 1 P - 0**

Module 1: Big Data & Statistics

Overview of Big Data; Characteristics of Big Data.

- Important statistical concepts used in data science
- Difference between population and sample
- Types of variables
- Measures of central tendency
- Measures of variability
- Coefficient of variance
- Skewness and Kurtosis

Module 2: Inferential statistics

Inferential statistics is used to generalize of populations, from which samples are drawn. This is a new branch of statistics, which helps you learn to analyze representative samples of large data sets. In this module, you will learn –

- Normal distribution
- Test hypotheses
- Central limit theorem
- Confidence interval
- T-test
- Type I and II errors
- Student's T distribution

Module 3: Python

Python is the most important and necessary topic that every data scientist should have knowledge about. In this section, our instructors will take you through the basics of Python and areas where it can be used. You will learn how to use some of the current tools such as Numpy, Pandas, and Matplotlib. Therefore, module 1 includes –

- Environment set-up
- Jupyter overview
- Python Numpy
- Python Pandas
- Python Matplotlib

Module 4: Exploratory data analysis

- Data visualization
- Missing value analysis
- The correction matrix
- R programming language

Module 5: Supervised machine learning

This is a comprehensive module to help you understand how to make machines or computers interpret human language. You will learn –

- Python Scikit tool

- Neural networks
- Support vector machine
- Logistic and linear regression
- Decision tree classifier

Cryptography and Network Security

MCA-304

Unit 1: Introduction to Cryptography

Overview of cryptography, historical background, and applications. Basic terminology such as plaintext, ciphertext, and key. Exploration of types of cryptography including symmetric and asymmetric methods. Introduction to classical ciphers like the Caesar cipher and Vigenère cipher, along with modern cryptographic algorithms.

Unit 2: Symmetric Key Cryptography

Focus on block ciphers including DES and AES, as well as their modes of operation. Discussion of stream ciphers such as RC4 and their applications. Key management and distribution strategies will be covered, along with cryptographic protocols that utilize symmetric key cryptography. Examination of potential attacks on symmetric key systems.

Unit 3: Asymmetric Key Cryptography

Principles of asymmetric cryptography, including the RSA algorithm for key generation, encryption, and decryption. Study of the Diffie-Hellman key exchange method and the concepts of digital signatures and certificates. Analysis of applications related to asymmetric cryptography.

Unit 4: Hash Functions and Message Integrity

Introduction to hash functions and their importance in cryptography. Exploration of the properties of cryptographic hash functions, with a focus on common examples like MD5, SHA-1, and SHA-256. Discussion on message authentication codes (MACs) and the applications and security implications of hash functions.

Unit 5: Network Security Protocols

Overview of network security concepts and practices. Detailed examination of Secure Sockets Layer (SSL) and Transport Layer Security (TLS), as well as Internet Protocol Security (IPsec). Insights into virtual private networks (VPNs), firewalls, and intrusion detection systems.

Compiler Design

MCA-332

Unit 1: Introduction to Compiler Design

Overview of compiler design and its phases. The role of compilers in programming languages. Lexical analysis, syntax analysis, and semantic analysis. Introduction to different types of translators, including interpreters.

Unit 2: Lexical Analysis

Detailed study of lexical analysis and its importance. Design and implementation of finite automata. Use of regular expressions in token specification. Construction of lexical analyzers and tools like Lex.

Unit 3: Syntax Analysis

Introduction to context-free grammars and parsing techniques. Overview of parsing algorithms, including top-down and bottom-up parsing. Study of predictive parsing, recursive descent parsing, and LR parsing. Construction of parse trees and syntax trees.

Unit 4: Semantic Analysis

Understanding semantic analysis and its role in compiler design. Techniques for type checking and symbol table management. Implementation of semantic actions and the use of attribute grammars. Error detection and handling during semantic analysis.

Unit 5: Intermediate Code Generation

Overview of intermediate representations used in compilers. Techniques for generating intermediate code from syntax trees. Three-address code, quadruples, and other forms of intermediate code. Optimization techniques at the intermediate level.

Professional Ethics and Social Responsibility for Sustainability

MCA-304 A

Unit 1: Introduction to Professional Ethics

Overview of professional ethics and its significance in various fields. Examination of ethical theories and frameworks. Discussion on the role of values and morals in professional conduct. Case studies highlighting ethical dilemmas in professional settings.

Unit 2: Ethical Decision-Making

Analysis of decision-making processes in ethical contexts. Models of ethical decision-making and their applications. Factors influencing ethical decisions in professional practice. Strategies for resolving ethical conflicts and dilemmas.

Unit 3: Social Responsibility

Definition and importance of social responsibility in business and professional environments. Examination of corporate social responsibility (CSR) initiatives. The relationship between social responsibility and sustainability. Impact of social responsibility on stakeholder engagement.

Unit 4: Sustainability and Ethical Practices

Understanding sustainability in the context of professional ethics. Exploration of environmental ethics and sustainable practices. Discussion on the role of professionals in promoting sustainable development. Case studies of organizations implementing sustainable practices.

Unit 5: Global Perspectives on Ethics and Responsibility

Examination of ethical standards across different cultures and societies. Challenges of maintaining ethical standards in a globalized world. The impact of globalization on professional ethics and social responsibility. Comparative analysis of ethical practices in various countries.

Enterprise Resource Planning

MCA-304 B

Unit 1: Introduction to Enterprise Resource Planning

Overview of Enterprise Resource Planning (ERP) systems and their significance in organizations. Examination of the evolution of ERP and its integration with business processes. Discussion on the components and architecture of ERP systems.

Unit 2: ERP Modules and Functionality

Detailed exploration of various ERP modules, including finance, human resources, supply chain management, manufacturing, and customer relationship management. Understanding the functionality and interconnectivity of these modules within an ERP system.

Unit 3: ERP Implementation Strategies

Analysis of ERP implementation methodologies and best practices. Overview of project planning, resource allocation, and change management during implementation. Discussion on the challenges and risks associated with ERP implementation.

Unit 4: ERP Customization and Integration

Examination of customization options within ERP systems. Strategies for integrating ERP with existing legacy systems and other software applications. Case studies of successful ERP integration projects.

Unit 5: Data Management and Reporting in ERP

Understanding the importance of data management within ERP systems. Overview of data migration processes and data quality management. Discussion on reporting tools and techniques for data analysis in ERP environments.

MCA-304 C

Unit 1: Introduction to Software Project Management

Overview of software project management principles and practices. Examination of the software development lifecycle and its phases. Discussion on the roles and responsibilities of a project manager in software projects.

Unit 2: Project Planning and Estimation

Introduction to project planning concepts and methodologies. Techniques for project estimation, including expert judgment, analogy-based estimation, and parametric models. Discussion on work breakdown structure (WBS) and project scheduling.

Unit 3: Risk Management in Software Projects

Identification and analysis of risks in software projects. Development of risk management plans and strategies for mitigating risks. Tools and techniques for monitoring and controlling project risks.

Unit 4: Resource Management and Team Dynamics

Overview of resource management in software projects, including human, financial, and material resources. Discussion on team dynamics, communication, and conflict resolution. Strategies for building and leading effective project teams.

Unit 5: Quality Assurance and Control

Introduction to quality management in software projects. Examination of quality assurance and quality control processes. Techniques for measuring and ensuring software quality throughout the project lifecycle.

Internet of Everything

MCA-304 D

Unit 1: Introduction to the Internet of Everything

Overview of the Internet of Everything (IoE) and its significance. Examination of the components of IoE: people, processes, data, and things. Discussion on the evolution of IoE from the Internet of Things (IoT) and its implications.

Unit 2: Architecture and Technologies of IoE

Understanding the architectural framework of IoE systems. Overview of enabling technologies such as sensors, connectivity protocols, and cloud computing. Examination of data processing and analytics in IoE environments.

Unit 3: IoE Communication Models

Analysis of communication models used in IoE. Discussion on device-to-device, device-to-cloud, and cloud-to-cloud communication. Exploration of protocols and standards that facilitate communication in IoE.

Unit 4: Data Management and Analytics

Introduction to data management challenges in IoE. Techniques for collecting, storing, and processing large volumes of data. Discussion on data analytics and visualization tools to derive insights from IoE data.

Unit 5: Security and Privacy in IoE

Examination of security challenges and vulnerabilities in IoE systems. Strategies for securing IoE devices and networks. Discussion on privacy concerns and regulations affecting IoE applications.

Cryptography and Network Security Lab

MCA-353 **L T P 0 0 2**

S.No	List of programs
1.	Write a program to implement the Caesar cipher for encryption and decryption of a given plaintext.
2.	Create a program that implements a substitution cipher by mapping each letter of the alphabet to another letter.
3.	Write a Program to Implement a transposition cipher for rearranging letters.
4.	Write a basic version of the DES encryption and decryption.
5.	Write a Program to Demonstrate Triple DES encryption and decryption.
6.	Write a Program to Implement one block cipher mode (e.g., CBC).
7.	Write a Program to Create a calculator for modular arithmetic operations.
8.	Write a Program to Generate RSA keys using two prime numbers.
9.	Write a Program to Implement Euclid's algorithm for finding GCD.
10.	Write a Program to Compute MD5 hash for a given string.
11.	Write a Program to Implement SHA-256 hash function for messages
12.	Write a Program to Generate a MAC using HMAC.
13.	Write a Program to Simulate a basic Kerberos authentication process.
14.	Write a Program to Demonstrate PGP encryption and decryption.
15.	Write a Program to Simulate a simple firewall rule for access control.

Lab PHP

MCA-351

1. Create a simple PHP script that prints "Hello, World!".
2. Build a form that takes user input and displays the submitted data.
3. Implement a user registration system that stores data in a MySQL database.
4. Create a login system with session management to authenticate users.
5. Develop a contact form that sends an email with user details.
6. Build a CRUD application to manage a list of books in a database.
7. Create a simple calculator that performs basic arithmetic operations.
8. Implement a file upload feature with validation for file types.
9. Develop a program that generates a random password.
10. Create a page that displays data from an API using cURL.
11. Implement pagination for displaying a list of products from a database.
12. Build a blog platform with post creation and commenting features.
13. Create a program to read and display contents of a text file.
14. Develop a shopping cart system that tracks selected items.
15. Implement user roles (admin and user) with access control.
16. Create a program that generates and displays a QR code.
17. Build a survey application that collects and displays user responses.
18. Create a simple image gallery that displays images from a folder.

Lab Data Science

MCA-352

1) Load a CSV file and display basic statistics using pandas.
2) Clean a dataset by handling missing values and duplicates.
3) Visualize data distributions using histograms and box plots with Matplotlib.
4) Implement a linear regression model to predict housing prices.
5) Perform exploratory data analysis (EDA) on a dataset with seaborn.
6) Create a scatter plot to visualize the relationship between two variables.
7) Build a decision tree classifier for a classification problem.
8) Implement k-means clustering on a dataset and visualize clusters.
9) Generate a word cloud from a text document.
10) Use Natural Language Processing (NLP) to tokenize and analyze text data.
11) Perform sentiment analysis on tweets using a pre-trained model.
12) Create a dashboard using Plotly Dash to visualize key metrics.
13) Implement feature scaling (standardization and normalization) on a dataset.
14) Build and evaluate a random forest classifier for a binary classification problem.
15) Create a time series analysis and forecasting model using ARIMA.
16) Use PCA (Principal Component Analysis) to reduce dimensionality of a dataset.
17) Implement a recommendation system using collaborative filtering.
18) Analyze geographical data and create maps using Folium.

Minor Project

MCA-354

1. Build a personal expense tracker application with user authentication.
2. Develop a simple blogging platform that allows users to create and manage posts.
3. Create a task management tool with features for adding, updating, and deleting tasks.
4. Implement a movie recommendation system using a collaborative filtering algorithm.
5. Build a weather dashboard that fetches real-time data from a weather API.
6. Develop a quiz application that scores user responses and provides feedback.
7. Create an online library management system for borrowing and returning books.
8. Implement a chat application using WebSockets for real-time communication.
9. Build a recipe sharing platform with user-generated content and ratings.
10. Develop a fitness tracking app that logs workouts and progress over time.
11. Create a simple e-commerce website with product listings and a shopping cart.
12. Implement a travel itinerary planner that helps users organize trips.
13. Build a note-taking application with features for tagging and searching notes.
14. Create a polling application for gathering opinions on various topics.
15. Develop an online resume builder that allows users to create and download resumes.
16. Implement a simple forum for discussions with user registration and threads.
17. Create a personal blog with customizable themes and comment functionality.
18. Build a language learning app that quizzes users on vocabulary and grammar.
19. Develop a digital art gallery to showcase user-uploaded artworks.
20. Create a simple game (e.g., Tic-Tac-Toe) that can be played against a computer or another user.

Seminar Based on Learning

MCA-355

1) Create a program that tracks learning progress over time using visualizations.
2) Develop a quiz application that adapts questions based on user performance.
3) Build a flashcard app for studying vocabulary or concepts with spaced repetition.
4) Implement a study group platform that connects learners with similar interests.
5) Create a resource-sharing tool for educational materials and links.
6) Develop a personalized learning path generator based on user goals.
7) Implement a gamified learning experience that rewards users for completing tasks.
8) Create a journal application for users to reflect on their learning experiences.
9) Build a web scraper to gather educational content from various websites.
10) Develop an interactive tutorial platform for teaching coding skills.
11) Create a language learning app with pronunciation feedback using speech recognition.
12) Implement a project-based learning platform that connects projects with relevant resources.
13) Build a mentorship matching system that pairs learners with experienced mentors.
14) Create a community forum for discussing learning strategies and sharing tips.
15) Develop a visualization tool to map out concepts and their relationships.
16) Implement a time management tool specifically designed for students.
17) Create a podcast aggregator focused on educational content.
18) Build an AI-powered chatbot to answer common learning-related questions.
19) Develop a survey tool for gathering feedback on learning experiences.
20) Create a platform for hosting and attending webinars on various topics.

MAJOR PROJECT PRESENTATION & VIVA

MCA-462

Unit 1: Introduction to the Internet of Everything

Overview of the Internet of Everything (IoE) and its significance. Examination of the components of IoE: people, processes, data, and things. Discussion on the evolution of IoE from the Internet of Things (IoT) and its implications.

Unit 2: Architecture and Technologies of IoE

Understanding the architectural framework of IoE systems. Overview of enabling technologies such as sensors, connectivity protocols, and cloud computing. Examination of data processing and analytics in IoE environments.

Unit 3: IoE Communication Models

Analysis of communication models used in IoE. Discussion on device-to-device, device-to-cloud, and cloud-to-cloud communication. Exploration of protocols and standards that facilitate communication in IoE.

Unit 4: Data Management and Analytics

Introduction to data management challenges in IoE. Techniques for collecting, storing, and processing large volumes of data. Discussion on data analytics and visualization tools to derive insights from IoE data.

Unit 5: Security and Privacy in IoE

Examination of security challenges and vulnerabilities in IoE systems. Strategies for securing IoE devices and networks. Discussion on privacy concerns and regulations affecting IoE applications.

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Master of (MCA) Lateral Entry, Two Year Programme

Semester System

(w.e.f. session 2013-14)

Approved and adopted in the year 2013 (1th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO 1 To provide a strong foundation in computer science and software engineering, enabling students to develop, design, and implement advanced IT solutions for complex challenges.

PEO 2 To enhance critical thinking and problem-solving abilities, allowing graduates to analyze, design, and optimize algorithms and systems for real-world applications in diverse domains.

PEO 3 To develop leadership skills, effective communication, and teamwork capabilities, preparing students to manage projects and lead multidisciplinary teams in delivering innovative IT solutions.

PEO 4 To foster research skills and encourage innovation, enabling students to explore emerging technologies and contribute to advancements in software development and computer science.

PEO 5 To promote ethical behavior, professional integrity, and continuous learning, ensuring graduates stay adaptable and contribute positively to the evolving IT industry throughout their careers.

PEO 6 To nurture leadership qualities, communication skills, and teamwork, preparing students to manage projects and collaborate effectively within multidisciplinary teams, ensuring success in software development and IT management.

PEO 7 To instill a sense of ethical responsibility, professionalism, and integrity, ensuring that graduates understand the societal impact of technology and contribute positively to the global IT community.

PEO 8 To promote lifelong learning and adaptability, preparing graduates to continually update their skills, stay current with emerging technologies, and remain competitive in an ever-evolving IT landscape.

Programme Specific Objectives (PSO's)

PSO 1 To develop proficiency in designing, implementing, and testing software applications using modern programming languages, frameworks, and tools to address complex computational problems.

PSO 2 To equip students with advanced knowledge of computer networks, protocols, and cybersecurity, enabling them to design secure, scalable, and efficient networked systems.

PSO 3 To provide expertise in database management, data structures, and data analysis, empowering students to design efficient data-driven applications for real-world business and scientific solutions.

PSO 4 To explore emerging technologies such as Artificial Intelligence, Machine Learning, Cloud Computing, and Big Data, preparing students to innovate and apply these technologies in various domains.

PSO 5 To cultivate strong analytical and problem-solving skills, enabling students to conduct research and develop innovative solutions to complex problems in software engineering and IT.

PEO 6 To develop expertise in software testing methodologies, debugging, and quality assurance processes, ensuring that software applications meet industry standards and perform reliably in diverse environments.

PEO 7 To enhance students' communication and interpersonal skills, preparing them for effective teamwork, leadership, and technical presentations in multidisciplinary, collaborative software development environments.

PEO 8 To instill a strong sense of professional ethics and a commitment to lifelong learning, ensuring students can adapt to technological advancements and contribute positively to the IT industry

Programme Outcome Objectives (POO's)

POO 1 Graduates will demonstrate a solid understanding of computer science fundamentals, software engineering principles, and IT solutions to address complex real-world problems across various domains.

POO 2 Students will possess advanced problem-solving skills, applying analytical and computational methods to design efficient algorithms and software solutions for technical challenges.

POO 3 Graduates will be proficient in designing, developing, testing, and deploying software applications using modern programming languages, frameworks, and software engineering methodologies.

POO 4 Students will gain expertise in database design, management, and optimization, and will be able to create efficient database systems for storing and retrieving data.

POO 5 Graduates will be adept in utilizing emerging technologies such as AI, Machine Learning, Cloud Computing, and Big Data to innovate and solve modern-day challenges.

POO 6 Students will understand networking protocols, communication models, and security principles to design and manage secure, efficient computer networks and distributed systems.

POO 7 Graduates will adhere to ethical standards and demonstrate professional conduct in their practice, ensuring responsibility, accountability, and respect in all computing-related endeavors.

POO 8 Students will develop strong research skills, contributing to the advancement of technology through innovative solutions and exploration of new computational techniques and methodologies.

POO 9 Graduates will possess effective communication skills, enabling them to work collaboratively in multidisciplinary teams, share ideas clearly, and present technical information effectively to stakeholders.

POO 10 Graduates will engage in lifelong learning, continuously updating their knowledge and adapting to new technologies, methodologies, and industry trends to remain competitive in the evolving IT landscape.

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective from 201 (LE)
MCA
III semester

Code	Course Title	Cr.	L	T	P
CCA 501	Java Programming	4	3	1	0
CCA 503	C# Programming	4	3	1	0
CCA 505	Data Communication and Networking	4	3	1	0
CCA 507	Advanced Operating System	4	3	1	0
CCA XXX	PROFESSIONAL ELECTIVE-I	4	3	1	0
CCA 551	Java Programming Lab	2	0	0	4
CCA 553	C# Programming Lab	2	0	0	4
	Total	24	15	5	8

PROFESSIONAL ELECTIVE-I

1. CCA 509 Theory of Computation
2. CCA 511 Computer Based Numerical & Statistical Techniques
3. CCA 511 A Introduction to Numerical Methods
4. CCA 511 B Statistical Methods for Data Analysis
5. CCA 511 C Linear Algebra and Matrix Computations
6. CCA 511 D Regression Analysis and Modeling
7. CCA 513 Introduction to Programming and Computer Organization

IV semester

Code	Course Title	Cr.	L	T	P
CCA 502	Network Security & Cryptography	4	3	1	0
CCA 504	Compiler Design	4	3	1	0
CCA 506 CCA 506 A CCA 506 B CCA 506 C CCA 506 D	Knowledge Management & Expert System Information Systems Management Enterprise Resource Planning Information Security Management Business Process Management	4	3	1	0
CCA XXX	PROFESSIONAL ELECTIVE-II	4	3	1	0
UCA XXX	OPEN ELECTIVE-I	4	3	1	0
CCA 552	Network Security & Cryptography Lab	2	0	0	4
CCA 554	Compiler Design Lab	2	0	0	4
	Total	24	15	5	8

PROFESSIONAL ELECTIVE-II

1. CCA 508 System Programming
2. CCA 510 Mobile Computing
3. CCA 512 Computer Graphics

OPEN ELECTIVE-I

1. UCA 502 Computing & Its Application
2. UCA 504 Management Information System
3. UCA 506 Software Project Management

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective from 2013
MCA
V semester

Code		Cr.	L	T	P
CCA 601	Advanced DBMS	4	3	1	0
CCA 603	Advanced DAA	4	3	1	0
CCA 605 CCA 605A CCA 605B CCA 605C CCA 605D	Expert Intelligence System Introduction to Expert Systems Knowledge Representation and Reasoning Expert System Design and Development Applications of Expert Systems in Industry	4	3	1	0
CCA XXX	PROFESSIONAL ELECTIVE-III	4	3	1	0
UCA XXX	OPEN ELECTIVE-II	4	3	1	0
CCA 651	Advanced DBMS	1	0	0	2
CCA 653	Advanced DAA	1	0	0	2
CCA 655	Minor Project	2	0	0	4
	Total	24	15	5	8

PROFESSIONAL ELECTIVE-III

1. CCA 607 Distributed OS
2. CCA 609 Multimedia Computing
3. CCA 611 Pattern Recognition

OPEN ELECTIVE-II

1. UCA 601 Neural Network
2. UCA 603 Client-Server Computing
3. UCA 603 Advanced Computer System Architecture

VI semester

Code		Cr.	L	T	P
CCA 602	Dissertation	16	0	0	32
CCA 604	Seminar and Progress Reports -	8	0	0	16
		24	0	0	48

DATA COMMUNICATIONS AND NETWORKING

CCA-505 **Cr. L T P**
4 3 1 0

Unit - I

Transmission Technology: Frequency, Spectrum, Bandwidth, Time Domain Concept, Frequency Domain Concept, Data & Signals i.e. Analog Signal, Digital Signal, Analog Data, Digital Data. Signal Strength, Decibals, Decibal-watt, Decibal-milivolt.

Relationship between data rate & Bandwidth: Nyquist Theorem & Shannon's Theorem, Bit Rate & Baud Rate.

Unit- II

Transmission Impairments: Attenuation**&**Attenuation Distortion, Delay Distortion, Noise, SNR, Thermal Noise, Inter modulation Noise, Cross Talk, Impulse Noise.

Transmission Media: Basic idea of electromagnetic spectrum, Guided Transmission Media(UTP,STP,COAX, Optical Fiber), Unguided Transmission Media(Wireless Transmission, Microwave Transmission, Infrared Transmission).

Unit - III

Communication System: Communication System Model, Data Communication Model.

Amplitude Modulation Theory: Mathematical Representation of AM**,** Frequency Spectrum of AM waves, Power relations in AM wave.

Frequency and Phase Modulation Theory: Mathematical Representation of FM, Frequency Spectrum of FM waves, Phase Modulation, Effect of Noise in Frequency Modulation.

Unit - IV

Signal Encoding Techniques: Transferring Analog Signals into a Digital form i.e. PCM, Delta Modulatio(DM), Digital Signal encoding Techniques: NRZ-L, NRZI, MultiLevel, Binary(Bipolar- AMI, Pseudoternary) Biphase(Manchester code & Differential Manchester code)

Encoding or Modulation Technique for Transforming Digital data into Analog Signals: ASK, FSK, PSK, BPSK and QPSK.

Unit - V

Data Communication Technologies: Asynchronous and Synchronous Transmission, Line Configurations: Point-to-Point, Multipoint, Simplex, Half Duplex and full duplex Transmission.

Multiplexing: FDM, TDM, Synchronous TDM, Statistical – TDM.

Circuit Switching Networks: Switching Concepts, Space division switching, Time division switching, Control Signaling(Inbound & outbound), Common channel Signaling.

Packet Switching Networks: Packet Switching Principles, Datagram packet switching & Virtual circuit packet switching , Frame Relay.

Interfacing: RS-232C, X.25, X.21, V.21 & V.28.

Computer Network: Gools and uses of Network, LAN, MAN, WAN, Network architecture & layering, OSI model and design Issues of Layers.

References Books:

1. WilliamStallings,"*Data and Computer Communications*", Pearson Education, Eighth Edition, Fourth Impression, 2009.
2. BehrouzA.Forouzan, "*Data Communications and Networking*", Tata McGraw-Hill Publishing Company Limited, New Delhi, Fourth Edition, Special Indian Edition, Eleventh Reprint, 2008.
3. GeorgeKennedy, "*Electronic Communication Systems*", Tata McGraw-Hill, Fourth Edition, 35th Reprint, 2008.

G.KMithal, "*Radio Engineering*", Khanna Publisher, 4thEdition, 2006

JAVA PROGRAMMING

CCA-503 **Cr. L T P**
4 3 1 0

Unit – I
Introduction to Java: Importance and features of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping: if..else, switch,?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.

Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

Unit – II
Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Run able interface, inter thread Communication, suspending, resuming and stopping threads.

Unit-III
Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. . Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming

Unit – IV
The Collection Framework: collection interfaces, collection classes(ArrayList, LinkedList, Hash set), Accessing a Collection via an Iterator, Vector, More utility class: StringTokenizer, Date.

Unit – V
Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, Java Applet. Beans: Introduction to Java Beans and Swings, Servlets

Reference Books:
1. Patrick Naughton and Herbertz Schildt, "*Java-2 the Complete Reference*", TMH, 7th Edition, 2006.
2. E. Balaguruswamy, "*Programming with Java:* A Primer", TMH, First Reprint, 2007.
3. Horstmann, "*Computing Concepts with Java 2 Essentials*", John Wiley and sons inc, Third Edition, 2003.
4. Kathy Sierra, "*Head First Java*", O'Rielly, Second Edition, February 2005.

THEORY OF COMPUTATION

CCA-505 **L T P Cr**

3 1 0 4

UNIT I:

Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem

UNIT II:

Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA, Pumping lemma.

UNIT III:

Context Free Languages – Leftmost and rightmost derivation, parsing and ambiguity, ambiguity in grammar and languages, normal forms

Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF.

UNIT IV:

Pushdown Automata – NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG.

UNIT V:

Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Decidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory, Chomsky Hierarchy

Textbooks:

1.An Introduction to Formal Languages and Automata, by Peter Linz, Third Edition, Narosa Publishers (1998)

2. Hopcroft, Ullman, "Introduction to Automata Theory,Languages and Computation", Pearson Education 3. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI Learning Private Limited, Delhi India.

4.Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishing house.

5. Y.N.Singh "Mathematical Foundation of Computer Science", New Age International.

6. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI Learning Private Limited, Delhi India.

7. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation, Pearson Education.

8. Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd

C# PROGRAMMING

CCA-507 **Cr. L T P**
4 3 1 0

UNIT - I

The CLR and .NET Framework: Understand the motivation behind the .NET platform, Common Language Infrastructure (CLI). Know the role of the Common Type System (CTS), the Common Language Specification (CLS) and the Common Language Runtime (CLR), Understand the assembly, metadata, namespace, type distinction, Contrast single-file and multi-file assemblies, Know the role of the Common Intermediate Language (CIL), Platform independent .NET(Mono / Portable .NET distributions).

UNIT - II

Evolution of C# Language: Language Fundamentals, Reference and value Types, primitive types the Nullable and enum types, Classes and objects, Defining classes Creating objects, Using static members, Garbage Collector, Overloading Methods, Various Constructors. Encapsulating data, access modifiers, properties, indexers arrays and readonly fields. Handling errors and throwing exceptions The Root object class. Inheritance and polymorphism specialization and generalization, Abstract classes, nesting of classes. Structures. String and DateTime classes.

UNIT - III

Event handling paradigm Delegates and events. Anonymous delegates and lambda expression
FUNC and Action delegates.

Generics Collections Interfaces, overriding interface implementation. Explicit interface implementation. Collection, IEnumerable, IEnumerator, IList, IComparer and their Generic equivalent. Working with generic List, Stack, Dictionary and Queue.

Programming Window Forms Applications:.The notifies - subscribers paradigm for handling events. .NET framework for handling GUI events. Introduction to WPF and building an WPF application **UNIT - IV Introducing LINQ and XML:** XML A quick introduction. LINQ and C#. Defining and executing a Query. Implicitly typed local variables. Anonymous Types, Extension Methods and Lambda Expressions. Putting LINQ to work. LINQ to SQL Fundamentals of ADO.NET Updating retrieving and deleting data using LINQ to SQL. **TEXT BOOKS:**

1. Jesse Liberty and Donald Xie , "Programming C# 3.0", O'REILLY.
2. J.G.R. Sathiaseelan, N Sasikaladevi, "Programming with C# .net", PHI, 2009.
3. Paul J. Deitel, Harvey Deitel, "C# 2008 for Programmers", Pearson, 3rd Ed., 2010.
4. Joseph Albahari and Ben Albhari, "C# 3.0/4.0 in NUTSHELL", O'REILLY.

REFERENCES:

1. Stephen C. Perry, AtulKahate, Stephen Walther, Joseph Mayo, "Essential of .net and Related Technologies with a focus on C#, XML, ASP.net and ADO.net", Pearson, 2nd Ed. 2009.
2. Jon Skeet, "C# in Depth ", O'REILLY

ADVANCE OPERATING SYSTEM

CCA-509 **Cr. L T P**
4 3 1 0

Unit-I
Introduction: Definition of operating systems, Operating System Design Issues, types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services.

Process Management: Process concept, Process scheduling, Cooperating processes, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

Unit-II
Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Unit-III
Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrasing, Page Size and other considerations, Demand segmentation.

Unit-IV
File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery,
Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

Unit-V
Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Case Study: Linux.

References Books:

1. Abraham Siberschatz and Peter Baer Galvin, "*Operating System Concepts",*Addision-Wesley,8th edition,2009.
2. Milan Milenkovie, "*Operating Systems, Concepts and Design*", McGraw-HillFifth Edition,2000.
3. Richard Peterson, "*Linux: The Complete Reference*", McGraw-Hill, sixth edition, 2007.
4. Harvey M Deital ,"O*perating Systems*", Addison-Wesley Pub. Co., Second Edition, 2007.

NETWORK SECURITY & CRYPTOGRAPHY

CCA-502 **Cr L-T-P**
4 3-1-0

Unit- I

Introduction to the Concept of Security: Introduction to Computer Security, Network Security, Cryptology & Cryptography, Introduction to Security attacks, Services and Mechanism. **Symmetric Key Encipherment:** Conventional encryption Model, Classical encryption techniques substitution ciphers & transposition ciphers, Crytanalysis, Stereography, Stream &Block Ciphers

Unit - II

Block Ciphers: Block Cipher Principals, Shannon's Theory of Confusion and Diffusion, Fiestal structure, DES, Strength of DES, Differential & Linear Cryptanalysis of DES, Block Cipher Modes of operation, Triple DES, IDEA encryption & Decryption, Strength of IDEA, Confidentiality using Conventional Encryption, Traffic confidentiality, key distribution, random number generation

Unit - III

Mathematics of Cryptography: Introduction to Graph, Ring and Field, Prime and relative prime numbers, Modular Arithmetic**,** Fermat's & Euler's Theorem, Primality Testing, Euclid's Algorithm, Chinese remainder theorem, Discrete logarithms. **Asymmetric Key Encipherment:** Principals of public key cryptosystems, RSA Algorithms, Security of RSA, key management, Diffle- Hellman key exchange algorithm.

Unit - IV

Integrity, Authentication & Hash Function: Authentication requirements, Authentication functions, Message Authentication Codes. Hash functions, Birthday Attacks, Security of Hash function & MAC, MD5 Message Digest Algorithm, Secure Hash Algorithm. **Digital Signatures:** Digital Signature, Authentication Protocol, DSS, Proof of Digital Signature Algorithms.

Unit - V

Network Security Applications: Authentication Applications: Kerberos & X.509, Directory Authentication Services **E-Mail Security:** PGP, S/MIME.**IP Security:** Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, key management. **Web Security:** Secure Socket Layer & Transport Layer Security , Secure electronic Transaction, **System Security:** Intruder, Intrusion Detection, Password Management. **Malicious Software:** Viruses and related threads. **Firewall:** Firewall design principles, trusted Systems

Reference Books:

1. William Stallings,"*Cryptography and Network Security: Principles and Practice"*, Pearson Education, 5th edition, First impression 2011.
2. Forouzan A.Behrouz, "*Cryptography and Network Security*", Tata McGraw Hill , 2nd Edition, 2008.
3. AtulKahate, "*Cryptography and Network Security"*, Tata McGraw Hill, 2nd Edition, 2006

SYSTEM PROGRAMMING

CCA-504 **Cr L-T-P**

4 3-1-0

Unit - I

Introduction To PC Architecture (Intel Pentium, PC Hardware, segments and addressing, Registers, Assembly Language Basics, Machine Addressing, special DEBUG features, Data Definition Directives, Addressing Formats, COM Programs.

Unit - II

Program Logic And Control Jmp, Loop and conditional jump Instructions, Boolean operations, Shifting, Rotating, Keyboard And Screen Processing, String Operations, Arithmetic Operations and Table Processing, Searching, sorting.

Unit - III

Macro Working and Linking, Macro Definition, The LOCAL Directive, Reception Directives, Conditional Directives, Intra-segment and Inter-segment calls, passing parameters, Advanced Screen and Keyboard Processing, BIOS Interrupt 16H for Keyboard input, Extended Function Keys.

Unit - IV

Disk Processing Disk Organization, File allocation Table, File Control Block, Sequential Reading of a Disk File, Random Processing, Miscellaneous disk Processing Features, File Handlers and Extended DOS functions, BIOS Disk Operations, Dos Memory Management, Program Segment Prefix, DOS Memory Control, Program loader, program overlays, Resident programs.

Unit - V

Assemblers And Macroprocessor, Design of Assembler, Data Structure, format of Databases, Algorithm, Macro instructions, Features of a macro facility, Atwopass algorithm and a single pass algorithm. LOADERS, Compile-and-go Loaders, General Loader Schemes, Absolute Relocating and Direct-Linking loaders.

Reference Books:

1. Peter Abel, "*IBM PC Assembly Language and Programming"*, Pearson Education, 5th Edition, 2009.
2. John J. Donovan," *Systems Programming"*, Tata McGraw-Hill, Fourth Edition,6th reprint, 2009.
3. Leland L.Beck, D. Manjula, "*System Software - An Introduction to System Programming"*, Pearson Education, 3rd Edition, 2009.
4. D. M. Dhamdhere, *"System Programming and Operating Systems"*, Tata McGraw-Hill, 2nd Edition, 2008.

COMPUTING AND ITS APPLICATION

CCA-506 **Cr L-T-P**
4 3-1-0

Unit - I
Introduction to soft computing, Aims of soft computing, Constituents of Soft Computing, Their Strengths and Weaknesses, Synergy of soft computing techniques.

Unit – II
Artificial Neural Network, Goals of Artificial Neural Network, Theoretical Properties of Artificial Neural Network, Applications of Artificial Neural Network.

Unit – III
Introduction to Genetic Algorithm,Optimization Problems, Genetic Operators, Crossover, Mutation, Comparison with other Optimization Techniques, Limitations of Genetic Algorithm.

Unit – IV
Machine Learning: Types of Problem and Tasks, Supervised Learning, Unsupervised Learning, Reinforcement Learning.

Unit-V
Introduction to fuzzy logic, Applying truth Variables, Linguistic Variables, Hard science withIF-THEN rules.

Reference Books:
1. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California.
2. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, .
3. "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, AddisonWesley, Reading, Mass.

KNOWLEDGE MANAGEMENT& EXPERT SYSTEM

CCA-508 **Cr. L T P**

4 3 1 0

Unit - I

Introduction to knowledge Management Distinction between data , information & knowledge. Concept of knowledge creation, Intellectual Capital Creation, Human Capital, Customer Capital and Organizational Capital

Unit-II

Socio-cultural aspects & organizational aspects Tacit & Explicit knowledge & Knowledge Organization . Knowledge Storage and Distribution, KM tools, Data warehouse, Data mining, knowledge management evaluation & Valuation of Knowledge.

Unit-III

K- Sharing Practices and Barriers. K – culture, KM In Indian organizations and MNC. Learning Organizations & Organizational Learning

Unit – IV

Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit-V

K-Initiative, K-Strategic issues in knowledge management, K-Commerce

Reference Books:

1. SudhirWarrier, "*Knowledge Management*", Vikas publishing House, New Delhi, First edition, 2007.
2. Thotharti Raman, "*Knowledge Management*", Excel Books ,New Delhi, First Edition,2004.
3. Stuart Barnes *"Knowledge Management Systems: Theory & Practice*", Thomson Learning Press, New Delhi, First Edition, 2002.
4. Ronald Maier, *"Knowledge Management System"*, Springer, Germany, Second Edition,2002.
5. AmritTiwana, "*Knowledge Management Tool Kit*", Pearson Education, New Delhi, First Edition, 2002.

COMPILER DESIGN

CCA-510 **Cr L-T-P**

4 3- 1- 0

Unit - I

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler, Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer, The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG

Unit - II

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers SLR, Canonical LR, LALR),Syntax Analyzer Generator: YACC, Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic Expressions, procedure calls, case statements, postfix translation.

Unit - III

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation Schemes, Symbol Table management

Unit - IV

Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit - V

Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Order of evaluation, Register allocation and code selection

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, "*Principles of Compiler Design"*, Narosa Publication, 2002
2. A.V. Aho, R. Sethi and J.D Ullman, "*Compiler: principle, Techniques and Tools"*, Addision Wesley, 2nd Edition, 2006.
3. H.C. Holub, "*Compiler Design in C"*, Prentice Hall Inc, Second Edition, Digitized Edition, 2010.
4. O.G. Kakde, "*Compiler Design"*, Laxmi Publication, Seventh Edition, 2007.

ADVANCED DBMS

CCA-601 **Cr. L T P**

4 3 1 0

Unit 1:

Introduction:Basic Concepts, Records and Files, Abstraction and Data Integration, Three-LevelArchitecture Proposal for DBMS, Components of a DBMS, Advantages and Disadvantages of a DBMS. Data Associations, Data Models.Classification: Relational Data Model, Network Data Model, Hierarchical Model. Manipulation, Updates, Implementation of data models, ER Diagrams.Relational Model: Relational Database, Relational Algebra, Relational Calculus. Relational Database Design, Relational Scheme and Relational Design.

Unit 2:

Anomalies in a Database: A Consequence of Bad Design, Universal Relation, Functional Dependency, Relational Database Design. Relational Database Manipulation, SQL, Data Manipulation, Basic Data Retrieval, Condition Specification, Arithmetic and Aggregate Operators. Normalization: 1NF, 2NF, 3NF,BCNF, 4NF, and other higher normal forms.

Unit 3:

SQL Join: Multiple Tables Queries, Set Manipulation, Categorization, Updates, Views. SQL Programming: Procedures, Cursors, Triggers.Concurrency Management, Serializability, Concurrency Control, Locking Scheme, Timestamp- Based Order, Optimistic Scheduling, Multiversion Techniques, Deadlock and Its Resolution. Database Security, Integrity, and Control, Security and Integrity, Threats, Defense Mechanisms, Integrity.

Unit 4:

Introduction to DDBMS: Fundamentals of DDBMS (Transparent management of distributed & replicated data, Reliability, Improved performance, System expansion), Types of DDBMS. Overview of three-tier Client server architecture.

Unit 5:

Data Fragmentation, Replication and allocation techniques for distributed database design. Query processing, concurrency control and recovery in DDBMS.

Text Books:

1. Desai, B., ―An Introduction To Database Concepts, Galgotia Publications, New Delhi.

2. Elimsari And Navathe, ―Fundamentals of Database Systems, Addison Wesley, New York.

Reference Books:

1. Date C.J., ―An Introduction to Database Systems, Narosa Publishing House, New Delhi.

2. Ullman, J.D, ―Principals of Database Systems, Galgotia Publications, New Delhi.

3. M. Tamer Ozsu& Patrick Valduriez, ―Principles of Distributed Database Systems‖, Pearson Education Asia.

ADVANCE DAA

CCA-603 **Cr. L T P**
4 3 1 0

Unit-I
Introduction to Algorithms Analysis of algorithm, Design of algorithm, complexity of algorithm, asymptotic notations, Recurrences. Sorting in polynomial time: Insertion sort, Merge sort, Quick sort, heap sort. Sorting in linear time: counting sort, bucket sort, radix sort. Medians and order statics.

Unit-II
Elementary data structure binary search tree. **Advanced data structure** Red Black tree, Augmenting data structure, binomial heaps, B-tree, Fibonacci heap and data structure for disjoint sets.

Unit-III
Advanced design and analysis techniques Dynamic programming, Greedy algorithm, Backtracking, Amortized analysis.

Unit-IV
Graph algorithm Breadth first search, Depth first search, Minimum spanning tree, Kruskal's algorithms, Prim's algorithms, Single source shortest path, All pair shortest path, Maximum flow and Traveling salesman problem.

Unit-V
String matching: The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm.
Randomized algorithms, string matching, NP-hard and NP-completeness, Approximation algorithms.

References Books :

4 Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein,*Introduction to Algorithm,* Tata Mc-Graw Hill, 2nd Edition, 2003.
5 Horowitz Sahani, *Fundamentals of Computers Algorithm*, Golgotia Publications, 1998.
3. Parag H. Dave, Himanshu B. Dave, *Design and Analysis of Algorithms*, Pearson Education, 2008.

EXPERT INTELLIGENCE SYSTEM

CCA-605 **Cr. L-T-P**
4 3- 1- 0

Unit - I
Introduction: Introduction to Artificial Intelligence, History, What is AI, Importance of AI, Issues, Simulation of sophisticated & Intelligent Behaviors in different area, problem solving in games, natural language, automated reasoning, visual perception, Search algorithms: Informed search, Uninformed search, Hill Climbing, Depth first search, Best first search, And or graph.

Unit - II
Processing and understanding Natural Languages: Understanding Natural Languages: Applications of Natural Languages, Natural Language processing,Parsing techniques: Rules of parsing, Top down parsing, Bottom up parsing, Transformational grammars, Context free grammar, Transition networks, Fillmore's grammars, Shanks Conceptual Dependency.

Unit - III
Knowledge Representation: Graphs, Frames structuresand related structures, Semantic Nets and Partitioned Nets,Scripts, Introduction to PROLOG, Production Rules, Knowledge Based systems, Inference engine, Forward deductions and backward deductions, Matching production rules against working memory.

Unit - IV
Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit - V
Pattern Recognition Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception, Semantic & Model, Object Identification, Speech Recognition. **Programming Language** Introduction to programming Language, LISP, PROLOG.

Reference Books :

1. Char Nick, "*Introduction to Artificial Intelligence"*, Addision Wesley, 2007.
2. Stuart Russell and Peter Norvig, ``*Artificial Intelligence: A Modern Approach*.", Prentice Hall, Third Edition, 2010.
3. Elaine Rich, Kevin Knight and Shivashankar B.Nair, "*Artificial Intelligence*", Tata McGraw-Hill, Third edition, 2009.
4. Patrick Henry Winston and Berthold Horn, " *LISP"*, Addison Wesley, Third Edition, 2010.
5. Marcellous, "*Expert Systems Programming"*, Prentice Hall Inc., Third Edition,2009.
6. Elamie, "*Artificial Intelligence"*, Academic Press, Third Edition, 2007.
7. Dan W. Patterson, *"Artificial Intelligence and Expert Systems*",PHI Learning Private Limited, Third Edition, 2009.

DISTRIBUTED OS

CCA-607 **Cr. L T P**

4 3 1 0

UNIT I:

Introduction: Distributed Computing Models, Software Concepts, Hardware Concepts,The Client-Server model, Issues in design of a distributed operating system.

UNIT II:

COMMUNICATION: Introduction to Message Passing, Advantages and features of message passing, Message format, Message Buffering, Remote Procedure Call, ExtendedRPC Models, Remote Object Invocation, Message Oriented Communication.

UNIT III:

Processes And Synchronization: Threads, code migration, clock synchronization, logicalclocks, global state, Election algorithms, mutual exclusion, Distributed transaction.

UNIT IV:

Distributed Deadlock Detection: System model, Resources vs. communicationdeadlocks, deadlock prevention, avoidance, detection and resolution, Centralized deadlockdetection, distributed deadlock detection, path pushing and edge chasing algorithm

UNIT V: Distributed Shared Memory: Introduction, General architecture of distributed sharedmemory, Design and implementation, Issues of DSM, Granularity, structure of sharedmemory space, consistency models, thrashing, advantages of DSM

UNIT VI: Distributed File System: Introduction, Desirable features of good distributed file system,file models, file accessing, sharing, caching methods, file replication, fault tolerance, CaseStudy: CORBA(CORBA RMI and Services)

TextBooks:

1 Andrew Tanenbaum, Maarten Van Steen, "Distributed System-Principals Paradigm", PHI Publication.

2 Singhal and Shivratri, "Advanced Concept in Operating Systems", McGraw Hill.

NEURAL NETWORK

UCA 601 **Cr. L T P**

4 3 1 0

UNIT – I INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT – II ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT – III SINGLE LAYER FEED FORWARD NETWORKS

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, TrainingAlgorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

UNIT – IV MULTI- LAYER FEED FORWARD NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - V ASSOCIATIVE MEMORIES

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis. Neural network applications: Process identification, control, faultdiagnosis.

REFERENCES

1. Laurene Fausett, "Fundamentals of Neural Networks" , Pearson Education, 2004..
2. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2003.
3. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TATA Mc Graw Hill, 2006.
4. S. Rajasekharan and G. A. Vijayalakshmi pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2004.
4. Timothy J. Ross, " Fuzzy Logic With Engineering Applications", Tata McGraw- Hill Inc. 2000

Mobile Computing

CCA 51 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Mobile Computing

This unit covers the fundamentals of mobile computing, including its evolution, definitions, and scope. It explores mobile computing applications and the types of mobile computing devices. The unit discusses various architectures, such as client-server and peer-to-peer, and introduces mobile communication protocols.

Unit 2: Mobile Communications and Networking

This unit delves into wireless communication systems, including cellular networks, satellite communication, and Wi-Fi. Topics include GSM, GPRS, and 3G/4G/LTE standards, as well as mobile IP and TCP. The unit also explores challenges in mobile network design, including handoff, roaming, and network congestion.

Unit 3: Mobile Application Development

This unit introduces mobile application platforms and development environments. Key topics include the mobile app lifecycle, app architecture, and mobile UI design principles. The unit provides an overview of Android and iOS app development, covering essential concepts like user interaction, activity lifecycle, and data persistence.

Unit 4: Mobile Operating Systems

This unit focuses on mobile operating systems such as Android, iOS, and Windows Phone. It explores system architecture, file systems, security, and app management. The unit examines the unique requirements of mobile OS design, including power management, multitasking, and security protocols.

Unit 5: Data Management in Mobile Computing

This unit addresses data storage, retrieval, and synchronization in mobile environments. Topics include cloud storage solutions, mobile database systems, and synchronization mechanisms. The unit explores data consistency, offline access, and techniques for data optimization in mobile applications

Computer Graphics

CCA 512 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Computer Graphics

This unit introduces the fundamentals of computer graphics, including its applications, history, and essential terminology. It covers basic concepts such as graphics hardware, display devices, and coordinate systems, along with an overview of graphics software.

Unit 2: Graphics Primitives and Drawing Algorithms

This unit explores fundamental graphics primitives, such as points, lines, and circles, and their role in rendering images. It includes algorithms for line drawing (e.g., DDA and Bresenham's algorithms) and circle drawing, as well as polygon filling methods like scanline fill and boundary fill.

Unit 3: 2D Transformations and Viewing

This unit covers the mathematical foundations of 2D transformations, including translation, rotation, scaling, and shearing. It discusses matrix representations of transformations, homogeneous coordinates, and composite transformations. Topics also include windowing, viewport transformations, and clipping algorithms like Cohen-Sutherland and Liang-Barsky.

Unit 4: 3D Transformations and Viewing

Building on 2D concepts, this unit introduces 3D transformations, including 3D rotation, translation, scaling, and projection transformations. It covers the 3D viewing pipeline, perspective and parallel projections, and transformations for viewing in three-dimensional space.

Unit 5: Illumination, Shading, and Color Models

This unit delves into the principles of light, color, and shading in computer graphics. It covers color models like RGB, CMYK, and HSV, as well as illumination models and shading techniques, including flat shading, Gouraud shading, and Phong shading.

Computer Based Numerical & Statistical Techniques

CCA 511 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Numerical Methods

This unit covers the basics of numerical methods, including error analysis, sources of error, and types of errors such as absolute, relative, and percentage errors. Concepts of numerical stability, convergence, and significant figures are discussed, setting a foundation for solving computational problems accurately.

Unit 2: Solution of Nonlinear Equations

This unit focuses on methods for finding roots of nonlinear equations, including iterative techniques like the bisection method, Newton-Raphson method, and secant method. Criteria for convergence, applications of root-finding methods, and considerations for choosing appropriate techniques are explored.

Unit 3: Interpolation and Curve Fitting

This unit delves into interpolation methods for estimating values within a given data set. Polynomial interpolation techniques, such as Newton's and Lagrange's interpolation, are introduced alongside spline interpolation. Curve fitting using least squares regression is also covered, highlighting applications in data analysis.

Unit 4: Numerical Differentiation and Integration

This unit introduces methods for numerical differentiation and integration, including finite differences, trapezoidal rule, and Simpson's rule. Practical applications of these techniques in engineering and scientific calculations are covered, along with discussions on truncation and round-off errors.

Unit 5: Statistical Methods and Probability Distributions

This unit provides an overview of statistical methods and probability distributions, covering measures of central tendency and dispersion, basic probability theory, and key distributions such as binomial, Poisson, and normal distributions. Hypothesis testing, correlation, and regression analysis are introduced, applying statistical techniques to computational data analysis.

Introduction to Numerical Methods

CCA 511A **Cr. L T P**

4 3 1 0

Unit 1: Fundamentals of Numerical Methods

This unit introduces the basic concepts and significance of numerical methods in solving mathematical problems. It covers the types of numerical errors, including truncation and round-off errors, and discusses the importance of accuracy and precision in numerical computations. The unit also includes an overview of numerical algorithms and their applications in various fields.

Unit 2: Solutions of Linear Equations

This unit focuses on methods for solving systems of linear equations. It covers direct methods such as Gaussian elimination and matrix factorization techniques, including LU decomposition. The unit also discusses iterative methods like Jacobi and Gauss-Seidel methods, addressing convergence criteria and practical applications of these techniques in engineering and computational problems.

Unit 3: Interpolation and Approximation

This unit explores interpolation techniques used to estimate unknown values from known data points. It covers polynomial interpolation methods such as Lagrange and Newton's interpolation, as well as spline interpolation for piecewise approximation. The unit emphasizes error analysis in interpolation and discusses the importance of approximation in numerical analysis.

Unit 4: Numerical Differentiation and Integration

This unit introduces techniques for numerical differentiation and integration. It covers finite difference methods for approximating derivatives and various numerical integration methods, including the trapezoidal rule and Simpson’s rule. The unit also discusses the concepts of error estimation in numerical integration and the applications of these methods in solving real-world problems.

Unit 5: Ordinary Differential Equations

This unit focuses on numerical methods for solving ordinary differential equations (ODEs). It covers initial value problems and discusses methods such as Euler's method, Runge-Kutta methods, and multi-step methods. The unit emphasizes stability, convergence, and error analysis

in the context of ODEs, providing insights into the practical applications of these techniques in modeling dynamic systems.

Statistical Methods for Data Analysis

CCA 511B **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Statistics and Data Exploration

This unit introduces the fundamental concepts of statistics, including types of data, data collection methods, and descriptive statistics. It covers measures of central tendency such as mean, median, and mode, as well as measures of dispersion like range, variance, and standard deviation. The unit emphasizes data visualization techniques, including histograms, box plots, and scatter plots, to aid in exploratory data analysis.

Unit 2: Probability Theory and Distributions

This unit focuses on the foundational principles of probability theory and its role in statistical analysis. It covers concepts such as probability rules, conditional probability, and Bayes' theorem. The unit also introduces discrete and continuous probability distributions, including the binomial, Poisson, normal, and exponential distributions. Applications of these distributions in real-world scenarios are discussed to illustrate their relevance.

Unit 3: Inferential Statistics and Hypothesis Testing

This unit explores the principles of inferential statistics, including estimation, confidence intervals, and hypothesis testing. It covers the formulation of null and alternative hypotheses, types of errors, and significance levels. Various hypothesis tests, such as t-tests, chi-square tests, and ANOVA, are introduced, along with their applications in comparing groups and making inferences from sample data.

Unit 4: Regression Analysis

This unit delves into regression analysis, focusing on simple linear regression and multiple regression techniques. It covers the principles of modeling relationships between variables, estimating parameters, and assessing model fit using R-squared and residual analysis. The unit also discusses assumptions of regression analysis and introduces logistic regression for binary outcomes, highlighting applications in predictive modeling.

Unit 5: Advanced Statistical Methods

This unit covers advanced statistical techniques used for data analysis, including non-parametric tests, time series analysis, and multivariate analysis. It introduces methods such as Kruskal-

Wallis test, Mann-Whitney U test, and principal component analysis (PCA). The unit emphasizes the application of these advanced techniques in complex data scenarios and discusses the interpretation of results to inform decision-making.

Linear Algebra and Matrix Computations

CCA 511C **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Linear Algebra

This unit covers the fundamental concepts of linear algebra, including the definition and properties of vectors and matrices. It introduces operations such as addition, scalar multiplication, and matrix multiplication. The unit also discusses special types of matrices, such as square, diagonal, and identity matrices, and emphasizes the importance of linear combinations and span in vector spaces.

Unit 2: Systems of Linear Equations

This unit focuses on methods for solving systems of linear equations, including Gaussian elimination and matrix inversion techniques. It covers the concepts of consistency and uniqueness of solutions and introduces the rank of a matrix and its implications for the solution of linear systems. The unit also discusses applications of linear systems in various fields, such as engineering and computer science.

Unit 3: Determinants and Eigenvalues

This unit explores determinants and their properties, including methods for calculating determinants and applications in solving linear equations. The unit introduces eigenvalues and eigenvectors, discussing their significance in linear transformations and matrix diagonalization. It also covers the characteristic polynomial and the spectral theorem, emphasizing their applications in data analysis and system stability.

Unit 4: Vector Spaces and Linear Transformations

This unit delves into the concepts of vector spaces, subspaces, and bases. It introduces linear transformations, including their properties and representations using matrices. The unit discusses the relationship between linear transformations and matrix multiplication, as well as concepts of the kernel and image of a transformation. Applications of vector spaces in various domains, such as computer graphics and optimization, are also highlighted.

Unit 5: Numerical Methods in Linear Algebra

This unit focuses on numerical techniques for performing matrix computations, including methods for solving linear systems, eigenvalue problems, and matrix factorizations such as LU and QR decompositions. It covers the concepts of numerical stability and conditioning, as well as iterative methods for large systems. The unit emphasizes the practical implementation of these methods using computational tools and libraries.

Regression Analysis and Modeling

CCA 511C **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Regression Analysis

This unit introduces the fundamental concepts of regression analysis, including its purpose and applications in statistical modeling. It covers the basic terminology and principles of simple linear regression, focusing on the relationship between dependent and independent variables. The unit discusses the interpretation of regression coefficients, goodness-of-fit measures, and the assumptions underlying linear regression models.

Unit 2: Multiple Regression Analysis

This unit expands on simple linear regression to explore multiple regression analysis. It covers the formulation of the multiple regression model, including interactions and polynomial terms. The unit discusses techniques for assessing model fit, including adjusted R-squared and F-tests, and examines the implications of multicollinearity. Practical considerations in model selection and evaluation, including variable selection methods, are also addressed.

Unit 3: Model Diagnostics and Validation

This unit focuses on model diagnostics and validation techniques to assess the adequacy of regression models. It covers residual analysis, including checking for homoscedasticity, normality, and independence of errors. The unit discusses outlier detection and influence measures, such as Cook's distance, and emphasizes the importance of cross-validation techniques to ensure the robustness of the regression models.

Unit 4: Advanced Regression Techniques

This unit explores advanced regression techniques, including logistic regression for binary outcomes and other generalized linear models. It discusses the use of regression for categorical data, including multinomial and ordinal logistic regression. The unit also introduces regularization techniques such as Lasso and Ridge regression to address overfitting and enhance model performance.

Unit 5: Applications of Regression Modeling

This unit examines real-world applications of regression modeling across various fields such as economics, healthcare, and social sciences. It covers case studies and practical examples demonstrating the use of regression analysis in predictive modeling and decision-making. The unit emphasizes the interpretation of results and the communication of findings to stakeholders, highlighting the ethical considerations in data analysis and modeling.

Introduction to Programming and Computer Organization

CCA 513 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Programming Concepts

This unit covers the fundamental concepts of programming, including the basic syntax and structure of programming languages. It introduces key programming constructs such as variables, data types, operators, and control structures including conditionals and loops. The unit emphasizes problem-solving techniques and algorithm development, preparing students for writing simple programs.

Unit 2: Functions and Modular Programming

This unit focuses on the concepts of functions and modular programming. It covers the definition and usage of functions, including parameters and return values. The unit discusses the importance of code reusability and organization, exploring topics such as function overloading and recursion. Practical exercises reinforce the development of modular code for solving complex problems.

Unit 3: Data Structures and Algorithms

This unit introduces fundamental data structures such as arrays, linked lists, stacks, and queues. It covers the implementation and application of these data structures in programming. The unit also discusses basic algorithms, including searching and sorting techniques, emphasizing their efficiency and performance. Practical examples are used to illustrate the importance of choosing the right data structure for specific problems.

Unit 4: Basics of Computer Organization

This unit provides an overview of computer organization, covering the architecture of computer systems. It discusses the components of a computer, including the CPU, memory, and input/output devices. The unit introduces concepts such as data representation, binary arithmetic, and assembly language basics. It emphasizes the relationship between hardware and software, preparing students for deeper exploration of computer systems.

Unit 5: Introduction to Operating Systems

This unit introduces the fundamentals of operating systems, covering their role and functions in managing computer resources. It discusses processes, memory management, and file systems. The unit explores various operating system concepts, including multitasking, scheduling, and synchronization. Practical examples highlight the interaction between programming and operating system functionalities, preparing students for further studies in system programming.

Information Systems Management

CCA 506A **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Information Systems

This unit provides an overview of information systems and their role in organizations. It covers the types of information systems, including transaction processing systems, management information systems, and decision support systems. The unit discusses the components of information systems, including hardware, software, data, people, and processes, as well as the strategic importance of information systems in modern business.

Unit 2: Information Systems and Organizational Strategy

This unit examines the role of information systems in shaping organizational strategy. It discusses how information systems support competitive advantage, streamline operations, and enable innovation. Topics include value chain analysis, strategic alignment of IT and business goals, and the role of enterprise systems in integrating business functions. Case studies are used to illustrate the strategic impact of information systems.

Unit 3: Managing Information Technology Infrastructure

This unit covers the planning, development, and management of IT infrastructure within organizations. It includes an overview of hardware, software, networking, and data management. The unit discusses cloud computing, virtualization, and emerging technologies that influence IT infrastructure decisions. Key concepts in IT service management and cost management are introduced, with a focus on optimizing IT resources.

Unit 4: Data Management and Business Intelligence

This unit focuses on the management of data as a critical organizational asset. Topics include database management systems, data warehousing, and data governance. The unit introduces business intelligence and analytics, discussing how data is used to support decision-making and gain insights. Topics such as big data, data mining, and predictive analytics are covered, highlighting their applications in real-world business scenarios.

Unit 5: Information Systems Security and Ethical Issues

This unit addresses the importance of information systems security and ethical considerations in managing information systems. It covers topics such as cybersecurity threats, risk management, and security policies. The unit also explores privacy, data protection regulations, and ethical issues related to information systems. Case studies illustrate best practices for securing information assets and maintaining ethical standards in information systems management.

Enterprise Resource Planning

CCA 506B **Cr. L T P**

4 3 1 0

Unit 1: Introduction to ERP Systems

This unit provides an overview of Enterprise Resource Planning (ERP) systems, their purpose, and their role in modern organizations. It covers the evolution of ERP from legacy systems, the characteristics of ERP systems, and the benefits they offer. The unit also introduces core ERP components, such as finance, human resources, manufacturing, and supply chain management, emphasizing the need for integration across business functions.

Unit 2: ERP and Business Process Integration

This unit examines how ERP systems facilitate business process integration. It discusses key concepts such as business process reengineering (BPR), workflow automation, and data integration. The unit covers how ERP systems streamline processes across departments and enhance information flow, improving efficiency and decision-making. Real-world examples illustrate the transformation of business processes through ERP.

Unit 3: ERP Implementation Lifecycle

This unit focuses on the ERP implementation process, including the stages of ERP lifecycle: planning, design, implementation, testing, and go-live. It discusses key factors for successful implementation, such as change management, user training, and project management. The unit also addresses common challenges in ERP implementations, such as cost overruns, resistance to change, and data migration issues.

Unit 4: ERP Systems and Technology

This unit covers the technical aspects of ERP systems, including system architecture, cloud-based ERP, and ERP software modules. It introduces leading ERP software solutions, such as SAP, Oracle, and Microsoft Dynamics, and discusses criteria for selecting the right ERP system for a business. The unit also explores emerging technologies, such as artificial intelligence (AI), Internet of Things (IoT), and analytics, and their integration with ERP systems.

Unit 5: Post-Implementation and ERP Maintenance

This unit addresses the post-implementation phase of ERP and focuses on system maintenance, upgrades, and performance optimization. It discusses the importance of ongoing support and user training for maintaining ERP effectiveness. The unit also covers ERP performance metrics, continuous improvement, and assessing return on investment (ROI). Case studies highlight the impact of ERP on long-term business success.

Information Security Management

CCA 506C **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Information Security

This unit covers the fundamentals of information security, including the concepts of confidentiality, integrity, and availability (CIA triad). It introduces key terms, types of threats, and the importance of securing information assets. The unit explores the goals of information security and provides an overview of cybersecurity frameworks, such as ISO/IEC 27001 and NIST.

Unit 2: Risk Management and Assessment

This unit focuses on risk management principles, including risk identification, assessment, and mitigation strategies. It covers risk assessment methodologies, such as qualitative and quantitative analysis, and discusses the importance of implementing risk management practices. The unit also addresses security policies, asset classification, and strategies for managing security risks in organizations.

Unit 3: Security Technologies and Controls

This unit introduces various security technologies and controls used to protect information systems. Topics include firewalls, intrusion detection systems, encryption, access control, and endpoint security. The unit covers technical, administrative, and physical controls, emphasizing how they work together to secure systems. It also explores the role of identity and access management (IAM) in protecting digital resources.

Unit 4: Security Governance, Compliance, and Legal Issues

This unit discusses security governance frameworks, regulatory compliance requirements, and legal issues in information security. It covers standards like GDPR, HIPAA, and SOX, as well as industry-specific regulations. The unit emphasizes the importance of security policies, incident

response plans, and audit practices in maintaining compliance and addressing legal challenges in information security.

Unit 5: Incident Response and Business Continuity

This unit focuses on incident response planning, disaster recovery, and business continuity management. It covers the steps involved in detecting, analyzing, and responding to security incidents, including the role of a Computer Security Incident Response Team (CSIRT). The unit also explores business continuity planning, data backup, and recovery strategies, emphasizing their importance in minimizing the impact of security incidents.

Business Process Management

CCA 506D **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Business Process Management

This unit provides an overview of Business Process Management (BPM), its purpose, and its significance in enhancing organizational performance. It covers basic BPM concepts, including process identification, modeling, and improvement. The unit discusses the lifecycle of BPM and explores the benefits of process-oriented management in aligning operations with strategic goals.

Unit 2: Process Modeling and Analysis

This unit focuses on process modeling techniques, such as flowcharts, Business Process Model and Notation (BPMN), and data flow diagrams. It covers the principles of process mapping and introduces tools for visualizing workflows. The unit also discusses methods for analyzing processes to identify inefficiencies, bottlenecks, and areas for improvement, emphasizing the importance of detailed process documentation.

Unit 3: Process Design and Improvement

This unit explores techniques for designing and improving business processes. Topics include process redesign, reengineering, and optimization, with a focus on methodologies like Lean, Six Sigma, and Total Quality Management (TQM). The unit addresses strategies for improving process efficiency, reducing costs, and enhancing quality, as well as the role of innovation in process improvement.

Unit 4: Process Automation and Technology Integration

This unit examines the role of technology in automating and supporting business processes. It covers automation tools such as Robotic Process Automation (RPA) and discusses the integration of Enterprise Resource Planning (ERP) and Customer Relationship Management

(CRM) systems in BPM. The unit explores how digital transformation, artificial intelligence (AI), and data analytics can drive process efficiency and agility.

Unit 5: BPM Governance and Performance Management

This unit addresses BPM governance and the importance of establishing a framework for monitoring and managing process performance. Topics include key performance indicators (KPIs), process metrics, and the use of dashboards for real-time monitoring. The unit also discusses change management, stakeholder engagement, and best practices for sustaining process improvements and ensuring continuous alignment with organizational objectives.

Computing & Its Application

UCA 502 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Computing

This unit provides an overview of computing, including the history and evolution of computers and computing technologies. It introduces the basic components of a computer system, such as hardware, software, and networks, and explores the fundamental concepts of data processing. The unit also discusses types of computer systems, from personal computers to mainframes, and their applications in various fields.

Unit 2: Computer Software and Operating Systems

This unit focuses on the role of software in computing, covering types of software such as system software, application software, and programming languages. It explores the functions and architecture of operating systems, including process management, memory management, and file systems. The unit also introduces popular operating systems like Windows, macOS, and Linux, emphasizing their features and applications.

Unit 3: Data Management and Databases

This unit introduces data management concepts and database systems. It covers the basics of database management systems (DBMS), including relational databases, SQL, and data models. The unit discusses the importance of data storage, retrieval, and management in supporting business applications, as well as the role of data warehouses and cloud storage in modern data management.

Unit 4: Networking and the Internet

This unit provides an overview of networking fundamentals, including network types (LAN, WAN), protocols, and internet technologies. It covers the basics of TCP/IP, DNS, and network security, emphasizing their roles in enabling communication and data exchange. The unit

explores the impact of the internet on business, society, and daily life, with an introduction to emerging concepts like the Internet of Things (IoT).

Unit 5: Applications of Computing in Various Fields

This unit examines the diverse applications of computing across different industries, including healthcare, education, finance, and entertainment. It explores topics such as e-commerce, digital marketing, artificial intelligence, and machine learning, highlighting how these technologies are transforming business operations and enhancing decision-making. The unit also discusses ethical and societal considerations in the application of computing technologies.

Management Information System

UCA 504 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Management Information Systems

This unit provides an overview of Management Information Systems (MIS), its components, and its role in organizations. It covers the key concepts of information systems, including data, information, and knowledge, and explores the importance of MIS in decision-making and operational efficiency. The unit also discusses the evolution of MIS and the types of information systems used in business, such as transaction processing systems and executive support systems.

Unit 2: Information Systems and Business Strategy

This unit examines the role of MIS in supporting business strategy and achieving competitive advantage. It discusses strategic models like Porter's Five Forces and the value chain and how information systems can enhance organizational capabilities. The unit explores the alignment of IT strategy with business goals, focusing on enterprise applications like ERP, CRM, and SCM that enable integration and collaboration.

Unit 3: System Development and Implementation

This unit focuses on the processes involved in developing and implementing MIS. It covers the system development life cycle (SDLC), including planning, analysis, design, implementation, and maintenance. The unit also introduces alternative methodologies, such as agile and prototyping. Topics include requirements gathering, feasibility analysis, and the challenges and best practices in MIS implementation.

Unit 4: Data Management and Business Intelligence

This unit covers the importance of data management in MIS, including database management systems (DBMS) and data warehousing. It introduces data mining, business intelligence, and analytics to support informed decision-making. The unit explores data visualization techniques

and reporting tools, focusing on how MIS leverages data for insights into business performance and market trends.

Unit 5: Security, Ethical, and Social Issues in MIS

This unit addresses the security, ethical, and social considerations in MIS. It covers topics like cybersecurity threats, risk management, and data privacy, including regulations such as GDPR. The unit also explores ethical issues related to information systems, such as intellectual property, digital rights, and social responsibility, emphasizing the need for secure and ethical management of information systems.

Software Project Management

UCA 506 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Software Project Management

This unit provides an overview of software project management, including its purpose, scope, and key principles. It covers the roles and responsibilities of a project manager and introduces project management frameworks, methodologies, and processes. Topics include project life cycles, the importance of effective project planning, and an introduction to common project management standards like PMBOK and Agile.

Unit 2: Project Planning and Scheduling

This unit focuses on project planning, including defining project scope, objectives, and deliverables. It covers techniques for creating work breakdown structures (WBS), estimating resources, time, and costs, and developing project schedules. The unit introduces tools like Gantt charts and PERT diagrams, as well as techniques for managing project dependencies and critical paths to ensure timely completion.

Unit 3: Risk Management in Software Projects

This unit addresses risk management in software projects, including identifying, analyzing, and mitigating risks. It covers types of project risks, such as technical, operational, and resource risks, and introduces qualitative and quantitative risk assessment techniques. The unit emphasizes the importance of proactive risk management, contingency planning, and tools like risk matrices and impact analysis.

Unit 4: Project Monitoring, Control, and Quality Management

This unit focuses on monitoring and controlling project progress, including tracking project performance, managing changes, and ensuring quality. Topics include key performance indicators (KPIs), earned value management (EVM), and quality management practices such as

software testing and quality assurance. The unit also discusses corrective actions, issue tracking, and maintaining alignment with project goals.

Unit 5: Project Closure and Evaluation

This unit covers the final stages of a software project, including project delivery, documentation, and evaluation. It discusses the importance of conducting post-project reviews, capturing lessons learned, and assessing project success against objectives and metrics. The unit also addresses project handover, client satisfaction, and continuous improvement in project management practices.

Introduction to Expert Systems

CCA 605A

Cr. L T P

4 3 1 0

Unit 1: Fundamentals of Expert Systems

This unit introduces the basic concepts of expert systems, their history, and their significance in artificial intelligence. It covers the characteristics and components of expert systems, including the knowledge base, inference engine, and user interface. The unit also explores the advantages and limitations of expert systems and provides an overview of various applications in fields such as medicine, engineering, and finance.

Unit 2: Knowledge Representation and Acquisition

This unit focuses on knowledge representation techniques used in expert systems, including rules, frames, semantic networks, and logic-based representations. It discusses the process of knowledge acquisition and elicitation from domain experts, as well as methods for structuring and organizing knowledge. The unit also introduces knowledge engineering and explores tools and techniques for building a robust knowledge base.

Unit 3: Inference Mechanisms and Reasoning

This unit delves into the inference mechanisms that drive expert systems, including forward and backward chaining, rule-based reasoning, and case-based reasoning. It discusses various reasoning approaches, such as deduction, induction, and abduction, and covers uncertainty management techniques like fuzzy logic and probabilistic reasoning. Practical examples illustrate how inference engines draw conclusions based on knowledge.

Unit 4: Expert System Development and Tools

This unit covers the methodologies and tools used in developing expert systems. It introduces development frameworks, including knowledge-based shell systems, and discusses prototyping and iterative development. The unit explores various expert system development environments

and languages, such as CLIPS and Prolog, providing hands-on experience with popular tools used to design and implement expert systems.

Unit 5: Applications, Ethics, and Future of Expert Systems

This unit examines real-world applications of expert systems in areas such as healthcare, finance, and customer service. It discusses the ethical implications of expert systems, including issues of trust, transparency, and accountability. The unit also explores the future of expert systems, the integration with machine learning and AI, and emerging trends in intelligent systems, highlighting the evolving role of expert systems in modern technology.

Knowledge Representation and Reasoning

CCA 605B

Cr. L T P

4 3 1 0

Unit 1: Introduction to Knowledge Representation

This unit covers the basics of knowledge representation, its significance in artificial intelligence, and the challenges involved in representing real-world knowledge. It explores the key characteristics of an effective knowledge representation system, including expressiveness, efficiency, and inferencing ability. The unit also introduces various forms of knowledge representation, such as declarative, procedural, and structural approaches.

Unit 2: Logic-Based Representation

This unit delves into logic-based representation techniques, covering propositional and predicate logic. It discusses logical connectives, quantifiers, and the syntax and semantics of logical expressions. The unit introduces the concepts of resolution and unification in logic, along with inference rules and theorem proving, to enable reasoning and problem-solving in logical systems.

Unit 3: Semantic Networks and Frames

This unit explores structured knowledge representation techniques, including semantic networks and frames. It covers how entities, relationships, and attributes are represented in semantic networks, along with inheritance and hierarchical relationships. The unit also discusses frames as a way to organize structured data, emphasizing slot-filler structures and their applications in representing real-world objects and scenarios.

Unit 4: Rule-Based Systems and Production Rules

This unit focuses on rule-based systems as a method of knowledge representation. It covers production rules, rule chaining (forward and backward), and the structure of rule-based inference engines. The unit also examines the strengths and limitations of rule-based reasoning, discussing

examples of rule-based expert systems and their applications in problem-solving and decision-making.

Unit 5: Reasoning Under Uncertainty

This unit addresses reasoning methods used when information is incomplete or uncertain. It introduces probabilistic reasoning, Bayesian networks, fuzzy logic, and belief networks, exploring how they are used to handle uncertainty in knowledge representation. The unit covers key concepts in uncertainty management and discusses applications of these techniques in fields like diagnostics, decision support, and robotics.

Expert System Design and Development

CCA 605C

Cr. L T P

4 3 1 0

Unit 1: Fundamentals of Expert Systems

This unit provides an introduction to expert systems, defining their purpose, components, and applications in artificial intelligence. It covers the architecture of expert systems, including the knowledge base, inference engine, and user interface. The unit also introduces knowledge acquisition methods and the role of expert systems in fields like healthcare, finance, and engineering.

Unit 2: Knowledge Representation Techniques

This unit explores different knowledge representation methods crucial for designing expert systems. It covers rule-based representation, semantic networks, frames, and object-oriented representations. The unit emphasizes the importance of structured knowledge and discusses the pros and cons of each representation method, focusing on their suitability for various expert system applications.

Unit 3: Inference Mechanisms and Reasoning Strategies

This unit delves into inference mechanisms essential for expert systems to perform reasoning. It covers rule-based reasoning (forward and backward chaining), case-based reasoning, and the handling of uncertainty using fuzzy logic and probabilistic reasoning. The unit also introduces hybrid reasoning approaches, illustrating how inference engines draw conclusions from structured knowledge.

Unit 4: Expert System Development Process and Tools

This unit focuses on the process of developing expert systems, from initial knowledge acquisition and analysis to system design and testing. It introduces development environments

and tools, including expert system shells and programming languages like CLIPS and Prolog. The unit discusses prototyping and iterative testing as key steps in refining expert systems to ensure accuracy and usability.

Unit 5: Applications, Evaluation, and Ethical Considerations

This unit examines various real-world applications of expert systems, such as diagnostic systems in medicine, financial advisory systems, and technical support. It also covers evaluation techniques to assess the performance and reliability of expert systems. The unit discusses ethical considerations, including transparency, accountability, and the potential impact of expert systems on decision-making and job roles.

Applications of Expert Systems in Industry

CCA 605D

Cr. L T P

4 3 1 0

Unit 1: Introduction to Expert Systems and Industrial Applications

This unit provides an overview of expert systems, their architecture, and key components, including the knowledge base and inference engine. It introduces the significance of expert systems in industry and discusses their role in automating complex decision-making tasks, enhancing efficiency, and supporting strategic objectives. The unit also highlights early successes of expert systems across various industrial sectors.

Unit 2: Expert Systems in Manufacturing and Production

This unit explores the use of expert systems in manufacturing, including applications in process control, quality management, and predictive maintenance. It covers the role of expert systems in optimizing production processes, monitoring equipment, and diagnosing machine faults. Case studies illustrate how expert systems reduce downtime, improve product quality, and support just-in-time manufacturing.

Unit 3: Expert Systems in Finance and Banking

This unit examines the applications of expert systems in finance and banking, focusing on credit scoring, fraud detection, and investment analysis. It discusses how expert systems analyze financial data, assess risk, and support decision-making in lending and investment. The unit also covers regulatory compliance and explores the role of expert systems in enhancing operational efficiency and customer service.

Unit 4: Expert Systems in Healthcare and Diagnostics

This unit focuses on the use of expert systems in healthcare, particularly in diagnostics, treatment planning, and patient monitoring. It covers the structure of medical expert systems, including

knowledge bases designed for specific health conditions, and examines examples like MYCIN and DENDRAL. The unit discusses how expert systems assist healthcare professionals in improving diagnostic accuracy and personalizing patient care.

Unit 5: Expert Systems in Customer Service and Technical Support

This unit addresses the role of expert systems in automating customer service and technical support processes. It covers the development of knowledge-based systems for troubleshooting, guiding customers, and answering FAQs. The unit also discusses the use of expert systems in industries like telecommunications and consumer electronics, highlighting their contribution to improved customer satisfaction and reduced service costs.

Multimedia Computing

CCA 609

Cr. L T P

4 3 1 0

Unit 1: Introduction to Multimedia Computing

This unit introduces the fundamentals of multimedia, including the types of multimedia data (text, audio, images, video, and animation) and their applications in various fields like entertainment, education, and business. It covers basic concepts of multimedia systems, multimedia data representation, digitization, and the importance of compression.

Unit 2: Digital Audio and Video Processing

This unit focuses on digital audio and video technologies, covering sampling, formats, and compression techniques for audio and video data. It discusses codecs like MP3, AAC, MPEG, and H.264, exploring methods for efficient storage and transmission. Topics include audio and video editing basics, synchronization, and streaming media challenges.

Unit 3: Image and Graphics Processing

This unit explores the principles of image representation, color models, and graphics processing techniques. Topics include image transformation, filtering, and basic image processing operations, as well as an introduction to vector and raster graphics. The unit also covers applications of image processing in multimedia, such as image enhancement, compression, and graphics for animation.

Unit 4: Multimedia Storage, Databases, and Retrieval

This unit discusses the management of multimedia data, including multimedia databases, storage formats, and retrieval techniques. Topics cover content-based image and video retrieval, indexing, metadata tagging, and the organization of multimedia data. It also introduces

multimedia content management systems (CMS) and their applications in digital libraries and archives.

Unit 5: Multimedia Networking and Applications

This unit covers the delivery of multimedia content over networks, including streaming protocols, Quality of Service (QoS), and network architectures for multimedia applications. It explores real-time multimedia applications, such as live streaming and video conferencing, along with challenges in bandwidth, latency, and multimedia synchronization. The unit also touches on emerging multimedia applications like virtual reality and augmented reality.

Pattern Recognition

CCA 611

Cr. L T P

4 3 1 0

Unit 1: Introduction to Pattern Recognition

This unit introduces the basics of pattern recognition, including definitions, scope, and applications across various fields like image analysis, speech recognition, and biometrics. It covers key concepts such as feature extraction, classification, and decision theory. The unit also discusses the difference between supervised and unsupervised learning in pattern recognition.

Unit 2: Statistical Pattern Recognition

This unit covers statistical approaches to pattern recognition, including probability theory, Bayes decision theory, and discriminant functions. It explores topics like parametric and non-parametric techniques, including linear discriminant analysis (LDA) and k-nearest neighbors (k-NN). The unit also introduces Gaussian models and probabilistic frameworks for classification.

Unit 3: Feature Selection and Dimensionality Reduction

This unit focuses on feature selection techniques, emphasizing the importance of identifying relevant features for accurate classification. It covers methods like principal component analysis (PCA), independent component analysis (ICA), and feature selection algorithms. The unit discusses the curse of dimensionality and the role of dimensionality reduction in improving recognition performance.

Unit 4: Clustering and Unsupervised Learning

This unit introduces clustering techniques used in unsupervised learning. Topics include popular clustering algorithms like k-means, hierarchical clustering, and density-based clustering (DBSCAN). The unit discusses clustering evaluation metrics, applications of clustering in pattern recognition, and the role of clustering in grouping and segmenting unlabeled data.

Unit 5: Neural Networks and Deep Learning for Pattern Recognition

This unit covers neural networks and deep learning approaches for pattern recognition. It introduces basic neural network architectures, training algorithms, and common activation functions. The unit explores deep learning models such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), discussing their applications in image, speech, and text recognition tasks.

Client-Server Computing

UCA 603 **Cr. L T P**
4 3 1 0

Unit 1: Introduction to Client-Server Computing

This unit provides an overview of client-server computing, including its architecture, components, and advantages. It discusses the differences between client-server and peer-to-peer architectures and introduces various types of client-server models. The unit also covers the fundamental concepts of networking and communication protocols that enable client-server interactions.

Unit 2: Client-Server Architecture and Design

This unit explores different client-server architectures, including two-tier, three-tier, and n-tier models. It discusses the roles of clients and servers, the communication between them, and the responsibilities of each component. The unit also covers design considerations, such as scalability, performance, and security, as well as best practices for developing robust client-server applications.

Unit 3: Communication Protocols and Middleware

This unit focuses on communication protocols used in client-server computing, such as HTTP, TCP/IP, and WebSocket. It introduces middleware technologies that facilitate communication and data exchange between clients and servers. The unit also discusses remote procedure calls (RPC), message-oriented middleware, and the role of APIs in client-server interactions.

Unit 4: Database Connectivity in Client-Server Applications

This unit examines database connectivity and management in client-server applications. It covers techniques for accessing databases from client applications, including ODBC, JDBC, and ORM frameworks. The unit discusses the importance of data consistency, transaction management, and security measures in database-driven client-server systems.

Unit 5: Security and Performance in Client-Server Computing

This unit addresses security challenges and performance optimization techniques in client-server computing. It covers authentication, authorization, encryption, and secure communication methods. The unit also explores performance factors, including load balancing, caching, and resource management, providing strategies for optimizing client-server applications for high availability and responsiveness.

References:

- Tanenbaum, A. S., & Austin, T. (2012). *Structured Computer Organization*. Pearson.
- Kurose, J. F., & Ross, K. W. (2017). *Computer Networking: A Top-Down Approach*. Pearson.
- Stallings, W. (2015). *Network Security Essentials: Applications and Standards*. Pearson.
- McGregor, J. D. (2016). *Client-Server Programming with Java and C#. Wiley.

Advanced Computer System Architecture

UCA 603 **Cr. L T P**

4 3 1 0

Unit 1: Fundamentals of Computer Architecture

This unit provides an overview of computer architecture, covering the basic components of computer systems, including the CPU, memory hierarchy, and input/output systems. It discusses the evolution of computer architecture and introduces fundamental concepts such as instruction sets, data paths, and control units. The unit also covers performance metrics and benchmarking techniques for evaluating computer systems.

Unit 2: Advanced Processor Architectures

This unit focuses on advanced processor designs, including superscalar, out-of-order execution, and speculative execution architectures. It discusses concepts like pipelining, cache memory organization, and virtual memory. The unit also explores multicore and many-core architectures, examining their impact on performance, energy efficiency, and parallel processing capabilities.

Unit 3: Memory Systems and Storage Architecture

This unit examines memory systems in-depth, covering cache design, memory hierarchy, and different types of memory technologies (RAM, ROM, SSDs, etc.). It discusses memory management techniques, including paging and segmentation, and explores storage architecture for high-performance systems. The unit also addresses issues related to data consistency, reliability, and fault tolerance in memory systems.

Unit 4: Parallel and Distributed Architectures

This unit introduces parallel and distributed computing architectures, covering shared memory and distributed memory models. It discusses parallel processing techniques, including SIMD and MIMD architectures, and explores programming models for parallel systems, such as OpenMP and MPI. The unit also addresses challenges in synchronization, communication, and load balancing in distributed systems.

Unit 5: Emerging Trends in Computer Architecture

This unit explores emerging trends and technologies in computer architecture, including quantum computing, neuromorphic computing, and energy-efficient architectures. It discusses the implications of these technologies for future computing systems and the challenges they present. The unit also examines the role of hardware-software co-design and the impact of machine learning on computer architecture.

References:

- Hennessy, J. L., & Patterson, D. A. (2019). *Computer Architecture: A Quantitative Approach*. Morgan Kaufmann.
- Patterson, D. A., & Hennessy, J. L. (2014). *Computer Organization and Design: The Hardware/Software Interface*. Morgan Kaufmann.
- Flynn, M. J. (2011). *Computer Architecture: Pipelined and Parallel Processor Design*. Jones & Bartlett Learning.
- Baer, J. (2017). *Computer Architecture and Implementation*. Cambridge University Press.

Dissertation

CCA 602 **Cr. L T P**
4 3 1 0

Unit 1: Introduction to Research Methodology

This unit introduces the principles of research methodology, including the research process, types of research, and the importance of defining research questions. It covers qualitative and quantitative research methods, literature review techniques, and ethical considerations in research. The unit emphasizes the significance of proper planning and organization in conducting research for a dissertation.

Unit 2: Literature Review and Theoretical Framework

This unit focuses on conducting a comprehensive literature review, identifying relevant sources, and synthesizing findings. It covers the development of a theoretical framework that supports the research question and informs the study. The unit emphasizes critical analysis of existing literature and how it relates to the proposed research, guiding the direction of the dissertation.

Unit 3: Research Design and Methodology

This unit explores the development of a research design, including selecting appropriate research methods, sampling techniques, and data collection strategies. It discusses various data analysis methods, both qualitative and quantitative, and the importance of validating results. The unit also covers the creation of research instruments, such as surveys and interview protocols, ensuring they align with the research objectives.

Unit 4: Writing the Dissertation

This unit covers the structure and organization of a dissertation, including the introduction, methodology, results, discussion, and conclusion chapters. It provides guidelines for academic writing style, citation formats, and referencing standards. The unit emphasizes the importance of clear communication and the presentation of research findings, as well as the revision process and addressing feedback from advisors.

Unit 5: Presentation and Defense of the Dissertation

This unit prepares students for the oral presentation and defense of their dissertation. It covers strategies for effectively communicating research findings to an audience, including presentation skills and visual aids. The unit also discusses the process of defending the dissertation before a committee, addressing questions, and incorporating feedback for future research or publication.

References:

- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
- Kothari, C. R. (2004). *Research Methodology: Methods and Techniques*. New Age International Publishers.
- Booth, W. C., Colomb, G. G., & Williams, J. M. (2008). *The Craft of Research*. University of Chicago Press.
- Silverman, D. (2013). *Doing Qualitative Research*. Sage Publications.

Seminar and Progress Reports

CCA 604 **Cr. L T P**

4 3 1 0

Unit 1: Introduction to Seminars and Reports

This unit introduces the purpose and significance of seminars and progress reports in academic and professional contexts. It covers the various types of seminars, including formal presentations

and informal discussions, and outlines the essential components of effective progress reports. The unit emphasizes the importance of communication skills and audience engagement in presenting research findings.

Unit 2: Research Topics and Literature Review

This unit focuses on selecting appropriate research topics for seminars and progress reports. It covers techniques for conducting literature reviews, identifying key sources, and synthesizing relevant information. The unit emphasizes the importance of establishing a theoretical framework and developing clear objectives to guide research and presentations.

Unit 3: Structuring Presentations and Reports

This unit explores the structure and organization of seminars and progress reports. It discusses the typical components, including introduction, methodology, results, discussion, and conclusion. The unit provides guidelines for creating clear and coherent presentations, emphasizing the effective use of visual aids and presentation software to enhance communication.

Unit 4: Presentation Skills and Techniques

This unit focuses on developing effective presentation skills for delivering seminars and progress reports. It covers techniques for public speaking, managing anxiety, and engaging the audience. The unit emphasizes the importance of body language, voice modulation, and the use of visual aids to enhance the clarity and impact of presentations.

Unit 5: Feedback, Evaluation, and Future Directions

This unit discusses the process of receiving and incorporating feedback from peers and advisors during seminars and report presentations. It covers evaluation criteria used to assess the quality of presentations and reports. The unit emphasizes the importance of reflecting on feedback to improve future research and presentation skills and discusses the next steps in the research process based on feedback received.

References:

- McMillan, K., & Weyers, J. (2010). *How to Prepare a Dissertation Proposal: Suggestions for Students in Education and the Social and Behavioral Sciences*. Pearson.
- Harris, M. (2017). *A Guide to Writing Seminar Papers and Reports*. Academic Press.
- McLean, S. (2010). *The Essentials of Business Research Methods*. Wiley.
- McCormick, S. (2015). *Effective Presentations: A Practical Guide to Presenting Your Ideas*. Routledge.

Lab Java Programming

CCA-551

1. Create a simple PHP script that prints "Hello, World!".
2. Build a form that takes user input and displays the submitted data.
3. Implement a user registration system that stores data in a MySQL database.
4. Create a login system with session management to authenticate users.
5. Develop a contact form that sends an email with user details.
6. Build a CRUD application to manage a list of books in a database.
7. Create a simple calculator that performs basic arithmetic operations.
8. Implement a file upload feature with validation for file types.
9. Develop a program that generates a random password.
10. Create a page that displays data from an API using cURL.
11. Implement pagination for displaying a list of products from a database.
12. Build a blog platform with post creation and commenting features.
13. Create a program to read and display contents of a text file.
14. Develop a shopping cart system that tracks selected items.
15. Implement user roles (admin and user) with access control.
16. Create a program that generates and displays a QR code.
17. Build a survey application that collects and displays user responses.
18. Create a simple image gallery that displays images from a folder.

Lab C# Programming

CCA-553

1. Write a C# program to calculate the factorial of a number using recursion.
2. Create a program that finds the greatest common divisor (GCD) of two integers using the Euclidean algorithm.
3. Develop a program that checks if a given string is a palindrome.
4. Write a C# program to sort an array of integers using the bubble sort algorithm.
5. Implement a program that reads a list of integers from the user and finds the maximum and minimum values.
6. Create a program to count the number of vowels and consonants in a given string.
7. Write a C# program to generate the Fibonacci series up to a specified number of terms.
8. Develop a program that reverses an array of integers.
9. Create a program to find the sum of the digits of a given integer.

10. Write a C# program to implement a basic calculator that performs addition, subtraction, multiplication, and division.
11. Implement a program to check if a number is prime.
12. Write a program that displays the multiplication table of a number provided by the user.
13. Create a program to find the second largest number in an array.
14. Write a C# program to convert a binary number (as a string) to its decimal equivalent.
15. Develop a program that counts the occurrences of each character in a string.
16. Implement a program to merge two sorted arrays into a single sorted array.
17. Write a C# program to print the first n prime numbers.
18. Create a program that removes duplicates from an array of integers.

Lab Network Security & Cryptography Lab

CCA-552

1. Write a program to implement the Caesar cipher encryption and decryption.
2. Create a program that uses the Vigenère cipher for text encryption and decryption.
3. Develop a program to perform a simple hash function (like SHA-256) on a given string.
4. Write a program that demonstrates symmetric key encryption and decryption using AES.
5. Create a program to implement RSA encryption and decryption.
6. Develop a program that generates a pair of RSA keys (public and private).
7. Write a program to demonstrate digital signatures using RSA.
8. Create a program that implements Diffie-Hellman key exchange.
9. Develop a program to encrypt and decrypt files using symmetric encryption.
10. Write a program that verifies the integrity of a file using checksums (MD5 or SHA-1).
11. Create a program that uses SSL/TLS to secure a simple client-server communication.
12. Develop a program to implement HMAC (Hash-based Message Authentication Code).
13. Write a program that simulates a man-in-the-middle attack and its prevention.
14. Create a program that implements a simple password manager with encryption.
15. Develop a program to perform steganography by hiding a message in an image.
16. Write a program to analyze network traffic and detect anomalies using basic heuristics.
17. Create a program that implements a simple firewall rule-checking mechanism.
18. Develop a program to simulate phishing detection by analyzing email content.
19. Write a program to implement two-factor authentication using a time-based one-time password

Lab Compiler Design

CCA-554

1. Write a program to implement a lexical analyzer (lexer) for a simple programming language.
2. Create a program to construct a syntax tree for arithmetic expressions.
3. Develop a program to implement a parser using recursive descent parsing.

4. Write a program that implements the Shunting Yard algorithm to convert infix expressions to postfix notation.
5. Create a program to evaluate postfix expressions.
6. Develop a program to perform semantic analysis and check for variable declaration and usage.
7. Write a program to generate intermediate code from a given source code.
8. Create a program to implement basic optimization techniques (constant folding, dead code elimination).
9. Develop a program to implement a simple code generator that translates intermediate code to assembly language.
10. Write a program to implement a symbol table with insertion, lookup, and deletion functionalities.
11. Create a program that performs type checking for a simple programming language.
12. Develop a program to implement operator precedence parsing.
13. Write a program to simulate a finite state machine (FSM) for a given regular expression.
14. Create a program to implement lexical analysis with regular expressions.
15. Develop a program that performs syntax-directed translation for arithmetic expressions.
16. Write a program to implement dynamic memory allocation and garbage collection in a simple language.
17. Create a program that generates a control flow graph (CFG) from a given intermediate representation.
18. Develop a program to implement an error recovery mechanism in a parser.
19. Write a program that analyzes and generates reports on the complexity of a given program.
20. Create a program to implement a simple interpreter for a basic programming language.

Lab Advanced DBMS

CCA-651

1. Write a program to create a database schema using SQL for a simple library management system.
2. Develop a program that connects to a database and performs CRUD operations using JDBC.
3. Create a program to implement a stored procedure that calculates the total sales for a given month.
4. Write a program to demonstrate the use of triggers in a database (e.g., updating inventory on a sale).
5. Develop a program that executes complex SQL queries involving joins, subqueries, and group functions.
6. Create a program to implement database normalization techniques and demonstrate denormalization.
7. Write a program to manage user authentication and authorization in a database application.

8. Develop a program to back up and restore a database using SQL commands.
9. Create a program that performs data mining operations, such as clustering or classification, on a dataset.
10. Write a program to implement transaction management and demonstrate ACID properties.
11. Develop a program that uses indexing to improve query performance in a large database.
12. Create a program that implements full-text search capabilities in a database.
13. Write a program to demonstrate the use of database views and materialized views.
14. Develop a program to perform data replication and synchronization between two databases.
15. Create a program that implements a data warehouse schema using star and snowflake designs.
16. Write a program to perform ETL (Extract, Transform, Load) operations on a dataset.
17. Develop a program that integrates a NoSQL database (like MongoDB) with a relational database.
18. Create a program to analyze query execution plans and optimize queries for performance.
19. Write a program that demonstrates data privacy techniques, such as data masking or encryption.
20. Develop a program to implement a distributed database system and demonstrate data consistency.
21.

Lab Advanced DAA

CCA-653

1. Write a program to implement Dijkstra's algorithm for finding the shortest path in a weighted graph.
2. Create a program that uses dynamic programming to solve the 0/1 Knapsack problem.
3. Develop a program to perform matrix multiplication using Strassen's algorithm.
4. Write a program to implement the Prim's algorithm for minimum spanning tree generation.
5. Create a program that demonstrates the A* search algorithm for pathfinding.
6. Write a program to solve the Traveling Salesman Problem using a brute force approach.
7. Develop a program that uses the Ford-Fulkerson method to find the maximum flow in a flow network.
8. Create a program that implements the branch and bound technique for solving the N-Queens problem.
9. Write a program to implement the Floyd-Warshall algorithm for all-pairs shortest paths.
10. Develop a program that applies the Bellman-Ford algorithm to find the shortest paths from a single source.
11. Create a program to implement a Huffman coding algorithm for data compression.
12. Write a program that uses backtracking to solve the Sudoku problem.
13. Develop a program to implement the Rabin-Karp algorithm for substring search.
14. Create a program to implement K-means clustering algorithm for data segmentation.

15. Write a program that demonstrates the Quick Sort algorithm with different pivot strategies.

LAB Minor Project

CCA 655

1. Develop a simple task management application with user authentication and CRUD operations.
2. Create a basic e-commerce website with product listings, shopping cart functionality, and order processing.
3. Write a program to build a personal finance tracker that allows users to manage expenses and budgets.
4. Implement a library management system that handles book borrowing, returns, and member management.
5. Create a weather forecasting application that fetches data from a public API and displays current conditions.
6. Develop a quiz application that allows users to take quizzes, track scores, and view results.
7. Write a program to create a note-taking application with rich text formatting and cloud synchronization.
8. Implement a simple blog platform where users can create, edit, and comment on posts.
9. Create a fitness tracking application that allows users to log workouts, track progress, and set goals.
10. Develop a recipe management system that enables users to search for recipes and save their favorites.
11. Write a program to build a social media dashboard that aggregates posts from multiple platforms.
12. Implement a music player application that allows users to create playlists and play local audio files.
13. Create a voting system for surveys or polls, with user authentication and result visualization.
14. Develop an online ticket booking system for events or movies with seat selection.
15. Write a program to implement a basic chat application using WebSockets for real-time communication.

Lab Dissertation

CCA 602

1. Develop a comprehensive system for managing academic research papers, including submission, review, and publication processes.
2. Create a program that analyzes large datasets using machine learning algorithms for predictive analytics.
3. Implement a blockchain-based voting system to enhance transparency and security in electoral processes.

4. Design a smart home automation system that integrates various IoT devices for energy efficiency and convenience.
5. Write a program for sentiment analysis on social media data to gauge public opinion on various topics.
6. Create a personalized recommendation system for an e-commerce platform based on user behavior and preferences.
7. Develop a virtual reality application for immersive education experiences in science or history.
8. Implement a comprehensive health monitoring system that collects and analyzes data from wearable devices.
9. Create a program for automated essay scoring using natural language processing techniques.
10. Design a disaster management system that predicts natural disasters and provides real-time alerts and resources.
11. Develop an augmented reality application for interior design, allowing users to visualize furniture in their space.
12. Write a program to facilitate peer-to-peer energy trading using smart contracts on a blockchain.
13. Create a multi-language learning platform that adapts to individual student progress and preferences.
14. Implement a content management system (CMS) for online journalism that allows for multimedia integration and collaboration.
15. Develop a cybersecurity simulation tool that helps organizations train employees on threat detection and response.
16. Create a program that analyzes traffic data to optimize urban transportation systems and reduce congestion.

Lab Seminar and Progress Reports

CCA 604

1. Develop a web-based application for tracking seminar registrations and managing attendee lists.
2. Create a program that generates automated progress reports for ongoing research projects.
3. Implement a presentation tool that allows users to create and share interactive slideshows.
4. Write a program to analyze feedback from seminar participants and generate summary reports.
5. Create a project management tool that helps teams track milestones and deadlines for seminars and presentations.
6. Develop a database system for organizing and retrieving seminar materials and resources.
7. Implement a video conferencing tool with features for screen sharing and recording seminars.
8. Create a program that schedules seminar sessions and sends reminders to participants.
9. Develop an online platform for submitting and reviewing seminar papers and abstracts.

10. Write a program that visualizes progress over time for individual research projects using graphs and charts.
11. Create a system for peer review of seminar presentations, allowing participants to provide constructive feedback.
12. Develop a mobile app that allows users to access seminar schedules and speaker bios on the go.
13. Implement a notification system for updates on upcoming seminars and related events.
14. Create a program that tracks attendance and engagement metrics during online seminars.
15. Develop a collaborative document editor for preparing seminar papers and reports in real time.
16. Write a program to create customizable templates for seminar presentations and reports.
17. Create a system for archiving and accessing past seminar recordings and materials.
18. Develop a resource-sharing platform where participants can exchange seminar-related documents and links.

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Bachelor of Engineering, Four Year Programme

Semester System

(w.e.f. session 2013-14)

Revised and approved in the year 2021 (17th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO 1 Graduates will acquire a strong foundation in engineering principles, enabling them to design, develop, and implement innovative solutions to complex engineering problems across various industries.

PEO 2 Graduates will develop the ability to apply critical thinking, problem-solving skills, and engineering techniques to analyze, evaluate, and resolve real-world challenges in their chosen engineering discipline.

PEO 3 Graduates will gain hands-on experience in using modern engineering tools, software, and technologies, enabling them to effectively design, model, and optimize engineering systems and processes.

PEO 4 Graduates will demonstrate the ability to work collaboratively in multidisciplinary teams, manage engineering projects, and communicate technical information effectively to both technical and non-technical stakeholders.

PEO 5 Graduates will adhere to professional and ethical standards, ensuring their engineering solutions are socially responsible, environmentally sustainable, and aligned with industry best practices and regulatory requirements.

PEO 6 Graduates will develop leadership and management skills, preparing them to take on roles of responsibility in both technical and managerial aspects of engineering projects.

PEO 7 Graduates will engage in lifelong learning and stay current with emerging technologies, ensuring continuous professional growth and adaptability to the evolving engineering landscape.

PEO 8 Graduates will contribute to the betterment of society by creating innovative solutions that address societal challenges, promote sustainable development, and enhance the quality of life globally.

Programme Specific Objectives (PSO's)

PSO 1 To equip students with a solid foundation in core engineering concepts, preparing them to design, analyze, and develop solutions for complex technical challenges in various fields.

PSO 2 To develop proficiency in modern engineering tools, techniques, and technologies, enabling students to effectively design, model, and optimize engineering systems and processes across diverse applications.

PSO 3 To enhance problem-solving skills, encouraging students to apply engineering principles and critical thinking to develop innovative and sustainable solutions for real-world challenges in their discipline.

PSO 4 To foster a strong understanding of professional ethics, environmental sustainability, and social responsibility, ensuring students create engineering solutions that are both technically sound and socially beneficial.

PSO 5 To provide hands-on experience through laboratory work, internships, and projects, helping students gain practical exposure to the application of engineering concepts in real-world scenarios.

PSO 6 To nurture teamwork, leadership, and communication skills, preparing students to effectively collaborate in multidisciplinary teams, manage engineering projects, and communicate complex ideas to diverse audiences.

PSO 7 To ensure students develop a global perspective on engineering practices, preparing them to adapt and innovate in response to technological advancements and the needs of a rapidly changing world.

PSO 8 To foster lifelong learning habits, ensuring students remain adaptable and stay updated with the latest trends, technologies, and advancements in their engineering field throughout their careers.

Programme Outcome Objectives (POO's)

POO 1 Graduates will have a strong foundation in engineering fundamentals, enabling them to apply core principles and methodologies to solve real-world engineering problems across various disciplines.

POO 2 Graduates will possess the ability to analyze complex engineering systems, design innovative solutions, and optimize processes while considering technical, environmental, and societal constraints.

POO 3 Graduates will be proficient in using modern engineering tools, software, and technologies to model, simulate, and solve engineering problems, ensuring efficient and effective system designs.

POO 4 Graduates will develop critical thinking, problem-solving, and decision-making skills to address engineering challenges, ensuring that solutions are feasible, sustainable, and aligned with industry standards.

POO 5 Graduates will demonstrate the ability to work effectively in multidisciplinary teams, manage projects, and communicate technical information clearly to diverse audiences, both within and outside of engineering fields.

POO 6 Graduates will adhere to ethical, professional, and legal standards in engineering practice, ensuring their solutions positively impact society, the environment, and the global engineering community.

POO 7 Graduates will be capable of undertaking independent research, applying engineering principles to explore new solutions, and contributing to advancements in technology and engineering practices.

POO 8 Graduates will have strong leadership and interpersonal skills, enabling them to manage engineering projects, lead teams, and coordinate with stakeholders to achieve desired outcomes.

POO 9 Graduates will demonstrate an understanding of sustainability, applying green engineering principles to minimize the environmental impact of their designs and promote socially responsible engineering practices.

POO 10 Graduates will embrace lifelong learning, continuously updating their knowledge and skills to stay relevant with evolving technologies, methodologies, and trends in engineering, ensuring professional growth throughout their careers.

Scheme of Teaching

TEACHING SCHEME OF B.TECH. 1ST YEAR (1ST SEMESTER)

W.E.F. Academic Session 2021-22

(COMMON FOR ALL BRANCHES)

CODE	SUBJECT	CREDIT	L	T	P
CMAN-101 CMAN-101 A/ CMAN-101 B/ CMAN-101 C/ CMAN-101 D	MATHEMATICS-I MATHEMATICS / BASIC MATHEMATICS / APPLIED MATHEMATICS / ADVANCED APPLIED MATHEMATICS	4	3	1	0
CMEN-101 CMEN-101 A/ CMEN-101 B/ CMEN-101 C/ CMEN-101 D	ENGINEERING MECHANICS STRUCTURAL ANALYSIS/ RIGID BODY MECHANICS/ FLUID MECHANICS/ FREE-BODY DIAGRAMS MECHANICS	4	3	1	0
CECN-101 CECN-101 A/ CECN-101 B/ CECN-101 C/ CECN-101 D	FUNDAMENTALS OF ELECTRONICS / ANALOG ELECTRONICS/ DIGITAL ELECTRONICS/ ELECTRONICS MEASUREMENT AND TESTING/ ELECTROMAGNETICS	4	3	1	0
CESN-101 CESN-101 A/ CESN-101 B/ CESN-101 C CESN-101 D	ENGINEERING CHEMISTRY AND ENVIRONMENTAL SCIENCE CHEMICAL THERMODYNAMICS/ CHEMICAL KINETICS/ ENVIRONMENTAL CHEMISTRY/ NATURAL RESOURCE MANAGEMENT	4	3	1	0
CPCN-101 CPCN-101 A/ CPCN-101 B/ CPCN-101 C/ CPCN-101 D	PRESENTATION AND COMMUNICATION SKILLS ENGLISH COMMUNICATION / ENGLISH / TECHNICAL COMMUNICATION / HUMAN VALUES, DEADDICTION AND TRAFFIC RULES	3	3	0	0
CMEN-151	ENGINEERING WORKSHOP PRACTICE	1	0	0	2
CMEN-153	ENGINEERING GRAPHICS LAB	1	0	0	2
CPCN-151 CPCN-151 A CPCN-151 B CPCN-151 C CPCN-151 D	COMMUNICATION LAB ENGLISH COMMUNICATION LAB / ENGLISH LAB / TECHNICAL COMMUNICATION LAB / HUMAN VALUES, DEADDICTION AND TRAFFIC RULES (LAB)	1	0	0	2
TOTAL		22	15	4	6

TEACHING SCHEME OF B.TECH. 1ST YEAR (2ND SEMESTER)
W.E.F. Academic Session 2021-22

CODE	SUBJECT	CREDIT	L	T	P
CMAN-102	MATHEMATICS-II	4	3	1	0
CMAN-102 A	Differential Equations/				
CMAN-102 B	Probability and Statistics/				
CMAN-102 C	Mathematical Logic/				
CMAN-102 D	Differential Geometry				
CPHN -102	ENGINEERING PHYSICS	4	3	1	0
CPHN -102 A	CLASSICAL MECHANICS/				
CPHN -102 B	ELECTROMAGNETIC THEORY/				
CPHN -102 C	QUANTUM MECHANICS/				
CPHN -102 D	SOLID STATE PHYSICS				
CCSN-102	COMPUTER FUNDAMENTALS AND PROGRAMMING USING-C	4	3	1	0
CEEN-102	BASICS OF ELECTRICAL ENGINEERING	4	3	1	0
CEEN-102 A	CIRCUIT THEORY/				
CEEN-102 B	ELECTROMAGNETISM/				
CEEN-102 C	DIGITAL ELECTRONICS/				
CEEN-102 D	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION				
CPCN-102	TECHNICAL COMMUNICATION	3	3	0	0
CPCN-102 A	BUSINESS COMMUNICATION/				
CPCN-102 B	PRESENTATION SKILLS/				
CPCN-102 C	DIGITAL COMMUNICATION/				
CPCN-102 D	AUDIENCE ANALYSIS				
CPHN-152	ENGINEERING PHYSICS LAB	1	0	0	2
CPHN-152A	CLASSICAL MECHANICS LAB /				
CPHN-152B	ELECTROMAGNETIC THEORY LAB /				
CPHN-152C	QUANTUM MECHANICS LAB /				
CPHN-152D	SOLID STATE PHYSICS LAB				
CCSN-152	COMPUTER PROGRAMMING USING C LAB	1	0	0	2
CEEN-152	BASIC ELECTRICAL ENGINEERING LAB	1	0	0	2
CEEN-152A	CIRCUIT THEORY LAB /				
CEEN-152B	ELECTROMAGNETISM LAB /				
CEEN-152C	DIGITAL ELECTRONICS LAB /				
CEEN-152D	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB				
TOTAL		22	15	4	6

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

W.E.F. Academic Session 2021-22

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

III semester

Code	Course Title	Cr.	L	T	P
CCSN-201	DATA STRUCTURE USING 'C'	4	3	1	0
CCSN-203	DBMS	4	3	1	0
CCSN-205	OPERATING SYSTEMS (UNIX PROGRAMMING)	4	3	1	0
CCSN-207	JAVA PROGRAMMING	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-I	4	3	1	0
CBSN-201 CBSN-201 A CBSN-201 B CBSN-201 C	VALUE EDUCATION, HUMAN RIGHTS ANDLEGISLATIVE PROCEDURES HUMANITIES AND SCIENCE PUBLIC POLICY LEADERS FOR GLOBAL OPERATIONS	2	2	0	0
CCSN-251	DATA STRUCTURE USING 'C' LAB	1	0	0	2
CCSN-253	DBMS LAB	1	0	0	2
CCSN-255	JAVA PROGRAMMING LAB	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-I

1. CCSN 209 DISCRETE MATHEMATICS
   - CCSN 209 A MATHEMATICS
   - CCSN 209 B BASIC MATHEMATICS
   - CCSN 209 C MATHEMATICS-I
   - CCSN 209 D Advanced Applied Mathematics
1. CCSN 211 PERL PROGRAMMING
2. CCSN 213 INTRODUCTION TO SOFT COMPUTING (Neural Networks, Fuzzy Logic and Genetic Algorithm)
3. CCSN 215 MATLAB PROGRAMMING FOR ENGINEERS

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

W.E.F. Academic Session 2021-22

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

IV semester

Code	Course Title	Cr.	L	T	P
CCSN-202	OBJECT ORIENTED PROGRAMMING USING C++	4	3	1	0
CCSN-204	DESIGN AND ANALYSIS OF ALGORITHMS	4	3	1	0
CCSN-206	INTERNET AND WEB TECHNOLOGY	4	3	1	0
CCSN-208	COMPUTER NETWORKS	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-II	4	3	1	0
CBSN-202 CBSN-202A CBSN-202B CBSN-202C	TECHNICAL ENGLISH BUSINESS COMMUNICATION TECHNICAL WRITING INTERCULTURAL COMMUNICATION	2	2	0	0
CCSN-252	OBJECT ORIENTED PROGRAMMING USING C++ LAB	1	0	0	2
CCSN-254	DESIGN AND ANALYSIS OF ALGORITHMS LAB	1	0	0	2
CCSN-256	INTERNET AND WEB TECHNOLOGY LAB	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-II

1. CCSN 210 FORMAL LANGUAGES & AUTOMATION THEORY
2. CCSN 212 NANO SCIENCES

INDUSTRIAL ENHANCEMENT ELECTIVE-I

1. CBSN-202 TECHNICAL ENGLISH
2. CBSN-202 A BUSINESS COMMUNICATION
3. CBSN-202 B TECHNICAL WRITING
4. CBSN-202 C INTERCULTURAL COMMUNICATION
5. CBSN-204 OPERATIONS RESEARCH

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

W.E.F. Academic Session 2021-22

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

V semester

Code	Course Title	Cr.	L	T	P
CCSN-301	SOFTWARE ENGINEERING	4	3	1	0
CCSN-303	COMPILER DESIGN	4	3	1	0
CCSN-305	OBJECT ORIENTED ANALYSIS AND DESIGN	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-III	4	3	1	0
CUCS-XXX	OPEN ELECTIVE-I	4	3	1	0
CBSN-301 CBSN-301A CBSN-301B CBSN-301C	ENERGY STUDIES SUPPLY CHAIN MANAGEMENT TRANSPORTATION ENVIRONMENT AND SUSTAINABILITY	2	2	0	0
CCSN-351	SOFTWARE ENGINEERING LAB	1	0	0	2
CCSN-353	COMPILER DESIGN LAB	1	0	0	2
CCSN-355	OBJECT ORIENTED ANALYSIS AND DESIGN LAB	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-III

1. CCSN 307 CRYPTOGRAPHY & INFORMATION SECURITY
2. CCSN 309 INTERNET WEB PROGRAMMING
3. CCSN 311 GRAPH THEORY

OPEN ELECTIVE-I

1. CUCS 341 COMPUTER VISION
2. CUCS 343 ROBOTICS AND AUTOMATION
3. CUCS 345 CLOUD COMPUTING
4. CUCS 347 HUMAN COMPUTER INTERFACE

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

W.E.F. Academic Session 2021-22

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

VI Semester

Code	Course Title	Cr.	L	T	P
CCSN-302	COMPUTER GRAPHICS	4	3	1	0
CCSN-304	DATA WAREHOUSING & DATA MINING	4	3	1	0
CCSN-306	MOBILE COMPUTING	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-IV	4	3	1	0
CUCS-XXX	OPEN ELECTIVE-II	4	3	1	0
CBSN-302 CBSN-302A CBSN-302B CBSN-302C	ENVIRONMENTAL STUDIES ENVIRONMENTAL SCIENCE NATURAL RESOURCE MANAGEMENT POLLUTION CONTROL	2	2	0	0
CCSN-352	COMPUTER GRAPHICS LAB	1	0	0	2
CCSN-354	DATA WAREHOUSING & DATA MINING LAB	1	0	0	2
CCSN-356	MINI PROJECT	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-IV

1. CCSN 308 KNOWLEDGE MANAGEMENT & EXPERT SYSTEM
2. CCSN 310 EMBEDDED COMPUTING SYSTEMS
3. CCSN 312 SIMULATION AND MODELING
4. CCSN 314 APPROXIMATION OF ALGORITHMS

OPEN ELECTIVE-II

1. CUCS 342 SOFTWARE PROJECT MANAGEMENT
2. CUCS 344 MICROWAVE ENGINEERING
3. CUCS 346 SUPPLY CHAIN MANAGEMENT-PLANNING
4. CUCS 348 SOFTWARE TESTING

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

W.E.F. Academic Session 2021-22

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

VII Semester

Code	Course Title	Cr.	L	T	P
CCSN-401	ARTIFICIAL INTELLIGENCE	4	3	1	0
CCSN-403	DISTRIBUTED COMPUTING SYSTEMS	4	3	1	0
CCSN-405	ADVANCED COMPUTER SYSTEM ARCHITECTURE	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-V	4	3	1	0
CUCS-XXX	OPEN ELECTIVE-V	4	3	1	0
CBSN-401 CBSN-401 A CBSN-401 B CBSN-401 C CBSN-401 D	LAW FOR ENGINEERS INTELLECTUAL PROPERTY RIGHTS EMPLOYMENT LAW DISPUTE RESOLUTION AND LITIGATION ENVIRONMENTAL LAW	2	2	0	0
CCSN-451	ARTIFICIAL INTELLIGENCE LAB	1	0	0	2
CCSN-453	DISTRIBUTED COMPUTING SYSTEMS LAB	1	0	0	2
CCSN-481	SEMINAR & GROUP DISCUSSION	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-V

1. CCSN 407 DIGITAL IMAGE PROCESSING
2. CCSN 409 MULTIMEDIA COMPUTING
3. CCSN 411 PATTERN RECOGNITION
4. CCSN 413 C# Programming

OPEN ELECTIVE-III

1. CUCS 441 CLIENT-SERVER COMPUTING
2. CUCS 443 NEURAL NETWORK
3. CUCS 445 ENGINEERING SYSTEM MODELING AND SIMULATION
4. CUCS 447 COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

VIII Semester

Code	Course Title	Cr.	L	T	P
CCSN-462	INTERNSHIP AND Report Presentation	20	0	0	40

SYLLABUS

Mathematics-I

CMAN-101

Cr.	L	T	P
4	3	1	0

COURSE OBJECTIVES:

The objectives of this course are to

1. Develop a strong foundation in matrix algebra, including matrix operations, eigenvalues, eigenvectors, and matrix diagonalization.
2. Understand and solve higher-order ordinary differential equations using various methods, including Euler-Cauchy and variation of parameters.
3. Learn numerical methods for solving ordinary differential equations, such as Picard's method and Euler methods.
4. Explore functions of several variables, including limits, differentiability, Jacobians, and Taylor's theorem.
5. Study series solutions of second-order linear differential equations and properties of Bessel functions and Legendre polynomials.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

1. Apply matrix algebra techniques to solve linear equations, calculate eigenvalues and eigenvectors, and understand matrix diagonalization.
2. Solve linear and simultaneous differential equations using various analytical methods like Euler-Cauchy and variation of parameters.
3. Implement numerical methods to solve ordinary differential equations and analyze the convergence of infinite series.
4. Evaluate functions of several variables, apply the chain rule, and find extrema using Taylor's theorem and Jacobians.
5. Solve second-order differential equations using series methods and understand the properties of Bessel functions and Legendre polynomials.

Unit-I

Matrix Algebra: Rank of a matrix, Inverse of a matrix by elementary operations; Solution of linear simultaneous equations and their numerical solutions by Gauss elimination , Eigenvalues and Eigenvectors of matrices by Cayley-Hamilton theorem; Diagonalisation of matrices; Orthogonal, Hermetian, Skew-Hermetian, Normal and Unitary matrices and their elementary properties.

Unit-II

Ordinary Differential Equations: Linear differential equation of nth order with constant coefficients, Simultaneous Linear differential equations, Euler-Cauchy equations, Solution of second order differential equations by change of dependent and independent variables; Method of variation of parameters for second order differential equations.

Unit-III

Numerical Solution of ODE: Picard's method, Taylor's series, Euler method & Modified Euler method. Definition of Sequence and series with example, Convergence of infinite series; Comparison test, Ratio test, Root test, Logarithmic test, De Morgan's test, Cauchy integral test.

Unit-IV

Functions of Several Variables: Limit cotinuity and differentiability of functions of two variables; Euler's theorem, Tangent plane and normal, Change of variables, Chain rule; Jacobians, Taylor's Theorem for two variables; Extrema of functions of two or more variables.

Unit-V

Solution in Series: Solution in series of second order linear differential equations with polynomial coefficients; Bessel and Legendre equations and their series solutions; Properties of Bessel functions and Legendre polynomials.

Reference Books :

1. Kreyszig, E. *Advanced Engineering Mathematics*. 8th Edition. Wiley Eastern, 2004.
2. Grewal, B.S. *Engineering Mathematics*. 39th Edition. Khanna Publishers, 2005.

CMAN-101 A **Mathematics**

Course Description:

This course introduces essential mathematical concepts and techniques for engineering students, covering calculus, linear algebra, differential equations, vector calculus, and probability theory. The aim is to provide students with the analytical tools needed to model and solve real-world engineering problems.

Unit 1: Calculus

Functions, Limits, and Continuity: Definitions, limit laws, and continuity.
Differentiation: Differentiation of functions, product and quotient rules, chain rule, higher-order derivatives.
Applications of Differentiation: Tangents and normals, maxima and minima, optimization problems, curve sketching.
Integration: Definite and indefinite integrals, techniques of integration (substitution, integration by parts), improper integrals.
Applications of Integration: Area under curves, volumes of solids of revolution.

Unit 2: Linear Algebra

Matrices and Determinants: Basic operations, types of matrices, determinants, properties.
System of Linear Equations: Gaussian elimination, inverse of a matrix, rank of a matrix, consistency of linear systems.
Eigenvalues and Eigenvectors: Definitions, properties, diagonalization, Cayley-Hamilton theorem, applications to systems of differential equations.
Vector Spaces: Subspaces, linear independence, basis, and dimension.

Unit 3: Ordinary Differential Equations

First-order Differential Equations: Separable equations, exact equations, integrating factors, applications (growth models, electrical circuits).
Second and Higher-order Differential Equations: Solutions of linear differential equations, homogeneous and non-homogeneous equations, method of undetermined coefficients, variation of parameters.
Applications: Mechanical vibrations, electrical networks, and other physical applications.

Unit 4: Vector Calculus

Vector Functions: Differentiation and integration of vector functions, gradient, divergence, and curl.
Line, Surface, and Volume Integrals: Green's theorem, Stokes' theorem, and Gauss's divergence theorem.

Applications: Fluid flow, electromagnetism, and potential fields.

Unit 5: Probability and Statistics

Probability Theory: Basics of probability, conditional probability, independent events, Bayes' theorem.
Random Variables: Discrete and continuous random variables, probability density function (PDF), cumulative distribution function (CDF), and expectation.
Probability Distributions: Binomial, Poisson, and Normal distributions, applications to engineering problems.
Statistics: Measures of central tendency (mean, median, mode), measures of dispersion (variance, standard deviation), hypothesis testing, confidence intervals.

Recommended Textbooks:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 11th Edition, Wiley, 2020.
2. Higher Engineering Mathematics by B.S. Grewal, 44th Edition, Khanna Publishers, 2022.
3. Linear Algebra and Its Applications by David C. Lay, 6th Edition, Pearson, 2021.
4. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, 6th Edition, Academic Press, 2020.
5. Differential Equations and Boundary Value Problems: Computing and Modeling by C.H. Edwards and David E. Penney, 6th Edition, Pearson, 2018

CMAN-101 B **Basic Mathematics**

Course Description:
This course aims to provide students with the basic mathematical tools and concepts essential for understanding more advanced topics in engineering. The focus is on algebra, trigonometry, coordinate geometry, basic calculus, and introductory probability and statistics, which form the foundation for problem-solving in engineering fields.

Unit 1: Algebra

Polynomials: Degree, factorization, roots of polynomials, quadratic equations, and their applications.
Arithmetic and Geometric Progressions: Definitions, nth term, sum of series, applications in engineering.
Binomial Theorem: Expansion, general term, and applications.
Logarithms: Properties of logarithms, solving logarithmic equations, applications.

Unit 2: Trigonometry

Trigonometric Functions: Definitions, identities, and equations.
Inverse Trigonometric Functions: Domains, ranges, and basic properties.
Trigonometric Equations: General solutions, applications to physical problems.
Applications of Trigonometry: Heights and distances, simple harmonic motion, and waves.

Unit 3: Coordinate Geometry

Straight Lines: Equation of a line in different forms, slope, angle between two lines, distance formula, applications.
Circles: Standard equation, tangents and normals, intersection of a circle with a line.
Conic Sections: Parabola, ellipse, and hyperbola - standard equations and simple properties.
Applications in Engineering: Modelling of trajectories and orbits, structural designs.

Unit 4: Calculus

Limits and Continuity: Concept of a limit, properties of limits, continuity of a function.
Differentiation: Basic rules, derivatives of standard functions, product rule, quotient rule, chain rule.
Applications of Differentiation: Rate of change, maxima and minima, curve sketching.
Integration: Basic rules of integration, integration of standard functions, definite and indefinite integrals.

Applications of Integration: Area under curves, volumes of revolution, and simple applications in physics.

Unit 5: Probability and Statistics

Probability Basics: Definitions, sample space, events, conditional probability, independence, and Bayes' theorem.
Random Variables: Discrete and continuous, probability mass function (PMF), probability density function (PDF), cumulative distribution function (CDF).
Descriptive Statistics: Measures of central tendency (mean, median, mode), measures of dispersion (variance, standard deviation).
Basic Probability Distributions: Binomial, Poisson, and normal distributions.
Introduction to Hypothesis Testing: Null and alternative hypotheses, significance levels, z-tests and t-tests.

Recommended Textbooks:

1. Basic Engineering Mathematics by John Bird, 8th Edition, Routledge, 2021.
2. Engineering Mathematics by K.A. Stroud and Dexter Booth, 8th Edition, Palgrave Macmillan, 2020.
3. College Algebra and Trigonometry by Margaret Lial, John Hornsby, David Schneider, 7th Edition, Pearson, 2021.
4. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, 6th Edition, Academic Press, 2020.
5. Calculus: Early Transcendentals by James Stewart, 9th Edition, Cengage Learning, 2020.

CMAN-101 C **Applied Mathematics**

Course Description:
This course covers advanced mathematical techniques and applications necessary for solving engineering problems. It includes advanced calculus, differential equations, numerical methods, and complex variables, providing tools to model, analyze, and solve practical problems in engineering disciplines.

Unit 1: Advanced Calculus

Partial Differentiation: Functions of several variables, total derivatives, chain rule, Jacobians.
Taylor's Theorem for Multivariable Functions: Expansion of functions in two variables.
Maxima and Minima of Functions of Several Variables: Lagrange multipliers method and applications.
Multiple Integrals: Double and triple integrals, applications to area, volume, and center of mass.
Applications of Calculus: Engineering problems involving optimization, mass distribution, and fluid mechanics.

Unit 2: Ordinary and Partial Differential Equations

First-Order Differential Equations: Separable, exact, and linear equations, applications in mechanics and electrical circuits.
Higher-Order Differential Equations: Solutions of linear differential equations with constant coefficients, method of undetermined coefficients, and variation of parameters.
Partial Differential Equations (PDEs): Classification, method of separation of variables, wave equation, heat equation, and Laplace equation.
Applications: Mechanical vibrations, heat conduction, and fluid flow analysis.

Unit 3: Numerical Methods

Roots of Equations: Bisection method, Newton-Raphson method, and secant method.
Numerical Integration: Trapezoidal rule, Simpson's rule, and Gaussian quadrature.
Numerical Solutions to ODEs: Euler's method, Runge-Kutta methods (2nd and 4th order).
Finite Difference Methods for PDEs: Forward and backward difference methods, Crank-Nicolson method.
Applications: Numerical simulations in engineering problems such as heat transfer and structural analysis.

Unit 4: Complex Variables and Complex Analysis

Complex Numbers and Functions: Basic properties of complex numbers, polar form, complex functions, and their derivatives.
Analytic Functions: Cauchy-Riemann equations, harmonic functions, conformal mapping.
Complex Integration: Cauchy's theorem, Cauchy's integral formula, Taylor and Laurent series, residue theorem, and its applications.
Applications in Engineering: Fluid dynamics, electromagnetic fields, and signal processing.

Unit 5: Fourier Series and Laplace Transforms

Fourier Series: Periodic functions, Fourier series expansions, half-range expansions, and applications in engineering (signal processing, vibrations).
Laplace Transforms: Definition and properties, inverse Laplace transforms, solving ordinary differential equations using Laplace transforms.
Applications of Fourier Series and Laplace Transforms: Solution of heat, wave, and Laplace equations, control systems, and circuit analysis.

Recommended Textbooks:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 11th Edition, Wiley, 2020.
2. Applied Mathematics for Engineers and Physicists by L.A. Pipes and L.R. Harvill, 4th Edition, Dover Publications, 2014.
3. Numerical Methods for Engineers by Steven C. Chapra and Raymond P. Canale, 8th Edition, McGraw-Hill, 2020.
4. Complex Variables and Applications by James Ward Brown and Ruel V. Churchill, 9th Edition, McGraw-Hill, 2021.
5. Fourier Analysis and Its Applications by Gerald B. Folland, 2nd Edition, American Mathematical Society, 2020.

CMAN-101 D **Advanced Applied Mathematics**

Course Description:
This course provides an in-depth study of advanced mathematical concepts and methods used in engineering and applied sciences. It covers advanced topics such as optimization techniques, advanced numerical methods, transform techniques, special functions, and integral equations. These topics are essential for solving complex engineering problems.

Unit 1: Optimization Techniques

Linear Programming: Formulation, graphical method, simplex method, duality, sensitivity analysis.
Non-Linear Programming: Introduction to non-linear optimization, Lagrange multipliers, Kuhn-Tucker conditions.
Dynamic Programming: Bellman's principle of optimality, recursive equations, applications to inventory control, resource allocation.
Applications: Optimization problems in engineering, project management, and operations research.

Unit 2: Advanced Numerical Methods

Interpolation and Extrapolation: Newton's forward and backward interpolation, Lagrange interpolation, spline interpolation.
Numerical Solutions to Nonlinear Systems: Fixed-point iteration, Newton's method for systems of equations.
Numerical Methods for ODEs and PDEs: Higher-order Runge-Kutta methods, finite element method (FEM), finite volume method (FVM).
Error Analysis and Stability: Concepts of error, stability, and convergence in numerical methods.
Applications: Numerical simulation of fluid dynamics, structural analysis, and heat transfer.

Unit 3: Integral Transforms

Fourier Transform: Fourier integrals, Fourier cosine and sine transforms, properties and applications to PDEs.
Laplace Transform: Review of Laplace transforms, inverse Laplace transforms, convolution theorem, application to ODEs and PDEs.
Z-Transform: Introduction, properties, inverse Z-transform, application in discrete-time systems and digital signal processing.
Applications: Signal processing, control systems, electrical circuits, and mechanical vibrations.

Unit 4: Special Functions

Gamma and Beta Functions: Definitions, properties, and applications in engineering problems.
Bessel Functions: Bessel's equation, Bessel functions of the first and second kinds, applications in vibration and heat conduction problems.
Legendre Polynomials: Legendre's equation, generating functions, orthogonality, applications in potential theory and electrostatics.
Applications: Solutions to boundary value problems in cylindrical and spherical coordinates.

Unit 5: Integral Equations and Calculus of Variations

Integral Equations: Volterra and Fredholm integral equations, kernel functions, methods of solving integral equations, applications.
Green's Function: Application of Green's function to solve boundary value problems.
Calculus of Variations: Euler-Lagrange equation, isoperimetric problems, Hamilton's principle, applications to mechanics and engineering.
Applications: Structural mechanics, fluid dynamics, and electrostatics.

Recommended Textbooks:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 11th Edition, Wiley, 2020.
2. Numerical Methods for Engineers by Steven C. Chapra and Raymond P. Canale, 8th Edition, McGraw-Hill, 2020.
3. Applied Mathematical Methods by J. David Logan, 4th Edition, Wiley, 2018.
4. Introduction to Optimization by Pablo Pedregal, 3rd Edition, Springer, 2021.
5. Special Functions for Scientists and Engineers by W.W. Bell, 2nd Edition, Dover Publications, 2014.

CMEN 101 **Engineering Mechanics** **L T P 2 0 0**

UNIT-I

Two Dimensional Force Systems: Basic concepts, Laws of motion, Principle of Transmissibility of forces, Resultant of a force system, Simplest Resultant of Two dimensional concurrent and Non-concurrent Force systems, Lami's Theorem, Distributed force system, Free body diagrams, Types of supports- Support reactions for beams with different types of loading-Concentrated, uniformly distributed and uniformly varying loading.

UNIT-II

Beam: Introduction, Shear force and Bending Moment, Shear force and Bending Moment Diagrams for StaticallyDeterminateBeams

Trusses: Introduction, Simple Truss and Solution of Simple truss, Method f Joints and Method of Sections.

UNIT-III

Simple stress and strain: Normal and shear stresses. One Dimensional Loading; members of varying cross section, bars in series. Tensile Test diagram for ductile and brittle materials, Elastic constants, Strain energy. Bending of Beams: theory of pure bending, neutral surface and neutral axis, stresses in beams of different cross sections. Theory of Torsion, Torque and twist, Shear stress due to torsion circular sections.

UNIT-IV

Centroid and Moment of Inertia: Centroid of plane, curve, area and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Mass Moment of Inertia

Unit-V

Engineering Thermodynamics: Thermodynamic system, Surrounding and the Universe, Control volume phase, Macroscopic & microscopic point of view, Thermodynamic equilibrium, Thermodynamic properties, State path process, Cyclic process, Laws of thermodynamics, Carnot cycle, Clausius inequality, Enthalpy and entropy, Principle of entropy increase.

References:

1. "Engineering Mechanics: Statics" , J.L Meriam , Wiley
2. "Engineering Mechanics: Dynamics" , J.L Meriam , Wiley
3. "Engineering Mechanics " , F L Singer
4. "Engineering Mechanics : Statics and Dynamics", R. C. Hibbler, Pearson
5. "Engineering Mechanics " , Thimoshenko& Young , 4ed, Tata McGraw Hill
6. "Engineering Mechanics: Statics and Dynamics", A. Nelason, McGraw-Hill
7. "Engineering Mechanics : Statics and Dynamics", Shames and Rao, Pearson
8. "Engineering Mechanics : Statics and Dynamics", S. Rajasekaran and G. Sankarasubramanian, Vikas
9. "Engineering Mechanics", V. Jayakumar and M. Kumar, PHI
10. "Engineering Mechanics", D. P. Sharma, PHI
11. "Engineering Mechanics", M. V. Sheshagiri Rao, and D. Rama Durgaiah, University Press.
12. "Engineering Mechanics" , K L Kumar and V. Kumar, McGraw Hill

13. “Engineering Mechanics” , Bhattacharya , Oxford Press
14. “Engineering Mechanics ” , Dr Sadhu Singh , Umesh Publications
15. “Engineering Mechanics ” , Bhavikatti , New Age

CMEN-101 A **STRUCTURAL ANALYSIS.**

UNIT I

Fundamentals of Statically Determinate Structures
Types of statically determinate & indeterminate structures, static and kinematic indeterminacy, stability of structures, principle of superposition, Maxwell's reciprocal theorems. Framed structure : Computation of internal forces in statically determinate framed structures such as plane truss, plane frame, grids.

UNIT II

Strain energy & Displacement of Statically Determinate structures
Strain Energy : Resilience, strain energy due to axial loads & flexure, proof resilience, modulus of resilience, impact loads, and sudden loads Displacement : Differential equation of elastic curve, relation between moment, slope and deflection, Displacement of beam by Macaulay's method

UNIT III

Direct and Bending stresses + Column & Struts
Direct and Bending stresses Members subjected to eccentric loads, middle third rule, kernel of Section, stress distribution. Applications of Direct & Bending stresses.Columns and Struts ,Buckling of columns, different end conditions, effective length, Least radius of gyration Applications: Euler's and Rankine's formulae,

UNIT IV

Statically Indeterminate beam
Types of statically indeterminate beams, Consistent Deformation Method, Basic principles for fixed beam, basics of moment distribution Method.Propped Cantilever beam : Analysis of propped cantilever beams. Fixed beam : Computation of fixed-end actions for various types of loads And secondary effects using basic principles, beams of varying moment of Inertia. Continuous beams

UNIT V

Computer Applications in Structural Engg. (for Laboratory Only)
Use of professional software such as STAAD-Pro, SAP, ETABS etc. for Determining response of frames structure of the topics related to this course

Reference Books:
1. Junarkar S.B. & Shah H.J.; Mechanics of Structures Vol-I; Charter publishing house, Anand
2. Wang. C.K., Intermediate Structural analysis. Tata McGraw Hill book Company.Delhi

CMEN-101 B **RIGID BODY MECHANICS**

UNIT I

Introduction to Rigid Body Mechanics
Definition and importance of rigid body mechanics. Basic concepts (position, displacement, velocity, acceleration). Reference frames (inertial, non-inertial). Rigid body idealization and modeling

UNIT II

Kinematics of Rigid Bodies
Translation, rotation, and general motion. Angular displacement, velocity, and acceleration. Euler's angles and rotation matrices. Relative motion and velocity analysis

UNIT III

Kinetics of Rigid Bodies
Newton-Euler equations. Angular momentum and moment of inertia. Work-energy principle and conservation of energy. Impulse-momentum principle

UNIT IV

Planar Motion of Rigid Bodies
. Planar kinematics and kinetics. Equations of motion (translation, rotation). Force and moment analysis. Application to linkages, gears, and cams

UNIT V

Three-Dimensional Motion of Rigid Bodies
3D kinematics and kinetics.Euler's equations and angular velocity. Gyroscopic motion and precession. Application to rotating shafts and machinery.Vibrations and Oscillations

Textbook Recommendations:
1. Hibbeler, R. C.Engineering Mechanics: Dynamics. 14th ed.
2. Bedford, A., & Fowler, W. . Engineering Mechanics: Statics & Dynamics. 6th ed. McGraw-Hill.

CMEN -101C **FLUID MECHANICS**

UNIT I

INTRODUCTION
Units & Dimensions. Properties of fluids - Specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws capillarity and surface tension concepts of system, energy equation, momentum equation

UNIT II

FLOW THROUG CIRCULAR CONDUITS
Laminar flow though circular conduits and circular annuli. Boundary layer concepts. Boundary layer thickness. Hydraulic and energy gradient. Darcy Weisbach equation. Friction factor and Moody diagram. Commercial pipes. Minor losses. Flow though pipes in series and in parallel.

UNIT III

DIMENSIONAL ANALYSIS
Dimension and units: Buckingham's II theorem Discussion on dimensionless parameters. Models and similitude. Applications of dimensionless parameters.

UNIT IV

ROTO DYNAMIC MACHINES
Homologus units. Specific speed. Elementary cascade theory. Theory of turbo machines. Euler's equation. Hydraulic efficiency. Velocity components at the entry and exit of the rotor.radial flow and axial flow machines. Centrifugal pumps, turbines,

UNIT V

POSITIVE DISPLACEMENT
Recriprocating pumps, Indicator diagrams, Work saved by air vessels. Rotory pumps.

REFERENCES BOOKS
1. S. Fluid Mechanics, Hydraulics and Fluid Machines, DhanpatRai
2. Bansal, R.K., Fluid Mechanics and Hydraulics Machines, Laxmi Publications

CMEN-101 D FREE BODY DIAGRAM MECHANICS

UNIT I

Introduction to Free Body Diagrams
Definition and importance of free body diagrams Basic concepts (forces, moments, torques) Drawing free body diagrams Identifying support reactions

UNIT II

Equilibrium of Particles and Rigid Bodies
Equilibrium equations (2D, 3D) Force and moment analysis Application to simple machines (levers, pulleys.) Center of gravity and center of mass; Moments and force

UNIT III

Force in Beams and Frames
Beam analysis (simply supported, cantilever). Frame analysis (simple, compound). Force and moment diagrams. Application to structural systems

UNIT IV

Torques and Rotational Equilibrium
Torque and rotational equilibrium. Application to gears, pulleys, and shafts. Rotational kinematic Angular momentum.

UNIT V

Stress and Strain Analysis
Introduction to stress and strain. Axial loading Torsional loading. Bending and shear stress
Textbook Recommendations:
1. Hibbeler, R. C. (2020). Engineering Mechanics: Statics & Dynamics. 14th ed. Pearson.
2. Beer, J. P., & Johnston, E. R. (2020). Mechanics of Materials. 8th ed. McGraw-Hill.

CECN-101 FUNDAMENTALS OF ELECTRONICS

Cr.	L	T	P
4	3	1	0

COURSE OBJECTIVES:

The objectives of this course are to

1. Understand the working principles of semiconductor diodes, their characteristics, and practical applications.
2. Learn the construction, operation, and configurations of Bipolar Junction Transistors (BJTs) and Field Effect Transistors (FETs).
3. Explore the basics and practical applications of Operational Amplifiers in analog circuits.
4. Master digital electronics concepts, including Boolean algebra, K-map minimization, and gate simplifications.
5. Gain knowledge of communication systems, focusing on modulation techniques and wireless communication technologies.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

1. Describe the concept of PN Junction and devices.
2. Explain the concept of BJT, FET and MOFET.
3. Apply the concept of Operational amplifier to design linear and non-linear applications.
4. Perform number systems conversions, binary arithmetic and minimize logic functions.
5. Describe the fundamentals of communication technologies.

UNIT-I

Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical Diodes, Diode Equivalent Circuits, Zener Diodes breakdown mechanism (Zener and avalanche)

Diode Application: Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits

Special Purpose two terminal Devices: Light-Emitting Diodes, Photo Diodes, Varactor Diodes, Tunnel Diodes.

UNIT-II

Bipolar Junction Transistor: Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration

Field Effect Transistor: Construction and Characteristic of JFETs. Transfer Characteristic. MOSFET (MOS) (Depletion and Enhancement) Type, Transfer Characteristic.

UNIT-III

Operational Amplifiers: Introduction, Op-Amp basic, Practical Op-Amp Circuits (Inverting Amplifier, Non-inverting Amplifier, Unit Follower, Summing Amplifier, Integrator, Differentiator).Differential and Common-Mode Operation, Comparators.

UNIT-IV

Digital Electronics: Number system & representation, Binary arithmetic, Introduction of Basic and Universal Gates, using Boolean algebra simplification of Boolean function. K Map Minimization upto 6 Variables.

UNIT-V

Fundamentals of Communication Engineering: Basics of signal representation and analysis, Electromagnetic spectrum Elements of a Communication System, Need of modulation and typical applications, Fundamentals of amplitude modulation and demodulation techniques.

Introduction to Wireless Communication: Overview of wireless communication, cellular communication, different generations and standards in cellular communication systems, Fundamentals of Satellite & Radar Communication.

Text Books:

1. Robert L. Boylestand / Louis Nashelsky "Electronic Devices and Circuit Theory", Pearson Education.
2. George Kennedy, "Electronic Communication Systems", McGrawPublication
3. David A. Bell, "Electronic Devices and Circuits", Oxford UniversityPress.
4. Jacob Millman, C.C. Halkias, StayabrataJit, "Electronic Devices and Circuits", McGrawHill.
5. A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.

CECN-101 A	ANALOG ELECTRONICS

Cr. L T P

4 3 1 0

Unit-I

Bipolar Junction Transistors: Transistor amplifier, small signal Equivalent circuits (Hybrid-pi model), Graphical Analysis, biasing the BJT for discrete-circuit design, Basic Single Stage BJT amplifier configurations.

Unit-II

MOSFETS: Construction of Enhancement and Depletion mode MOSFET, Drain & Transfer characteristics, Internal capacitances of MOSFET, MOSFET as an amplifier, Biasing in MOS amplifier circuits, Basic configurations of MOS amplifier, Analysis of Source follower.

Unit-III

Frequency Response: BJT internal capacitances and high frequency model, frequency response of CE amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier.

Unit-IV

Feed Back: Properties of negative feedback, four basic feedback topologies (series shunt; series-series; shunt-shunt; & shunt-series) determination of Loop gain

Unit-V

Oscillators: Basic principles of sinusoidal oscillator Different oscillator circuits (RC phase shift, Wein-bridge, Collpitts, Hartley, Clap. and Crystal Oscillators.)

Reference Books:

1. A.S. Sedra and K.C. Smith, "Microelectronic circuits", Oxford University Press (India).
2. Boylestad&Nashelsky "Electronic Device and Circuit."
3. Millman, J. and Grabel, A./"Microelectronics"/McGraw Hill.
4. Bell, David A/ "Electronic Devices & Circuits"/Prentice Hall (India) 4th Edition

CECN-101 B	DIGITAL ELECTRONICS

Cr	L	T	P
4	3	1	0

Unit-I

Introduction: Types of Digital circuits and their characteristics, Number system: Direct conversion between bases, Negative numbers & BCD and their arithmetic's, Boolean algebra, Logic gates, Minimization of Boolean Functions: K-Map & Tabular method, Error detecting & correcting codes, hamming codes.

Unit-II

Combinational Logic Circuits: Design Procedure, Adders, Subtractors, Code conversion, Multiplexers/ Demultiplexers, Encoder/ decoders, decimal adders & amplitude comparators. Decoder and driver circuits for 7-segment LED displays.

Unit-III

Sequential Logic Circuits: Flip–Flops and their conversions, excitation table, state table & state diagram, state reduction, Shift registers and their applications. Design of synchronous and asynchronous counters.

Unit-IV

Memory and Programmable Logic: RAM, Types of RAM. ROM, Types of ROM. Programmable Logic Device (PLD), Programmable Logic Array(PLA),Programmable Array Logic(PAL).

Unit-V

Asynchronous Sequential Logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.

Reference Books :

1. Digital Design by M Moris Mano, 2nd Edn.PHI
2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH.
3. Switching Circuit & Logic Design by Hill & Peterson, Wiley
4. Digital Circuit & Logic Design, by Holsworth.

CECN-101 C	ELECTRICAL MEASUREMENT & INSTRUMENTATION

Cr	L	T	P
4	3	1	0

UNIT I

Measuring Instruments: Classification , deflecting, control and damping torques , Ammeters and Voltmeters , PMMC, moving iron type instruments , expression for the deflecting torque and control torque , Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type Extension of range of E.S. Voltmeters.

Instrument transformers: CT and PT – Ratio and phase angle errors , design considerations Type of P.F. Meters – dynamometer and moving iron type 1-ph and 3-ph meters , Frequency meters , resonance type and Weston type , synchroscopes.

UNIT II

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques , Extension of range of wattmeter using instrument transformers , Measurement of active and reactive powers in balanced and unbalanced systems.

UNIT III

Measurement of Energy: Single phase induction type energy meter , driving and braking torques , errors and compensations , testing by phantom loading using R.S.S. meter. Three phase energy meter, trivector meter, maximum demand meters.

UNIT IV

Potentiometers: Principle and operation of D.C. Crompton's potentiometer, standardization Measurement of unknown resistance, current, voltage.

Resistance Measurements: Method of measuring low, medium and high resistance , sensitivity of Whetstone's bridge , Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance , loss of charge method.

UNIT V

A.C. Bridges: Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle, Desauty Bridge. Wien's bridge, Schering Bridge.

Magnetic Measurements: Ballistic galvanometer, equation of motion, flux meter, constructional details, comparison with ballistic galvanometer. Determination of B-H Loop methods of reversals six point method , A.C. testing , Iron loss of bar samples, core loss measurements by bridges and potentiometers.

TEXT BOOKS:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.

2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney, DhanpathRai& Co.

REFERENCE BOOKS

1. Electrical Measurements by Buckingham and Price, Prentice Hall of India

2. Electrical Measurements: Fundamentals, Concepts, Applications by Reissland, M.U, New Age International (P) Limited, Publishers

CECN-101 D **ELECTRO MAGNETICS**

Unit-I

Review of Vector analysis, Rectangular, Cylindrical and Spherical coordinates and their transformation. Divergence, gradient and curl in different coordinate systems. Divergence's theorem and Stoke's theorem.

Unit-II

Electric field intensity, Electric Flux density, Energy and potential. Current and conductors, Dielectrics and capacitance, Poisson's and Laplace's equation.

Unit-III

Steady magnetic field, magnetic forces, materials and inductance, Time varying field and Maxwell's equation.

Unit-IV

Uniform plane waves: wave propagation in free space, dielectrics, and conductors. Poynting Vector, Plane wave reflection at normal incidence.

Unit-V

Transmission lines: Line equations, line parameters and line examples. Smith chart, Application of transmission lines.

Reference Books:

1. William H.Hayt, John A.Buck, 'Engineering Electromagnetics', Tata McGraw Hill Publishing Co. Ltd., New Delhi Sixth edition.
2. Jordan E.C. and Balmain K.G. "Electromagnetic wave and radiating systems",PHI, Second edition.
3. Mathew M.O.Sadiku, "Element of Electromagnetics", Oxford Press, 4th Edition.

CESN-101 Engineering Chemistry and Environmental Studies

Cr.	L	T	P
4	3	1	0

Unit 1: Fuels:

Introduction, Classification of fuels, Calorific value, Methods for determination of Calorific value of fuel, Classification of coal by rank, Analysis of coal, Proximate & Ultimate analysis of coal, Biomass, Biogas, Biodiesel: Definition, Types, Physical Characteristics and Biodiesel Production procedure.

Unit 2 Polymers:

Introduction, Nomenclature of polymers, Functionality, Types of Polymerization, Classification of Polymers, Plastics, Important Thermoplastic and Thermosetting Resins, Synthetic Fibres, Ion-exchange resins, Rubbers (Elastomers), Vulcanization of rubber, De-vulcanization, Synthetic rubbers or elastomers, Application of rubber, Bio-polymers, Degradation of polymers.

Unit 3 Water Technology:

Introduction, Hardness of water: Temporary and Permanent hardness; Equivalents of Calcium Carbonate, units of hardness, Disadvantage of hard water, Boiler troubles, Scale and sludge formation in boilers and their disadvantage, Boiler corrosion, Caustic embrittlement, Priming and foaming, water softening methods: Permutit process, De-ionization process, Lime-soda process.

Unit 4: Environmental pollution and its impact:

Environment and Atmosphere; Kinds of pollution; Air pollution: Greenhouse effect, Acid rains and global warming; Noise pollution; Water and Solid waste pollution: Industrial effluents and wastes, Ground water pollution, Lead pollution, Fluoride pollution; Radiation and chemical toxicology.

Unit 5 Pollution Cleanup:

Prevention and control of air pollution: Source correction, Collection of pollutants, Cooling, Treatment; Prevention and control of water pollution: Stabilization of the ecosystem, Reutilization and Recycling of waste, Removal of Pollutants; Solid waste management: Collection, Disposal, etc.; Bioremediation: Introduction, Phytoremediation.

Reference Books:

•Textbook of Engineering Chemistry, 2024, Wiley Publishers (ISBN: 9789357460972)972

•Jain, M. and Jain, P.C., Engineering Chemistry, 17th edition, DhanpatRai Publishing Company (P) Ltd., New Delhi.

•Engineering Chemistry Second Edition, Publisher: McGraw Hill Education India, ISBN: 9789352605774.

- Kuriacose and Rajaram, Chemistry in Engineering and Technology, TMH, Delhi.
- Sharma, P.D., Ecology and Environment, 11th edition, Rastogi Publications, Meerut.
- Gupta, K.M. Environmental Studies, Umesh Publications, Delhi.
- Gopalan, R.R., Environmental Studies: from crisis to cure, Oxford University Press, New Delhi.

CESN-101 A

Chemical Thermodynamics

Course Description: This course provides an in-depth understanding of chemical thermodynamics, focusing on the laws of thermodynamics, thermodynamic properties, phase and chemical equilibria, and the thermodynamics of solutions. It is designed forstudents, covering both fundamental and advanced topics.

Unit 1: Basic Concepts of Thermodynamics

Thermodynamic Systems and Processes**:**Definition of system, surroundings, and boundaries, Types of systems: isolated, closed, and open systems, Thermodynamic processes: isothermal, adiabatic, isobaric, and isochoric processes, State and path functions (internal energy, work, heat)
Zeroth Law of Thermodynamics: Concept of thermal equilibrium, Temperature and its measurement
First Law of Thermodynamics: Concept of internal energy (U) and enthalpy (H), Mathematical form of the first law: $\Delta U = q + w$, Work done in various processes (PV work, electrical work), Specific heat capacities (Cp and Cv) and their relation
Application of the First Law: Internal energy changes in ideal and real gases, Joule-Thomson effect, Joule-Thomson coefficient, inversion temperature

Unit 2: Second Law of Thermodynamics and Entropy

Second Law of Thermodynamics: Limitations of the first law, Concepts of heat engines and refrigerators, Carnot cycle and its efficiency
Entropy (S): Definition of entropy and its physical significance, Entropy changes in reversible and irreversible processes, Entropy of the universe and the second law
Applications of the Second Law: Clausius inequality, Entropy change in mixing of gases, Free expansion of gases and its relation to entropy
Third Law of Thermodynamics: Nernst heat theorem, Absolute entropy and its significance

Unit 3: Thermodynamic Potentials and Equilibrium

Thermodynamic Potentials:Definitions of thermodynamic potentials (Gibbs free energy, Helmholtz free energy, Enthalpy, Internal energy), Maxwell relations and their applications, Gibbs-Helmholtz equation and its significance
Criteria for Spontaneity:Conditions for equilibrium and spontaneity ($\Delta G < 0$ for spontaneous processes), Phase equilibrium and phase rule, Le Chatelier's principle and its applications
Chemical Equilibrium:Law of mass action and equilibrium constant, Temperature dependence of equilibrium constant (Van't Hoff equation), Relation between free energy and equilibrium constant,

Phase Equilibria:Phase diagrams for one-component systems (water and sulfur), Clausius-Clapeyron equation and its applications

Unit 4: Thermodynamics of Solutions

Ideal and Non-Ideal Solutions:Raoult's law and deviations from ideal behavior, Henry's law and its applications, Activity, activity coefficient, and their significance
Thermodynamics of Mixing:Partial molar quantities (partial molar volume, partial molar Gibbs free energy), Gibbs-Duhem equation, Chemical potential and its variation with temperature and pressure
Colligative Properties:Lowering of vapor pressure, elevation of boiling point, depression of freezing point, Osmotic pressure and its applications in determining molecular weight
Applications in Electrolyte Solutions:Thermodynamic properties of electrolytes, Debye-Hückel theory of ion-ion interactions

Recommended Books:

1. "Thermodynamics: An Engineering Approach" by Yunus A. Çengel and Michael A. Boles (2021)
2. "Introduction to Chemical Engineering Thermodynamics" by J.M. Smith, H.C. Van Ness, and M.M. Abbott (2017)
3. "Chemical Thermodynamics: Advanced Applications" by J. Bevan Ott and Juliana Boerio-Goates (2019)
4. "Modern Thermodynamics: From Heat Engines to Dissipative Structures" by DilipKondepudi and Ilya Prigogine (2014)
5. "Molecular Driving Forces: Statistical Thermodynamics in Biology, Chemistry, Physics, and Nanoscience" by Ken A. Dill and Sarina Bromberg (2018)

CESN-101 B

Chemical Kinetics

Course Description: This course focuses on the study of the rates of chemical reactions and the factors influencing them. Topics include reaction mechanisms, theories of reaction rates, and advanced concepts in kinetics. The aim is to equip students with a thorough understanding of both the theoretical and practical aspects of chemical kinetics.

Unit 1: Fundamentals of Chemical Kinetics

Basic Concepts:Definition of reaction rate and rate laws, Order and molecularity of a reaction, Rate constant and its units for different orders of reactions, Elementary and complex reactions
Integrated Rate Equations:Zero-order, first-order, second-order reactions, Half-life period for different orders of reactions, Determination of order of reaction using integrated rate laws
Experimental Methods of Studying Kinetics:Methods of determining reaction rates (flow, stopped-flow, relaxation methods), Spectroscopic methods, electrical methods, and pressure measurement

Unit 2: Theories of Reaction Rates

Collision Theory:Basic postulates of collision theory, Effective collisions and activation energy, Dependence of rate on temperature and concentration
Transition State Theory (TST):Concept of activated complex, Energy profiles of reactions, Eyring equation and its applications
Arrhenius Equation:Temperature dependence of reaction rates, Interpretation of Arrhenius parameters (A and Ea), Determination of activation energy
Comparative Study of Collision and Transition State Theories:Merits and limitations of both theories

Unit 3: Reaction Mechanisms

Reaction Mechanisms:Elementary steps and their importance in mechanisms, Steady-state approximation and rate-determining step theory
Unimolecular and Bimolecular Reactions:Lindemann-Hinshelwood mechanism for unimolecular reactions, Chain reactions: H_2-Br_2 reaction and decomposition of acetaldehyde
Catalysis and Reaction Mechanism:Homogeneous and heterogeneous catalysis
Enzyme catalysis: Michaelis-Menten mechanism, Role of catalysts in altering reaction pathways

Unit 4: Complex Reactions and Kinetics in Solutions

Complex Reactions:Parallel, consecutive, and reversible reactions, Analysis of complex reaction mechanisms, Chain reactions and explosion limits (e.g., hydrogen-oxygen reaction)

Reactions in Solutions:Factors influencing reaction rates in solution (solvent effect, ionic strength), Diffusion-controlled and activation-controlled reactions
Kinetics of fast reactions in solutions: relaxation methods, flash photolysis
Kinetics of Polymerization:Free-radical polymerization kinetics, Chain initiation, propagation, and termination

Recommended Books:

1. "Chemical Kinetics and Reaction Dynamics" by Paul L. Houston (2020)
2. "Essentials of Chemical Kinetics" by C. Kalidas and V. Rajaram (2019)
3. "Chemical Kinetics: From Molecular Structure to Chemical Reactivity" by Luis Arnaut, Sebastiao Jose Formosinho, and Hugh Burrows (2018)
4. "Reaction Kinetics: Principles and Applications in Organic and Biological Chemistry" by Keith J. Laidler (2018)
5. "Chemical Reaction Engineering and Kinetics" by Jorge Ancheyta (2021)

CESN-101 C

Environmental Chemistry

Course Description: This course provides an understanding of chemical processes occurring in the environment, including the atmosphere, hydrosphere, lithosphere, and biosphere. It focuses on the chemistry of pollutants, environmental degradation, and sustainable practices for environmental protection.

Unit 1: Fundamentals of Environmental Chemistry

Introduction to Environmental Chemistry:Definition, scope, and importance of environmental chemistry, Segments of the environment: atmosphere, hydrosphere, lithosphere, and biosphere, Chemical composition of air, water, and soil
Environmental Cycles:Biogeochemical cycles (carbon, nitrogen, sulfur, phosphorus cycles), Role of microorganisms in biogeochemical cycles
Concepts of Green Chemistry:Principles of green chemistry and sustainability, Environmental impact of chemical processes and industrial activities, green solvents, catalysts, and alternative energy sources

Unit 2: Atmospheric Chemistry

Structure and Composition of Atmosphere:Layers of the atmosphere: troposphere, stratosphere, mesosphere, thermosphere, Composition and chemical reactions in the atmosphere
Air Pollution and Global Warming:Primary and secondary pollutants (SOx, NOx, CO, particulate matter, VOCs), Greenhouse gases and their effects on global warming, Photochemical smog, acid rain, and ozone depletion
Monitoring and Control of Air Pollution:Air quality standards and monitoring techniques (AQI, particulate matter sensors), Control measures: scrubbers, electrostatic precipitators, catalytic converters

Unit 3: Water Chemistry and Pollution

Water Quality Parameters:Physical parameters (temperature, color, turbidity), Chemical parameters (pH, dissolved oxygen, BOD, COD, alkalinity, hardness), Biological parameters (coliform bacteria, microbial contamination)
Water Pollution:Sources of water pollution (domestic, industrial, agricultural), Heavy metals in water (lead, mercury, cadmium, arsenic) and their toxicity, Eutrophication and its effects on aquatic ecosystems
Water Treatment and Purification:Primary, secondary, and tertiary treatment of wastewater Methods of water purification: filtration, coagulation, flocculation, sedimentation, disinfection (chlorination, UV treatment), Desalination and reverse osmosis techniques

Unit 4: Soil Chemistry and Waste Management

Soil Composition and Chemistry:Composition of soil: minerals, organic matter, water, air, Soil properties: pH, cation exchange capacity, nutrient availability, Soil pollutants: pesticides, heavy metals, industrial wastes
Soil Pollution:Sources of soil contamination: fertilizers, pesticides, industrial discharge, Effects of soil pollution on plant growth and food safety, Remediation techniques: bioremediation, phytoremediation, chemical methods
Solid Waste Management:Types of solid waste: municipal, hazardous, biomedical
Waste management practices: recycling, composting, incineration, landfills, Hazardous waste management and disposal

Recommended Books:

1. "Environmental Chemistry: A Global Perspective" by Gary W. vanLoon and Stephen J. Duffy (2021)
2. "Environmental Chemistry" by Stanley E. Manahan (2022)
3. "Principles of Environmental Chemistry" by James Girard (2020)
4. "Introduction to Environmental Chemistry" by Julian E. Andrews, Peter Brimblecombe, and Tim D. Jickells (2020)
5. "Environmental Chemistry: Fundamentals" by Ronald A. Hites and Jonathan D. Raff (2021)

CESN-101 D

Natural Resource Management

Course Description: This course focuses on the sustainable management of natural resources such as water, soil, forests, and minerals. It covers the principles of conservation, management strategies, the socio-economic implications of resource use, and the role of policy and governance in resource management.

Unit 1: Introduction to Natural Resources

Definition and Classification of Natural Resources:Renewable and non-renewable resourcesBiotic and abiotic resources, Resource availability, scarcity, and carrying capacity
Global and National Resource Distribution:Geographical distribution of resources (water, forests, minerals), Resource consumption patterns: global vs. local scenarios, Depletion and degradation of natural resources
Principles of Sustainable Resource Management:Sustainability concepts and sustainable development goals (SDGs), The role of science, technology, and innovation in resource management

Unit 2: Water Resource Management

Water Resources:Types of water resources: surface water, groundwater, glaciers, oceans, Hydrological cycle and water balance, Freshwater availability and demand
Water Pollution and Scarcity:Sources and types of water pollution (industrial, agricultural, domestic), Impact of water pollution on ecosystems and human health, Global water scarcity and strategies to combat it
Water Conservation and Management:Rainwater harvesting, groundwater recharge, watershed management, Irrigation management techniques
Policies for sustainable water resource management: National Water Policy, Integrated Water, Resource Management (IWRM)

Unit 3: Forest Resource Management

Importance of Forests:Forest ecosystems and their role in maintaining biodiversity, Forest resources and their economic, ecological, and social significance
Deforestation and Forest Degradation:Causes of deforestation (agriculture, urbanization, logging), Impacts of deforestation on climate, biodiversity, and indigenous communities
Forest Conservation and Sustainable Management:Afforestation, reforestation, and agroforestry, Forest certification programs (FSC) and sustainable logging practices, Community-based Forest management and Joint Forest Management (JFM)

Unit 4: Soil and Mineral Resource Management

Soil Resources:Types of soils, soil formation, and soil profiles, Soil fertility and its importance in agriculture, Soil erosion, desertification, and degradation
Soil Conservation Techniques:Soil conservation methods: contour plowing, terracing, crop rotation, Integrated soil management practices, Policies for sustainable agriculture and soil conservation
Mineral Resources:Types of mineral resources: metallic and non-metallic mineralsGlobal distribution of minerals and mining activities
Environmental impacts of mining: pollution, habitat destruction, land degradation
Sustainable Mining Practices:Techniques for reducing environmental impact of mining (e.g., rehabilitation, reforestation), Waste management in mining (tailings and their treatment), Responsible mining initiatives and policies

Recommended Books:

1. "Sustainable Resource Management: Global Trends, Visions, and Policies" by Stefan Bringezu and AnkeSchandl (2021)
2. "Natural Resource and Environmental Economics" by Roger Perman, Yue Ma, and Michael Common (2020)
3. "Natural Resource Conservation: Management for a Sustainable Future" by Daniel D. Chiras and John P. Reganold (2021)
4. "Natural Resource Management: Principles and Practices" by B.W. Pandey (2020)
5. "Water Resources Management: Principles, Challenges and Solutions" by Neil S. Grigg (2020)

CPCN-101 Presentation and communication skills

Cr.	L	T	P
3	3	0	0

Unit – I

Essential Grammar: Basic Clause/Sentence Patterns, Correct Usage of Different Word-Classes, Articles, Tense, Syntactic Concord, Prepositions, Transformation, Synthesis, Graded Syntactic Structures.

Unit – II

Essential Vocabulary: Basic words, Synonyms, Antonyms, Homophones, One-Word Substitutes, Idioms and Phrases, Word-formation-Suffix and Prefix, Technical Vocabulary.
Linguistic Skills: Listening, Speaking, Reading, and Writing (Activities to be Selected by the Teacher).Strategies for Active Listening, Introduction to Phonetics-Monophthongs, Diphthongs and Consonant sound symbols.Newspaper reading and Precis Writing, SQ3R technique of Reading& Comprehension Passage.

Unit – III

Language Through Literature: Non-Fiction &/or Fiction, Verse, and Play
Bacon's *Essays* (Selection) and/or Lamb's *Tales from Shakespeare* (Selection)
Keats' *The Eve of St Agnes/ Ode To Autumn/Ode to A Nightingale*
Tagore's *Chitra/ Gitanjali(Lyric 1-5)*

Unit – IV

Speaking Professionally: Job Interviews, Group-Discussions, Difference between GD and Debate, Public Speaking, Argumentative Skills, Role-Plays, Presentation Skills, Significance of Body Language

Reference Books :

1. Hornby, A.S. *Guide to Patterns & Usage in English*. 2nded. New Delhi: Oxford University Press, 2002. Print.
2. Swan, Michael. *Practical English Usage*. 3rded. New Delhi: Oxford University Press, 2006. Print.
3. Carter, R. and M. McCarthy. *Cambridge Grammar of English*. New Delhi: Cambridge University Press, 2006.CD-ROM, Print.
4. McCarthy, M. and F. O'Dell. *English Vocabulary in Use*. New Delhi: Cambridge University Press, 2006. Print.
5. Kumar, E. Suresh and P. Sreehari. *A Handbook for English Language Laboratories*. New Delhi: Cambridge University Press, 2007. Print.

English Communication

CPCN-101 A

Units: 1

Introduction: Theory of Communication, Types and modes of Communication Language of Communication: - Verbal and Non-verbal (Spoken and Written) - Personal, Social and Business - Barriers and Strategies - Intra Personal, Inter Personal and Group Communication

Unit 2

Listening Skills- Listening to others, Listening short Lectures and Videos, Types of Listening, How to improve our listening skills?

Unit: 3

Speaking Skills: - Monologue - Dialogue - Group Discussion - Effective Communication/ Mis-Communication - Interview - Public Speech

Unit 4

Reading and Understanding - Close Reading - Comprehension - Summary Paraphrasing - Analysis and Interpretation - Translation(from Indian language to English and vice-versa) Literary/Knowledge Texts
Unit 5

Writing Skills - Documenting - Report Writing - Making notes - Letter Writing

English

Sub Code: CPCN-101 B

Unit: 1

Basic Essential Grammar: Parts of Speech, Tenses, Sentence Pattern, Correct Usage of different word classes, Syntax Concord, Transformation, Syntheses, Articles, Prepositions

Unit 2

Vocabulary: Synonyms, Antonyms, Homophones, Homonyms, One word substitution, Idiom and Phrases, Word Formation, Words often confused, Technical Vocabulary

Unit: 3

Linguistic Skills-Listening skills, Speaking Skills, Reading Skills, Writing Skills (Activities also done selected by teacher)

Unit 4

Professional Speaking- Group Discussion, Debate, Public Speaking, Job Interview, Role Plays, Presentation Skills

Unit 5

Writing Skills - Documenting - Report Writing - Making notes - Letter Writing, Proposal Writing, Paragraph Writing

Technical Communication

Sub Code: CPCN-101 C

Unit: 1

Grammar rules -articles, tenses, auxiliary verbs (primary & modal) prepositions, subject-verb agreement, pronoun-antecedent agreement, discourse markers and sentence linkers
General Reading and Listening comprehension – rearrangement & organization of sentences

Unit 2

Different kinds of written documents: Definitions- descriptions- instructions-recommendations- user manuals – reports – proposals, writing formal Letters, punctuation
Scientific Reading & Listening Comprehension

Unit: 3

Technical paper writing: documentation style – document editing – proof reading – Organizing and formatting, Modifiers, phrasal verbs, tone and style, graphical representation
Reading and listening comprehension of technical documents

Unit 4

Professional Speaking- Group Discussion, Debate, Public Speaking, Job Interview, Role Plays, Presentation Skills

Unit 5

Phonetics- International Phonetic Alphabet, Phonemes, Allophones, Phonetics Transcription, Organ of speech.

Human Values, De-addiction and Traffic Rules

CPCN-101 D

Unit: 1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for Value Education
- Self-Exploration– content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit 2 Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Swasthya

Unit: 3 Understanding Harmony in the Family and Society- Harmony in Human Relationship

- Understanding harmony in the Family- the basic unit of human interaction
- Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
- Understanding the meaning of Vishwas; Difference between intention and competence 16. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

Unit 4 Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence

Unit 5 Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

CMEN-151 **WORKSHOP PRACTICE** **L T P**
0 0 4

COURSE OUTCOMES

	Course Outcome (CO)
At the end of this course, the students should be able to:	
CO 1	Study and practice on machine tools and their operations
CO 2	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding
CO 3	Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping
CO 4	Welding and soldering operations
CO 5	Apply basic electrical engineering knowledge for house wiring practice

LIST OF EXPERIMENTS

Machine shop:

- Study of machine tools in particular Lathe machine
- Demonstration of different operations on Lathe machine
- Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting.
- Study of Quick return mechanism of Shaper.

Fitting shop:

- Preparation of T-Shape Work piece as per the given specifications.
- Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
- Practice marking operations.

Carpentry:

- Study of Carpentry Tools, Equipment and different joints.
- Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

Welding:

- Instruction of BI standards and reading of welding drawings.

- Butt Joint
- Lap Joint

Smithy

- Sharpening any arc and edge.
- Preparing small arc and edge,
- Repair of agricultural implements and power plough, use of power hammer etc.

Text Books:

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, DhanpathRai& Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. JeyapoovanT.andPranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

CMEN -153 ENGINEERING GRAPHICS LAB

Basic Drawing Operations

- Objective: Familiarize with basic drawing tools.
- Activities:
  - Draw a line using two endpoints.
  - Draw a circle given a center and radius.
  - Draw a rectangle with specified coordinates.

Transformations

- Objective: Apply geometric transformations.
- Activities:
  - Implement translation of shapes (move by dx, dy).
  - Implement rotation of shapes around a point.
  - Implement scaling of shapes (increase/decrease size).

Drawing 2D Shapes

- Objective: Create various 2D shapes.
- Activities:
  - Draw a triangle given three vertices.
  - Draw a polygon by specifying the number of vertices and their coordinates.

Basic CAD Commands

- Objective: Understand basic CAD functionalities.
- Activities:
  - Draw an arc using center, radius, start angle, and end angle.
  - Implement a Bezier curve using control points.

Parametric Equations for Curves

- Objective: Use parametric equations to draw curves.
- Activities:
  - Draw a parametric curve (e.g., a sine wave).
  - Visualize parametric equations in 2D space.

3D Projections

- Objective: Understand 3D object representation.
- Activities:
  - Create isometric projections of simple shapes.
  - Draw orthographic views (front, top, side) of 3D objects.

Sectional Views

- Objective: Learn to create sectional views.
- Activities:
  - Generate a sectional view of a given solid object.
  - Illustrate the differences between full and half sections.

 Dimensioning Techniques

- Objective: Apply dimensioning standards.
- Activities:
  - Add linear and angular dimensions to a drawing.
  - Practice dimensioning for clarity and accuracy.

 Rendering Techniques

- Objective: Enhance drawings with rendering techniques.
- Activities:
  - Apply shading to 2D shapes.
  - Use textures and gradients for better visual representation.

 CAD Software Basics

- Objective: Introduction to CAD software tools.
- Activities:
  - Create a simple project using CAD software.
  - Familiarize with layers, commands, and saving/exporting drawings.

COMMUNICATION LAB

CPCN- 151 **L**
T P C

0 0 2 1

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills

Objectives 1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

• Listening for general content

• Listening to fill up information

• Intensive listening

• Listening for specific information

Speaking Skills

Objectives 1. To involve students in speaking activities in various contexts

2. To enable students express themselves fluently and appropriately in social and professional contexts • Oral practice: Just a Minute (JAM) Sessions

• Describing objects/situations/people

• Role play – Individual/Group activities

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication. Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations. Practice: Formal Presentations.

Exercise – IV

CALL Lab:

Understand: Listening for General Details. Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks. Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details. Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills. Practice: Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration
ii) ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab:

A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

ENGLISH COMMUNICATION LAB

CPCN-151 A

1. Develop interactive quizzes or flashcards to enhance vocabulary through definitions, synonyms, and antonyms.
2. Create listening exercises using audio clips followed by questions to assess understanding and retention.
3. Implement a program for students to record, analyze, and improve their speeches based on feedback.
4. Design a workshop that allows students to practice and present topics using visual aids and presentation software.
5. Create a platform for conducting group discussions on various topics, focusing on turn-taking and effective communication.
6. Develop a program that provides writing prompts and feedback on grammar, structure, and style.
7. Implement role-playing exercises to simulate real-life situations and improve conversational skills and confidence.
8. Create an application that helps students practice pronunciation through audio playback and comparison.
9. Design a set of reading passages followed by comprehension questions to enhance critical reading skills.
10. Implement a digital journal for students to reflect on their communication experiences and receive peer feedback.

ENGLISH LAB

CPCN-151 B

1) Develop a program that identifies and corrects grammatical errors in written text.
2) Create an application with quizzes and games to help users expand their vocabulary.
3) Implement audio-based comprehension exercises that include questions to test understanding.
4) Design a tool that records speeches and provides feedback on pace, tone, and clarity.
5) Develop a program that presents reading passages followed by comprehension questions.
6) Create an application that allows users to practice pronunciation and receive feedback using audio samples.
7) Implement a tool that provides creative writing prompts to stimulate writing practice.
8) Design a platform for virtual group discussions where participants can practice speaking and listening skills.
9) Develop a program that guides users through creating and delivering effective presentations.
10) Create a platform for students to share their writing and receive constructive feedback from peers.

TECHNICAL COMMUNICATION LAB

CPCN-151 C

- Writing Technical Reports
  - Focus on structure, clarity, and audience.
- Creating User Manuals
  - Emphasize step-by-step instructions and usability.
- Developing Proposals
  - Learn to draft persuasive and structured proposals.
- Designing Presentations
  - Use of visuals and effective delivery techniques.
- Conducting Oral Communication Workshops
  - Improve verbal skills through practice and feedback.
- Practicing Resume and Cover Letter Writing
  - Tailor documents for job applications.
- Engaging in Peer Review Sessions
  - Provide and receive constructive feedback on documents.
- Utilizing Visual Aids Effectively
  - Incorporate charts, graphs, and images to enhance communication.
- Exploring Digital Communication Tools
  - Familiarization with software for documentation and collaboration.
- Analyzing Case Studies in Technical Communication
  - Examine real-world examples to identify best practices.

HUMAN VALUES, DEADDICTION AND TRAFFIC RULES

CPCN-151 D

1. Workshops on Ethics and Morality
    - Discuss fundamental ethical principles and moral dilemmas.
2. Community Service Projects
    - Engage in activities promoting social responsibility and compassion.
3. Conflict Resolution Training
    - Teach effective communication and mediation skills.
4. Empathy Development Sessions
    - Activities to foster understanding and empathy towards others.
5. Cultural Awareness Programs
    - Explore diversity and promote respect for different cultures.

Addiction Awareness Programs

1. Substance Abuse Education
    - Provide information on the effects of drugs and alcohol.
2. Support Group Facilitation
    - Create safe spaces for sharing experiences and recovery stories.
3. Stress Management Workshops
    - Teach techniques for coping with stress without resorting to substances.
4. Healthy Lifestyle Promotion
    - Encourage activities like exercise and hobbies as alternatives to addictive behaviors.
5. Guest Lectures from Addiction Experts
    - Invite professionals to discuss prevention and treatment strategies.

Traffic Rules Programs

1. Road Safety Workshops
    - Educate on traffic laws and safe driving practices.
2. Mock Traffic Situations
    - Simulate real-life scenarios to practice safe behavior.
3. Pedestrian Safety Campaigns
    - Promote awareness of pedestrian rights and safety tips.
4. Bicycle and Motorcycle Safety Training
    - Teach specific rules and safety measures for non-vehicle commuters.
5. Community Awareness Drives
    - Organize events to highlight the importance of following traffic rules.

MATHEMATICS-II

CMAM-102 **Cr. L T P**

4 3 1 0

Unit-I **10**

Integral Calculus: Double and triple integrals, change of order of integration, Change of variables; Gamma, Beta functions and their properties, Dirichlet's integral; Applications to area and volume.

Unit-II **08**

Vector Calculus:

Vectors Differentiation: Gradient, Divergence, Curl and their physical meaning; Differential operators and their identities.

Vector Integration: Line and surface integrals; Green's Theorem in a plane; Gauss's Divergence theorem and Stokes's theorem and their applications.

Unit-III **06**

Fourier Series & Fourier Transform: Trigonometric Fourier series, Half range series, Harmonic analysis; Fourier Transform: Definition, Fourier sine and cosine transforms, Fourier integral formula and applications.

Unit-IV **10**

Laplace Transform: Laplace transform, Existence theorem, Properties of Laplace Transform, Laplace transform of derivative and integrals, Unit step function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem. Application of Laplace Transform to solve ordinary differential equation.

Unit-V **06**

Z-Transform: Definition of Z-transform of elementary functions; Shifting theorems, Convolution theorem, Initial and Final value theorems; Inverse of Z-transform; Application to solution of difference equations.

Reference Books :

1. Thomas, G. and R.L. Finney. *Calculus and Analytical Geometry*. 6th Edition. Addision Wesley/Narosa, 1998.
2. Grewal, B.S. *Engineering Mathematics*. 39th Edition. Khanna Publishers, 2005.
3. Prasad, C. *Mathematics for Engineers*. 19th Edition. Prasad Mudralaya.

Differential Equations

CMAN-102 A

Unit 1: Introduction to Differential Equations
This unit covers the definitions and basic concepts of differential equations, distinguishing between ordinary and partial differential equations, as well as exploring their order and degree. It also addresses initial and boundary value problems.

Unit 2: First-Order Differential Equations
In this unit, students will learn about the various types of first-order differential equations, including separable, homogeneous, and linear equations. It also includes methods such as exact equations and integrating factors, along with applications of first-order equations in real-world scenarios.

Unit 3: Higher-Order Differential Equations
This unit focuses on linear differential equations of higher order with constant coefficients. Students will study methods for solving these equations, including the method of undetermined coefficients and variation of parameters, as well as exploring non-homogeneous equations and their applications.

Unit 4: Systems of Differential Equations
Students will be introduced to systems of first-order differential equations, learning techniques for solving linear systems. This unit also includes phase plane analysis and the stability of equilibrium points.

Unit 5: Laplace Transforms
This unit covers the definition and properties of the Laplace transform, along with the inverse Laplace transform and its applications. Students will learn how to solve ordinary differential equations using Laplace transforms.

Probability and Statistics

CMAN-102 B

Unit 1: Introduction to Probability
This unit introduces the fundamental concepts of probability, including sample spaces, events, and the basic rules of probability. It covers conditional probability and independence, along with applications of the counting principles.

Unit 2: Random Variables and Probability Distributions
In this unit, students learn about random variables and their types—discrete and continuous. The unit covers important probability distributions such as binomial, Poisson, and normal distributions, including their properties and applications.

Unit 3: Expectation and Variance
This unit focuses on the concepts of expectation and variance for random variables. Students will learn how to calculate expected values, variance, and standard deviation for various probability distributions, along with properties of linear combinations of random variables.

Unit 4: Sampling Distributions and Estimation
Students will explore the concept of sampling distributions, the Central Limit Theorem, and point estimation. This unit covers properties of estimators, methods of estimation, and confidence intervals for population parameters.

Unit 5: Hypothesis Testing
In this unit, students learn the fundamentals of hypothesis testing, including formulating null and alternative hypotheses. The unit covers Type I and Type II errors, test statistics, p-values, and conducting hypothesis tests for means and proportions.

Mathematical Logic

CMAN-102 C

Unit 1: Introduction to Mathematical Logic
This unit covers the fundamental concepts of mathematical logic, including syntax and semantics of formal languages, as well as the distinction between propositional logic and first-order logic. Students will explore the role of logic in mathematics and computer science.

Unit 2: Propositional Logic
In this unit, students learn about propositional variables, logical connectives, and truth tables. The unit includes methods for evaluating logical expressions and techniques for proving logical equivalences, including De Morgan's laws and distributive laws.

Unit 3: First-Order Logic
This unit introduces the syntax and semantics of first-order logic, including predicates, quantifiers, and the structure of first-order sentences. Students will learn how to express mathematical statements using first-order logic and explore the concepts of interpretation and validity.

Unit 4: Proof Techniques
Students will study various proof techniques, including direct proofs, indirect proofs, proof by contradiction, and proof by induction. The unit emphasizes the importance of rigorous reasoning and clarity in mathematical arguments.

Unit 5: Set Theory and Relations
This unit covers the basics of set theory, including operations on sets, relations, and functions. Students will learn about properties of relations, including equivalence relations and partial orders, and their relevance to logic.

Differential Geometry

CMAN-102 D

Unit 1: Introduction to Differential Geometry
This unit introduces the basic concepts and motivation behind differential geometry, covering the historical context and its applications in various fields such as physics and engineering. Students will learn about curves and surfaces, along with essential definitions and examples.

Unit 2: Curves in Euclidean Space
In this unit, students explore the properties of curves, including arc length, curvature, and torsion. The unit covers parameterizations of curves, the Frenet-Serret formulas, and the classification of curves based on their geometric properties.

Unit 3: Surfaces in Euclidean Space
This unit focuses on the study of surfaces, including definitions, parameterizations, and local properties. Students will learn about tangent planes, normal vectors, and the first and second fundamental forms, along with examples of standard surfaces.

Unit 4: Metric and Curvature on Surfaces
Students will explore the concepts of intrinsic and extrinsic geometry, including the definitions of Gaussian curvature and mean curvature. The unit covers important theorems, such as the Gauss-Bonnet theorem, and applications of curvature in understanding surface geometry.

Unit 5: Differential Forms and Exterior Calculus
In this unit, students are introduced to differential forms, their properties, and applications. The unit covers the exterior derivative, Stokes' theorem, and the concept of integration on manifolds, emphasizing the geometric interpretation of these concepts.

CPHN-102 **ENGINEERING PHYSICS**

Cr. L T P

4 3 1 0

UNIT-I :Relativstic Mechanics

Inertial and non inertial frames, Galliean transformation equation, Einstein's postulates, Length contraction and time dilation, Addition of velocities, Mass energy equivalence. Lorentz transformation equation, Variation of mass with velocity.

UNIT-II : Laser and Wave optics

Spontaneous and stimulated emission of radiation, Einstein's coefficients, construction and working of Ruby, He- Ne lasers. Application of lasers.

Interference of light, Biprism experiment, displacement of fringes, Newtons ring, Polarization, Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, specific rotation, Optical activity.

-III : Wave Mechanics

Introduction to wave particle duality, de Broglie matter waves, phase and group velocities, Heisenberg's uncertainty principle and its applications, Wave function characteristics and significance, Time dependent and time independent Schrodinger's wave equations, Particle in one dimensional rigid box.

UNIT- IV : Superconductivity and Nanomaterials

Temperaure dependence of resistivity, Effect of magnetic field (Meissner effect), isotope effect, London's equation, Type I and Type II superconductor, Temperature dependence of critical field, BCS theory, High temperature superconductors, Application of superconductors.

Introduction to nanomaterials, Basic principles of nano-science and technology, structure, properties and uses of carbon nanotubes, some application of nanomaterials.

UNIT- V : Electromagnetics

Maxwell's equations (intergral and differential forms), Equation of continuity, Transverse nature of EM waves, EM- wave propagation and its propagation in free space, Poynting vector. Gradient, Divergence and Curl, Statement of gauss divergence and stokes theorems and useful vector identities.

Reference Books :

1.S.K.Gupta 'Engineering Physics-I'KrishnaPrakashan Media (P) Ltd. Meerut.
2. .S.K.Gupta 'Engineering Physics-II'KrishnaPrakashan Media (P) Ltd. Meerut.
3. Avandhanulu, M.N. and P.G. Kshirsagar. A Text book of Engineering Physics. S. Chand Publication, New Delhi.
4. Subrahmanyam, N. and BrijLal. A Textbook of Optics. S. Chand Publication, New Delhi.

CLASSICAL MECHANICS

CPHN -102 A

Unit 1: Introduction to Classical Mechanics
This unit introduces the fundamental concepts of classical mechanics, including the historical development of the field and the importance of mechanics in physics. Students will learn about the basic principles of motion and the laws governing classical systems.

Unit 2: Kinematics of Particles
In this unit, students explore the motion of particles in one and two dimensions. Topics include displacement, velocity, acceleration, and the equations of motion. The unit also covers projectile motion and circular motion.

Unit 3: Dynamics of Particles
This unit focuses on the forces acting on particles and the application of Newton's laws of motion. Students will study concepts such as mass, weight, friction, and the relationship between force and acceleration.

Unit 4: Work and Energy
Students will learn about the work-energy principle, the concept of kinetic and potential energy, and the conservation of mechanical energy. This unit also covers power and the work done by non-conservative forces.

Unit 5: Systems of Particles and Rigid Body Dynamics
This unit examines the dynamics of systems of particles, including center of mass and linear momentum. Students will also study rigid body motion, moments of inertia, and the rotation of rigid bodies about fixed axes.

ELECTROMAGNETIC THEORY

CPHN -102 B

Unit 1: Introduction to Electromagnetic Theory
This unit introduces the fundamental concepts of electromagnetism, including historical perspectives and the significance of electromagnetic theory in physics. Students will learn about the basic electromagnetic phenomena and the scope of the subject.

Unit 2: Electrostatics
In this unit, students will explore the principles of electrostatics, including Coulomb's law, electric fields, and electric potential. The unit covers Gauss's law, electric field lines, and the concept of dielectric materials.

Unit 3: Magnetostatics
This unit focuses on the study of magnetic fields and forces. Students will learn about the Biot-Savart law, Ampère's law, and the concept of magnetic flux. The unit also covers the properties of magnetic materials and their applications.

Unit 4: Electromagnetic Induction
Students will investigate the principles of electromagnetic induction, including Faraday's law and Lenz's law. This unit covers the concepts of self-inductance and mutual inductance, as well as applications in electrical circuits.

Unit 5: Maxwell's Equations
In this unit, students will study Maxwell's equations and their significance in electromagnetic theory. The unit covers the integral and differential forms of these equations, along with boundary conditions and their implications for electric and magnetic fields.

QUANTUM MECHANICS

CPHN -102 C

Unit 1: Introduction to Quantum Mechanics
This unit introduces the fundamental concepts of quantum mechanics, including its historical development and the limitations of classical mechanics. Students will explore the basic principles and significance of quantum theory in modern physics.

Unit 2: Wave-Particle Duality
In this unit, students will study the dual nature of matter and light, focusing on experiments such as the double-slit experiment. The unit covers the concept of wave functions and the implications of wave-particle duality in quantum mechanics.

Unit 3: Quantum States and Operators
This unit covers the mathematical formulation of quantum mechanics, including the concepts of quantum states, state vectors, and operators. Students will learn about observables, commutation relations, and the role of Hermitian operators in measurements.

Unit 4: The Schrödinger Equation
Students will explore the time-dependent and time-independent Schrödinger equations, their physical significance, and applications to various quantum systems. The unit includes solving the Schrödinger equation for simple potentials and boundary conditions.

Unit 5: Quantum Mechanics of One-Dimensional Systems
This unit focuses on one-dimensional quantum systems, including the particle in a box, harmonic oscillator, and the potential barrier. Students will study the solutions to these systems and their physical interpretations.

SOLID STATE PHYSICS

CPHN -102 D

Unit 1: Introduction to Solid State Physics
This unit provides an overview of solid state physics, including its significance, basic concepts, and the classification of solids. Students will learn about crystal structures and the importance of symmetry in solid materials.

Unit 2: Crystal Lattices and Structures
In this unit, students will study the concept of crystal lattices, unit cells, and the various types of crystal structures, such as face-centered cubic, body-centered cubic, and hexagonal close-packed. The unit covers lattice parameters and the calculation of atomic packing fractions.

Unit 3: X-ray Diffraction
This unit focuses on the principles of X-ray diffraction and its applications in determining crystal structures. Students will learn about Bragg's law, diffraction patterns, and methods for analyzing crystal structures using X-ray techniques.

Unit 4: Phonons and Thermal Properties
Students will explore the concept of phonons, their role in lattice vibrations, and their significance in thermal properties of solids. The unit covers specific heat, thermal conductivity, and the Debye model of heat capacity.

Unit 5: Band Theory of Solids
In this unit, students will learn about the electronic band structure of solids, including the concepts of conduction bands, valence bands, and band gaps. The unit discusses conductors, semiconductors, and insulators, along with their electronic properties.

COMPUTER FUNDAMENTALS AND PROGRAMMING USING C

CCSN-102

Cr.	L	T	P
4	3	1	0

Unit-I

Computer System: Basics of computer systems, history, types, capability and limitations of computer systems, Concept of assembler, compiler, interpreter, loader and linker. Genration of Computers.

Hardware Organization: Anatomy of a digital computer, CPU, Memory, processor, I/O Devices. **Memory Units:** Hierarchy, primary memory, cache; Auxiliary storage

Unit-II

Number System: Introduction to Number Systems-Types-Decimal, Binary, Octal, Hexadecimal; Conversion from one number system to other; Binary arithmetic operations; Representation of Negative Numbers;1's complement and 2's complement, BCD code, ASCII code

Computer Fundamentals-Introduction of Operating system, Basics of computer networks, Introduction of software

Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo code with examples, From algorithms to programs, source code.

Unit-III

Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language. Standard I/O in C, Fundamental data types, Variables and memory locations, Storage classes.

Arithmetic expressions and precedence : Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.

Unit-IV

Conditional Branching: Applying if and switch statements, nesting if and else, use of break and default with switch.

Iteration and loops: use of while, do while and for loops, multiple loop variables, use of break and continue statements.

Functions: Introduction, types of functions, Defining a Function, Function Declarations, Calling a Function , Passing parameters to functions, call by value, call by reference, recursive functions.

Unit-V

Arrays: Array notation and representation, manipulating array elements, using multi-dimensional arrays. Character arrays and strings, Structure, union, enumerated data types, Array of structures, Passing arrays to functions.

Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)

Pointers: Introduction, declaration, applications, Introduction to dynamic memory allocation (malloc, calloc, realloc, free)

File handling: File I/O functions
Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures

TEXT & REFERENCE BOOKS:

1. Fundamentals of computers and programming with C, A. K. Sharma, Dhanpat Rai Publications, Daryaganj New Delhi
2. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
3. C Programming – A modern approach by K.N. King, 1996, WW Norton & Co.
4. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH

CEEN-102 BASIC ELECTRICAL ENGINEERING

Network Fundamentals: Voltage and current sources, concept of linearity, unilateral and bilateral elements. Kirchoff's laws, Mesh and node analysis of D.C. networks; Transient analysis: RL & RC circuits; Network theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power theorem, Star-delta transformation.

Unit-II

Steady State Analysis of Single Phase AC Circuits: Representation of Sinusoidal waveforms – Average and effective values, Form and peak factors. Analysis of single phase AC Circuits consisting R-L-C combination (Series and Parallel) Apparent, active & reactive power, Power factor. Concept of Resonance in series & parallel circuits, bandwidth and quality factor. Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit-III

Transformers: Magnetic Circuit, Analogy with electrical circuits, Calculation for series, parallel and series parallel magnetic circuits, Eddy current and Hysteresis losses.

Single Phase Transformer: Basic constructional features and operating principle. Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.

Unit-IV

Electrical Machines: Principle of operation and constructional features of DC machine, Emf and torques equation, Armature reaction, Types of D.C. motors starting and speed control of D.C. motors, Machines:

Principle of operation of single phase motor and methods of starting of single phase motor.

Three phase induction motor operating principle.

Constructional features, Synchronous generator, Basic principle of operation, Emf equation, Constructional features.

Unit-V

Measurement of Electrical Quantities: Measurement of voltage current power and energy moving iron instruments. Measurement of 3 phase power, Accuracy class of meters.

Unit-VI

Electrical Installations: Introduction of Switch Fuse Unit (SFU), MCB, ELCB, MCCB, ACB. Types of Wires, Cables and Bus-bars. Fundamentals of earthing and lightning protection. Types of Batteries.

CPCN- 102 Technical Communication

CPCN-102

Cr. L T P
3 2 1 0

Unit – I

Basics of Technical Communication: Meaning, Elements, Process, Origin, Scope and Significance, Forms, Channels & Media of Communication, Barriers to Communication, Organisation and Style in Technical Communication, Non-Verbal Communication. The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication
Technical Reports: Nature & Significance, Types, Formats of Reports, Structure of Formal Reports: Project Report, Dissertation and Thesis, Strategies for Writing.
Technical Articles: Nature & Significance, Types, Elements, Research Methods, Writing Strategies.
Technical Proposals: Nature & Significance, Types, Structure of a Formal Proposal, Tips for Writing.

Unit – II

Guidelines for Effective Writing: Requisites of Good Sentence Writing; Elements of a Paragraph, Requisites of Impeccable Paragraph Writing: Unity, Coherence and Logical Order; Development of Paragraphs. Mechanics of Writing: Modifiers, phrasal verbs, tone and style, graphical representation
Specific Writing: Note-Making; Summarising& Paraphrasing; Referencing; Professional Memos; e-Mails; e-Writing.

Unit – III

Professional Correspondence: Letter Writing Skills; Form & Structure; Writing Personal & Official Letters, Technical paper writing: documentation style – document editing – proof reading – Organising and formatting Quotations, Supply Orders, Complaint and Adjustment Letters, Minutes for Meeting, Designing Resume/CV/Bio-Data, Job Application, Follow-up Letters, E. Mail Writing.

Unit – IV

Basics of Phonetics: Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: International Phonetic Alphabet, Phonemes, Allophones, Phonetic Transcription, Organs of Speech, Places and Manners of Articulation, Syllable, Stress, Rhythm, Intonation, Weak Forms.

Reference Books :

1. Rizvi, M Ashraf. *Effective Technical Communication*. New Delhi: Tata McGraw-Hill, 2005. Print.
2. Raman, M. and S. Sharma. *Technical Communication: Principles and Practice*. New Delhi: Oxford University Press, 2004. Print.
3. Anderson, Paul V. *Technical Communication: A Reader-Centered Approach.* 6th ed. New Delhi: Cengage Learning, 2007. Print.

4. Taylor, Shirely. *Model Business Letters, E-mails and Other Business Documents*. 6th ed. New Delhi: Pearson Education, 2004. Print.
5. Roach, Peter. *English Phonetics and Phonology: A Practical Course*. 4th ed. New Delhi: Cambridge University Press, 2009. CD-ROM, Print.

CPCN-102 B **Presentation Skills**

Unit 1: Essential Grammar

Application of tenses, Auxiliaries- correct usage and importance informal communication, Business Vocabulary - Vocabulary exercises through web-baseApplications,Written Communication

Unit 2: Written Communication Skills

Email writing- Formal and Informal email writing structure, Inquiry letters, Instruction letters, complaint letters, Routine business letters, Sales Letters etc. Technical writing, Essay writing, Paragraph writing.

Unit 3: Leader's Role, Responsibilities And Skill Required:

Understanding good Leadership Learning the difference between Leadership and Management, Gaining insight

into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership,
Determining how well you perceive what's going on around you, interpersonal Skills and

Communication Skills, Learning about Commitment and How to Move Things Forward,

Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating

and Inspiring Others, Leading by example, effective feedback. Problem Solving Skill:3: Writing Skills

Unit 4: Corporate business etiquettes

Corporate grooming & dressing, etiquettes in social & office Setting-Understand the importance of professional behaviour at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities Diversity and Inclusion Part 2: Socio-Cultural and Cross-Cultural

Reference Books:

Fred Luthans, Organizational Behaviour, McGraw Hill

Lesikar and petit, Report writing for Business

M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill

Wallace and masters, Personal Development for Life and Work, Thomson Learning,

Hartman Lemay, Presentation Success, Thomson Learning

Malcolm Goodale, Professional Presentations

Farhathullah, T. M. Communication skills for Technical Students

Michael Muckian, John Woods, The Business letters Handbook

Herta A. Murphy, Effective Business Communication

Lehman, Dufrene, Sinha BCOM, Cengage Learning

CPCN-102 C **Digital Communication**

Unit 1:

Pulse Digital Modulation: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Time Division Multiplexing &Demultiplexing. Delta Modulation: Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, Noise in PCM and DM systems. Illustrative Problems.

Unit 2:

Digital Modulation Techniques: Introduction, ASK modulator, Coherent and Non-Coherent ASK detector, FSK modulator, Spectrum of FSK, coherent reception, non-coherent detection of FSK. BPSK transmitter, Coherent reception of BPSK, DPSK, QPSK. Data Transmission: Base band signal receiver, probability of error, The optimum filter, Matched filter, probability of error using matched filter.Optimum filter using correlator.Probability of error of ASK,FSK,BPSK and QPSK. Illustrative Problems

Unit 3:

Information Theory: Discrete messages, Concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties, Illustrative Problems. Source Coding: Introduction, Advantages, Hartley Shannon's theorem, bandwidth – S/N trade off, Shanon- Fano coding, Huffman coding, Illustrative Problems

Unit 4:

Linear Block Codes: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of linear block codes, Hamming codes. Cyclic Codes: Encoding, Syndrome Calculation, Decoding's

Unit 5:

Convolution Codes: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: State, Tree and Trellis diagram. Decoding using Viterbi algorithm Illustrative Problems

Reference Books:

Fred Luthans, Organizational Behaviour, McGraw Hill

Lesikar and petit, Report writing for Business

M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill

Wallace and masters, Personal Development for Life and Work, Thomson Learning,

Hartman Lemay, Presentation Success, Thomson Learning

Malcolm Goodale, Professional Presentations

Farhathullah, T. M. Communication skills for Technical Students

Michael Muckian, John Woods, The Business letters Handbook

Herta A. Murphy, Effective Business Communication

Lehman, Dufrene, Sinha BCOM, Cengage Learning

CPCN-102 D **Audience Analysis**

Unit 1 : Fundamentals of Communication and Voice Dynamics: Role and Purpose of Communication, Types & Flow of Communication, Barriers to Effective Communication, 7 C's of Communication, Code and Content; Stimulus & Response, Vowel Sounds, Consonant Sounds, Tone: Rising and Falling Tone.

Unit 2 : Communication Skills for Career Building CV and Résumé Writing, Interview Skills, Group Discussion, Effective Profiling, Communication and Networking: Building relationships, Writing the Statement of Purpose (SOP) for admission in Higher Studies, Seminar & Conference Paper Writing, Expert Technical Lecture: Writing and Presenting.

Unit 3: Communication Skills for Presentation: Writing, Designing, and Speaking Thesis and Project Report Writing, Technical Proposal Writing, How to Pitch an Idea: Process, Preparation and Structure, Elements of Speech Delivery: Passion, Poise & Illustrations.

Unit 4 : Communication and Leadership Development Leadership Communication, Communication and Social competence: context, feelings, intentions, behaviors, Providing and Receiving feedback, Difference between Tact and Intelligence, Emotional Intelligence: Trust through Communication, Thinking Skills: Meaning and Types.

Unit 5 : Digital Communication and Personality Making Content Creation for Social Media: Emails, Webinars, podcasts, Blogs. Effective and Ethical use of Social Media by Text and Technique, Speech and Personality, Personality Analysis: Types of Personality; Concept of Personality: Maslow, Freud, Vivekananda, Jung Typology &Personality Assessment.

Prescribed Book:

1. Technical Communication – Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2018, New Delhi

2. Personality Development and Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.

3. Technical Communication, by Pfeiffer, 6 thedn (Pearson)

4. Soft Skills & Employability, Sabina Pillai and Agna Fernandez Cambridge University Press 2018.

5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S.Publications India Ltd.; Krishan Nagar, 2014, Delh

Reference Books:

Fred Luthans, Organizational Behaviour, McGraw Hill

Lesikar and petit, Report writing for Business

M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill

Wallace and masters, Personal Development for Life and Work, Thomson Learning,

Hartman Lemay, Presentation Success, Thomson Learning

Malcolm Goodale, Professional Presentations

Farhathullah, T. M. Communication skills for Technical Students

Engg. Physics Lab.

CPHM-152

1. Measurement of wavelength of monochromatic light by Newton's rings
2. Measurement of the specific rotation of cane sugar solution using Biquartzpolarimeter
3. Measurement of wavelength of spectral lines using plane transmission grating
4. Measurement of the specific resistance of the material of a given wire using Carey Foster Bridge
5. Study of the variation of magnetic field along the axis of current carrying coil and then to estimate the radius of the coil
6. Calibration of the given voltmeter and ammeter with a potentiometer
7. Measurement of the resistivity and energy band gap of a semiconductor material (four probe)
8. Study of Hall effect and determination of Hall coefficient and carrier density of a given semiconductor material
9. Measurement of acceleration due to gravity by compound pendulum
10. Measurement of electro-chemical equivalent (ECE) of copper using Helmholtz galvanometer
11. Measurement of Planck's constant 'h' by measuring radiation in a fixed spectral range
12. Measurement of wavelength of He-Ne Laser using a narrow slit (Diffraction pattern)
13. Measurement of the dielectric constant of different solids

Reference Books :

1. Jain, R.K., DarakhshanSahar and D. Mishra. *Engineering Physics Practical Manual.*Shobhit University Publication, 2009.

CLASSICAL MECHANICS LAB

CPHN-152 A

List of Experiments:

1) Measurement of acceleration due to gravity using a simple pendulum.
2) Study of projectile motion using a projectile launcher.
3) Analysis of collisions using a ballistic pendulum.
4) Investigation of harmonic motion with a spring-mass system.
5) Determination of the moment of inertia using a rotational apparatus.
6) Study of the conservation of energy with a mechanical energy experiment.
7) Measurement of the coefficient of friction using an inclined plane.
8) Analysis of motion using a ticker tape timer.
9) Experiment to study the motion of a body under uniform circular motion.
10) Examination of the principles of linear momentum using a dynamics cart.
11) Investigation of damped harmonic motion with a damped oscillator setup.
12) Measurement of the gravitational force using a torsion balance.
13) Study of the laws of motion using a dynamic cart and track.
14) Experiment to analyze the motion of a pendulum with varying lengths.
15) Determination of the center of mass of a system of particles.
16) Investigation of rolling motion and its relation to translational motion.
17) Measurement of the energy loss during inelastic collisions.
18) Study of the oscillations of a compound pendulum.
19) Analysis of the effects of air resistance on falling objects.
20) Experiment to verify Kepler's laws using a planetary motion setup.
21) Investigation of the principles of energy transfer in a spring system.

ELECTROMAGNETIC THEORY LAB

CPHN-152 B

List of Experiments:

1) Measurement of electric field strength using a parallel plate capacitor.
2) Determination of capacitance of various capacitors.
3) Study of magnetic field around a current-carrying conductor using a magnetic field sensor.
4) Investigation of Faraday's law of electromagnetic induction using coils and magnets.
5) Measurement of resistance of different materials using a Wheatstone bridge.
6) Analysis of resonance in an LC circuit.
7) Experiment to determine magnetic field strength using a solenoid.
8) Study of the Hall effect in semiconductors.
9) Investigation of electromagnetic waves using antennas and oscilloscopes.
10) Measurement of the dielectric constant of various materials.
11) Determination of the characteristics of a transformer.
12) Analysis of the behavior of RLC circuits.
13) Experiment to observe the phenomenon of self-inductance and mutual inductance.
14) Study of the principles of rectification using diodes.
15) Measurement of the frequency response of an RLC circuit.

QUANTUM MECHANICS LAB

CPHN-152 C

List of Experiments:

1. Measurement of Planck's constant using a photoelectric effect experiment.
2. Determination of the energy levels of hydrogen using the Balmer series.
3. Experiment to observe electron diffraction patterns.
4. Study of the Stern-Gerlach experiment to investigate spin states.
5. Measurement of the energy levels of a quantum harmonic oscillator.
6. Investigation of the Compton Effect using X-rays.
7. Experiment to demonstrate quantum tunneling using a tunneling microscope.
8. Analysis of the characteristics of semiconductor diodes.
9. Measurement of the properties of lasers and their quantum aspects.
10. Study of the effects of temperature on the resistance of superconductors.
11. Experiment to observe the double-slit interference pattern with single photons.
12. Determination of the energy distribution of thermal photons.
13. Investigation of the Rydberg formula for hydrogen-like atoms.
14. Measurement of Zeeman Effect in a magnetic field.
15. Study of quantum entanglement using polarization filters.
16. Analysis of wave-particle duality through various experiments.
17. Experiment to investigate the effect of temperature on quantum states in solids.

SOLID STATE PHYSICS LAB

CPHN-152 D

List of Experiments:

1. Measurement of lattice parameters using X-ray diffraction.
2. Study of crystal structure using a polarizing microscope.
3. Determination of the thermal conductivity of a solid material.
4. Measurement of specific heat capacity of solids using the calorimetric method.
5. Investigation of electrical conductivity in different materials.
6. Analysis of the Hall effect in semiconductor samples.
7. Measurement of the band gap energy of semiconductors using a four-probe method.
8. Study of the magnetic properties of materials using a vibrating sample magnetometer.
9. Measurement of dielectric constant and loss tangent of materials.
10. Investigation of the characteristics of p-n junction diodes.
11. Determination of the resistivity of materials at varying temperatures.
12. Study of ferromagnetic hysteresis using a magnetometer.
13. Measurement of the phonon dispersion relation using inelastic neutron scattering.
14. Analysis of the temperature dependence of resistivity in metals and semiconductors.
15. Study of piezoelectric properties in certain crystals.
16. Measurement of the sound velocity in solids using ultrasonic methods.
17. Investigation of the mechanical properties of materials through stress-strain tests.
18. Study of the optical properties of semiconductors using a spectrophotometer.
19. Measurement of the thermal expansion of solid materials.
20. Investigation of defects in crystals using etch pit techniques.

COMPUTER PROGRAMMING USING C LAB.

CCSN 152

Cr. L T P

1 0 0 2

1. Introduction of DOS Commands, Windows and C.
2. Writing Simple Batch Program.
3. Programming using 'C' Language involving in uses of following constricts of 'C'
4. Print "Hello, World!" to the console.
5. Read two integers and print their sum.
6. Calculate the factorial of a given number using recursion.
7. Determine if a number is prime.
8. Print the Fibonacci series up to a specified term.
9. Read a string and print it in reverse order.
10. Check if a given string is a palindrome.
11. Implement bubble sort to sort an array of integers.
12. Perform addition of two matrices.
13. Use the Euclidean algorithm to find the GCD of two numbers.
14. Convert temperatures between Celsius and Fahrenheit.
15. Count the number of vowels and consonants in a string.

Simple Input Output Functions, Arithmetic/Logical & Relational Operators, Sequence Control, Decision Control, Iteration, Arrays Single/Multi dimensional(Numeric/Character), Functions (Call by value/Call by reference), Recursive functions, Structures, Pointers, Library functions, File streams.

Reference Books :

1. Sharma, A.K. *Fundamentals of Computers and Programming with C*. DhanpatRai Publications, New Delhi, 2005.

2. Sharma, Divya. *Lab. Manual: Fundamentals of Computers and Programming with C*, Shobhit University Publication, Meerut.

BASIC ELECTRICAL ENGINEERING LAB

CEEN 152

Cr.	*L*	*T*	*P*
1	**0**	**0**	**2**

1. Verify the KCL
2. Verify the KVL
3. Short Circuit and Open Circuit
4. Study of Energy meter
5. Verification Thevenin Theorem
6. Verification of Norton theorem
7. Verification of superposition theorem
8. V-I Characteristics of PN Junction Diode
9. Study the half wave rectifier.
10. Study the full wave rectifier.

CIRCUIT THEORY LAB

CEEN-152A

1) Measurement of voltage, current, and resistance using a multimeter.
2) Analysis of series and parallel circuits using resistors.
3) Study of Ohm's law and its verification through experiments.
4) Investigation of Kirchhoff's voltage and current laws in circuit analysis.
5) Measurement of the characteristics of a diode.
6) Study of transistor characteristics and biasing configurations.
7) Experiment to analyze the behavior of RL circuits.
8) Measurement of capacitance using an RC circuit.
9) Study of the frequency response of an RLC circuit.
10) Analysis of AC and DC circuits using an oscilloscope.
11) Investigation of phase shift in RC and RL circuits.
12) Measurement of power in AC circuits using a wattmeter.
13) Study of the charging and discharging of a capacitor.
14) Analysis of resonance in RLC circuits.
15) Experiment to determine the time constant of an RC circuit.
16) Measurement of the input and output characteristics of a common-emitter amplifier.
17) Study of filter circuits: low-pass, high-pass, and band-pass filters.
18) Investigation of the use of breadboards for circuit prototyping.
19) Measurement of inductance using a series RLC circuit.
20) Study of the operation of a Wheatstone bridge.
21) Experiment to analyze the response of a feedback amplifier.

ELECTROMAGNETISM LAB

CEEN-152B

1. Measurement of electric field strength using a parallel plate capacitor.
2. Investigation of electrostatic potential using an electroscope.
3. Study of magnetic field lines using iron filings and a magnet.
4. Measurement of the resistance of different materials using a multimeter.
5. Analysis of the magnetic field around a current-carrying conductor using a compass.
6. Experiment to demonstrate Faraday's law of electromagnetic induction.
7. Measurement of the capacitance of capacitors in series and parallel configurations.
8. Study of the properties of solenoids and their magnetic fields.
9. Investigation of the Hall effect in semiconductor materials.
10. Measurement of the permeability of free space using a solenoid.
11. Study of Lenz's law using a coil and a falling magnet.
12. Experiment to determine the characteristics of a transformer.
13. Measurement of the dielectric constant of various materials.
14. Analysis of the behavior of RC and RL circuits.
15. Study of electromagnetic waves using a dipole antenna.
16. Investigation of resonance in RLC circuits.
17. Measurement of the speed of electromagnetic waves in different media.
18. Study of electric fields using field line patterns and potential plots.
19. Investigation of capacitive and inductive reactance in AC circuits.
20. Measurement of the magnetic field strength using a Gauss meter.
21. Experiment to analyze the effect of frequency on inductive and capacitive reactance.

DIGITAL ELECTRONICS LAB

CEEN-152 C

1. Study of basic logic gates: AND, OR, NOT, NAND, NOR, and XOR.
2. Construction and analysis of combinational circuits using logic gates.
3. Implementation of a half adder and full adder circuit.
4. Design and testing of a 4-bit binary adder/subtractor using full adders.
5. Construction of a 4-to-1 multiplexer and demultiplexer.
6. Implementation of a 2-bit binary comparator.
7. Design of a 7-segment display decoder using logic gates.
8. Analysis of flip-flops: SR, D, JK, and T flip-flops.
9. Construction of a 4-bit shift register and its operations.
10. Design and simulation of synchronous and asynchronous counters.
11. Study of digital-to-analog converters (DAC) and their applications.
12. Implementation of an analog-to-digital converter (ADC) circuit.
13. Experiment to analyze timing diagrams of digital circuits.
14. Design of a binary counter using flip-flops.
15. Construction of a state machine using flip-flops and logic gates.
16. Study of memory devices: RAM and ROM, and their applications.
17. Implementation of a priority encoder circuit.
18. Analysis of combinational and sequential logic circuit behaviors.
19. Simulation of digital circuits using software tools like Logisim or Multisim.
20. Study of noise margins and signal integrity in digital circuits.
21. Experiment to implement and analyze a basic ALU (Arithmetic Logic Unit).

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

CEEN-152 D

1. Measurement of voltage using a digital multimeter.
2. Measurement of current using a clamp meter.
3. Determination of resistance using a Wheatstone bridge.
4. Calibration of an ammeter and voltmeter using standard references.
5. Measurement of power in an AC circuit using a wattmeter.
6. Study of the characteristics of different types of electrical instruments.
7. Measurement of frequency using a frequency counter.
8. Determination of the phase angle in an AC circuit using an oscilloscope.
9. Experiment to measure the insulation resistance of cables.
10. Analysis of a potentiometer for voltage measurement.
11. Measurement of temperature using thermocouples and RTDs.
12. Study of the operation of an LCR meter for inductance and capacitance measurement.
13. Measurement of capacitance using a capacitance meter.
14. Experiment to analyze the response of a digital oscilloscope.
15. Measurement of power factor in an AC circuit.
16. Study of various transducers and their applications in measurements.
17. Experiment to measure the Earth resistance using an Earth tester.
18. Analysis of load characteristics of different electrical machines.
19. Measurement of magnetic field strength using a Gauss meter.
20. Experiment to evaluate the performance of a signal generator.
21. Study of data acquisition systems and their applications in instrumentation.

CCSN-201 DATA STRUCTURE USING 'C' L T P 3 1 0

Unit - I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT), Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List.

UNIT - II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

UNIT – III

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

Search Trees: Binary Search Trees (BST), Insertion and Deletion in BST, HEAP (Max and min heap), Heap Implementation, Insertion and Deletion Operations, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees.

UNIT – IV

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm.

UNIT - V

Searching: Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.

Complexity of Search Algorithm

Hashing Hash Function, Collision Resolution Strategies.

Storage Management: Garbage Collection and Compaction.

Text Books:

1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
2. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia, Delhi- 2002
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
4. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
5. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
6. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore)

CCSN-203 **DBMS** **L T P 3 1 0**

Unit- I Introduction:
An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and database language and interfaces, Data definitions language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Unit- II Relational data Model and Language:
Relational data model concepts, CODD's Rules, integrity and constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. **Introduction on SQL:** Characteristics of SQL, advantage of SQL. SQl data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL

Unit- III Data Base Design & Normalization:
Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit- IV Transaction Processing Concepts:
Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Unit- V Concurrency Control Techniques:
Concurrency control and recovery system: Concurrency control, lock based protocols, time-stamp based protocols, validation based protocols, multiple granularity. Recovery system - failure classification, storage structure, recovery and atomicity, log-based recovery, shadow paging, buffer management, failure with loss of non-volatile storage, advanced recovery techniques, remote backup systems.Data Storage and Indexes - file organizations, primary, secondary index structures, various index structures - hash-based, dynamic hashing techniques, multi-level indexes, B+ trees.

Text Books

1) Date C J, "An Introduction To Database System", Addision Wesley
2) Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3) Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley
4) Leon & Leon, "Database Management System", Vikas Publishing House.
5) Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
6) Majumdar & Bhattacharya, "Database Management System", TMH
7) Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
8) Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
9) Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi

JAVA PROGRAMMING

CCSN-207 **Cr. L T P**

4 3 1 0

COURSE OBJECTIVES: The objectives of this course are to:

1. Understand Object Oriented Programming concepts and basic characteristics of Java.
2. Know the principles of packages, inheritance and interfaces.
3. Define exceptions and use I/O streams.
4. Develop a java application with threads and generics classes
5. Design and build simple Graphical User Interfaces.

COURSE OUTCOMES: On successful completion of the course, the student will be able to:

1. Write Java programs with properly designed constants, variables, objects, methods and reusability functionality
2. Learn how and where to implement interface and exception-handling concepts.
3. Write multi-threaded programming concepts for concurrency control based applications.
4. Construct GUI based JAVA enterprise applications
5. Develop web applications using JDBC, RMI and Servlet methodologies.

Unit – I

Introduction to Java: Overview of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping, Jump statements: break, continue, return.

Introducing classes, objects and methods, constructors, class inheritance. Inheritance types, super keyword, preventing inheritance: final classes and methods.

Arrays and String: Creating an array, one and two dimensional arrays, string array and methods.

Packages and interfaces: Extending Interfaces, CLASSPATH, Access protection. Interfaces-defining an interface, implementing interfaces.

Unit – II

Exception handling - Fundamentals of exception handling, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

Unit – III

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files.

The Collection Framework: collection interfaces, collection classes(ArrayList, LinkedList, Hash set), Accessing a Collection via an Iterator, Vector, More utility class

Unit – IV

Working with windows, Graphics and Text, using AWT controls, Button, Label, TextField Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout and Menus.

GUI Programming with Swing – Introduction, limitations of AWT, components, containers.

Event Handling: Event Classes, Listener Interfaces, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes. A Simple AWT Application

Unit – V

Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, **Beans:** Introduction to Java Beans and Servlets.

Database Connectivity JDBC architecture, establishing connectivity and working with connection interface, connecting to a database, working with statements, creating and executing SQL statements, working with Result Set

Course Outcomes:

• An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements;

• A competence to design, write, compile, test and execute straightforward programs using a high level language;

• An appreciation of the principles of object oriented programming;

• An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.

• Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.

• Demonstrate the ability to use simple data structures like arrays in a Java program.

• Be able to make use of members of classes found in the Java API (such as the Math class)

Reference Books:

1. Patrick Naughton and Herbertz Schildt, "*Java-2 the Complete Reference*", TMH, 7th Edition, 2006.
2. E. Balaguruswamy, "*Programming with Java:* A Primer", TMH, First Reprint, 2007.

3. Horstmann, "*Computing Concepts with Java 2 Essentials*", John Wiley and sons inc, Third Edition, 2003.
4. Kathy Sierra, "*Head First Java*", O'Rielly, Second Edition, February 2005.
5. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.

OPERATING SYSTEMS (UNIXPROGRAMMING)

CCSN-205 **L T P 3 1 0**

UNIT - I: Introduction to Operating System:

Operating Systems Objectives and functions, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs.

UNIT - II: Process and CPU Scheduling :-

Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Preemptive Scheduling, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling - Process Synchronization, The Critical section Problem, Reader's Writer's Problem, Dining Philosopher Problem, Semaphores, and Classic Problems of Synchronization.

UNIT - III: Memory Management and Virtual Memory :

Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demanding Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT - IV: I/O System :-

I/O SYSTEM: Mass storage structure - overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure**.**

I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance.

UNIT - V: Deadlocks -:

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock. Banker's Algorithm

Protection - System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights.

TEXT BOOKS:

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

REFERENCES BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. Operating Systems, A. S. Godbole, 2nd Edition, TMH
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, S, Haldar and A. A. Arvind, Pearson Education.
7. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
8. Operating Systems in depth, T. W. Doeppner, Wiley.

DISCRETE MATHEMATICS

CCSN-209 CR L-T-P

4- 3-1-0

Unit-I: Set Theory, Relations, and Functions (10 topics)

Sets: definition, countable/uncountable, Venn diagrams, power set, Relations: definition, types, composition, equivalence relation, partial ordering, Functions: definition, types, one-to-one, onto, inverse, composition, Theorem Proving Techniques: mathematical induction, pigeonhole principle, proof by contradiction.

Unit-II: Propositional Logic (10 topics)

Propositions, logic operators, First-order predicate logic, Truth tables, tautologies, arguments, Contradictions, logical implications, equivalence, Predicates, universal/existential quantifiers. 1. Probability: definitions, axioms, properties, Random Variables: definitions, types,Probability Distributions: Bernoulli, Binomial, Conditional Probability and Independence,

Unit-III: Posets, Hasse Diagrams, and Lattices (12 topics)

Permutations and Combinations, Recurrence Relations, Generating Functions,Ordered sets, Hasse diagrams, Isomorphic ordered sets, well-ordered sets, Lattices: properties, bounded, complemented, Boolean Algebra: basic definitions, sum/product forms, Logic gates, Karnaugh maps.

Unit-IV: Algebraic Structures (10 topics)

Number Theory: divisibility, primality, Congruences: definitions, properties,Groups: definition, properties, types (Semi Group, Monoid, Abelian), Subgroup, cyclic groups, cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of groups, Rings and fields.

Unit-V: Graphs and Combinatorics (10 topics)

Recurrence Relations, generating functions, Graphs: simple, multi, terminology, Representation, Bipartite, Regular, Planar, connected, Euler graphs, Hamiltonian path/circuits, Adjacency/Incidence Matrices, Graph coloring, Tree: definition, rooted, properties, binary search.

Reference Books:

1. Seymour Lipschutz& M.L. Lipson, Discrete Mathematics, Tata McGraw Hill, 2nd Edition, 1999.

2. Trembley, J.P & R. Manhor, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill, 1997.

3. Kennth H. Rosen, Discrete Mathematical and its applications, McGraw Hill, 4th Edition, 2002.

4. JL Morr, AKandal and TP Baker, Discrete Mathematics for Computer Scientists and Mathematics, PHI, 1999.

5. Deo, Narsingh, Graph Theory With application to Engineering and Computer Science, PHI, 2007

MATHMATICS

CCSN-209 A **L T P 31 2**

UNIT-I

Introduction, Elementary row and column transformations, Rank of matrix, Linear dependence, Consistency of linear system of equations, characteristic equation, CaleyHamilton Theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices

UNIT-II

nth derivative, Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables..

UNIT-III

Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications)

UNIT-IV

Double and triple integrals, Change of order of the Integration, Change of variables, Beta and Gamma functions, Application to area and volume, Dirichlet's integral and its applications.

UNIT-V

Point functions, Gradient, divergence and curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems.

References:

1. Shanti Narayan A Text Book of Martices, S. Chand & Co.
2. Thomas/Finny Calculus and Analytical Geometry, Narosa House.
3. B.S. Grewal . Higher Engineering Mathematics, Publishers,
4. Piskunov, M. . Differential and Integral Calculus, Peace Pub.
5. Jaggi and Mathur : Advanced Engineering Mathematics, Khanna
6. C. Prasad . Mathematics for Engineers, Prasad

BASICS MATHMATICS

CCSN-209 B **L T P 31 2**

UNIT-I

Numbers, HCF & LCM, Decimal Fractions, Simplification, Square and Cube roots, Average, Problems on numbers, Problems on Ages, Surds and Indices, Percentage, Profit and Loss

UNIT-II

Ratio and Proportion, Partnership, Chain rule, Time and work, Pipes and cisterns, Time and distance, Problems on trains, Boats and streams.

UNIT-III

Number system and basic Arithmetic, Algebra, Trigonometry, Geometry and Cartesian, Geometry, Calculus- Differential and Integral, Matrix Algebra, Probability and Statistics.

UNIT-IV

Double and triple integrals, Change of order of the Integration, Change of variables, Beta and Gamma functions, Application to area and volume, Dirichlet's integral and its applications.

UNIT-V

Point functions, Gradient, divergence and Time and work, Pipes and cisterns, Time and distance, Problems on trains, Boats and streams, Simple and Compound interest, Miscellaneous curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems.

References:

1. Shanti Narayan A Text Book of Martices, S. Chand & Co.
2. Thomas/Finny Calculus and Analytical Geometry, Narosa House.
3. B.S. Grewal . Higher Engineering Mathematics, Publishers,
4. Piskunov, M. . Differential and Integral Calculus, Peace Pub.

Mathematics-I

(CCSN 209 C)

Unit – 1

Differential Calculus -1: determination of nth order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems. Polar Curves - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) –problems

Unit -2

Differential Calculus -2 Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms. Partial derivatives – Definition and simple problems, Euler's theorem(without proof) – problems, total derivatives, partial differentiation of composite functions-problems. Definition and evaluation of Jacobians

Unit – 3

Vector Calculus: Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient, Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - div(ϕA), curl (ϕA), curl(grad ϕ), div(curl A).

Unit - 4

Differential Equations ; Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations .Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.

Unit - 5

Linear Algebra Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonalisation of a square matrix . Reduction of Quadratic form to Canonical form.

Advance Applied Mathematics

(CCSN 209 D)

Unit – I

Complex Analysis: Analytic function, Cauchy-Riemann equations, Complex integration: Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Taylor's series, Maclaurin's series, Laurent's series, Singularities and zeros.

Unit – II

Complex Analysis: Residue integration method, evaluation of real integrals Numerical Methods: Errors of numerical results, error propagation,., Lagrange Interpolation, Newton divided difference interpolation, Newton's forward and backward interpolation, Spline interpolation.

Unit - III

Numerical Methods: Numerical integration: The trapezoidal rule, The Simpson's rules, Gauss Integration formulas. Solution of ordinary differential equation: Euler's method, Improvement of Euler's method, Runge-Kutta methods, multistep methods, Methods for system and higher order ordinary differential equations.

Unit - IV

Probability Theory and Its Applications: Probability, Random variables, Probability distributions, Mean and variance; Features of Probability Distribution: Binomial, Poisson, Uniform and Normal distribution, Distribution of several random variables.

Unit – V

Statistical Techniques and Its Applications: Scope of Statistics, Random sampling, Sampling Distribution, Correlation analysis, Regression Analysis, Fitting Straight Lines, Estimation of Parameters, Statistical Hypothesis.

CBSN-201 VALUE EDUCATION, HUMAN RIGHTS AND LEGISLATIVE PROCEDURE

UNIT – I : Concept of Human Values, Value Education Towards Personal Development Aim of education and value education; Evolution of value oriented education; Concept of Human values; types of values; Components of value education.

Personal Development: Self-analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbors, co-workers.

UNIT – II : Value Education Towards National and Global Development National and International Values: Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity. Social Values - Pity and probity, self-control, universal brotherhood. Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith. Religious Values - Tolerance, wisdom, character. Aesthetic values - Love and appreciation of literature and fine arts and respect for the same. National Integration and international understanding.

UNIT – III : Environment and Ecological balance – interdependence of all beings – living and non-living. The binding of man and nature – Environment conservation and enrichment.

UNIT - IV : Therapeutic Measures Control of the mind through a. Simplified physical exercise b. Meditation – Objectives, types, effect on body, mind and soul c. Yoga – Objectives, Types, Asanas d. Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii)Eradication of Worries (iv)Benefits of Blessings

UNIT; V : Human Rights 1. Concept of Human Rights – Indian and International Perspectives a. Evolution of Human Rights b. Definitions under Indian and International documents

2. Broad classification of Human Rights and Relevant Constitutional Provisions. a. Right to Life, Liberty and Dignity b. Right to Equality c. Right against Exploitation d. Cultural and Educational Rights e. Economic Rights f. Political Rights g. Social Rights

3. Human Rights of Women and Children a. Social Practice and Constitutional Safeguards (i) Female Foeticide and Infanticide (ii) Physical assault and harassment (iii) Domestic violence (iv) Conditions of Working Women

4. Institutions for Implementation a. Human Rights Commission b. Judiciary

5. Violations and Redressel a. Violation by State b. Violation by Individuals c. Nuclear Weapons and terrorism d. Safeguards.

Humanities and Science

(CBSN 201 A)

Unit I

Atomic and molecular structure Schrodinger equation. Particle in a box solutions and their applications for simple sample. Molecular orbitals of diatomic molecules . Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Unit II

Spectroscopic techniques and applications Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications inmedicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magneticresonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering

Unit III

Intermolecular forces and potential energy surfaces Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena.

Unit IV

Use of free energy in chemical equilibriaFirst and second laws of thermodynamics and thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

Unit V

Periodic properties Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

Public Policy

(CBSN 201B)

Unit-I

Introduction of Public Policy: Definition, Nature, Scope and Importance of Public Policy, Evolution of Public Policy and Policy Sciences, Public Policy and Public Administration. Approaches to Public Policy Analysis: The Process Approach, The Logical Positivist Approach, The Phenomenological Approach, The Participatory Approach and Normative Approach

Unit-II

Theories and Process of Public Policy Making: Theories and Models of Policy Making, Perspectives of Policy Making Process, Institutions of Policy Making.

Unit-III

Policy Implementation and Evaluation: Concept of Policy Implementation, Techniques of Policy Implementation, Concept of Policy Evaluation, Constraints of Public Policy Evaluation

Unit-IV

Introduction of Governance: Definitions, Issues and Controversies, Reinventing Government, Reforming Institutions: The State, Market and Public domain. State and Governance: Origin and types of State, Democratic State and Democratic Administration, Neo-Liberalism and Rolling Back State and Governance as Government.

Unit-V

Citizen and Techniques of Governance: Rule of Law and Human Rights, Accountability, Participation, Representation. Techniques of Governance: Openness and Transparency, Citizen Charter, Social Audit. Emerging Trends in Public and Private Governance: An Overview, Market, Civil Society, Information and Communication Technology

Leaders for Global Operations

(CBSN 201C)

UNIT –I

Introduction to Operations Management - Process Planning - Plant Location - Plant Lay out - Introduction to Production Planning.

UNIT –II

Stages of Development of Operations Research- Applications of Operations ResearchLimitations of Operations Research- Introduction to Linear Programming- Graphical Method- Simplex Method - Duality.

UNIT-III

Transportation Problem- Assignment Problem - Inventory Control - Introduction to Inventory Management - Basic Deterministic Models - Purchase Models - Manufacturing Models with and without Shortages.

UNIT-IV

Shortest Path Problem - Minimum Spanning Tree Problem - CPM/PERT - Crashing of a Project Network.

UNIT- V

Game Theory- Two Person Zero-sum Games -Graphical Solution of (2 x n) and (m x 2) Games - LP Approach to Game Theory - Goal programming - Formulations - Introduction to Queuing Theory - Basic Waiting Line Models: (M/M/1):(GD/a/a), (M/M/C):GD/a/a).

PERL PROGRAMMING

CCSN-211

Course Outcomes:
At the end of the course student will be able to

CO1: To identify basic perl constructs and to outline perl debugging commands.

CO2: To create and design simple perl programs with the available perl
CO3: pre-defined functions.

CO4: To demonstrate perl subroutines and perl references

CO5: To Apply Data Structures on perl programs and perl formats.

CO6: To install HTTP server and to design and execute perl programs CO5: through CGI.

UNIT-I (10 Lectures)

Introduction to perl# ! , Basic I/O, Variables variables& Backslash Interpolation, Scalar/list control operators, operator procedure, if unless, loops, loop control.

Debugging perl scripts Debugging commands, Debugger customization, Unattended execution, Debugging support, the perl profiler.

UNIT-II (10 Lectures)

Built in Function Perl functions by category, Perl functions in alphabetical order. Regular expressions Pattern Matching, operators, Meta character and meta symbols. Character classes, quantifiers, Pointers, capturing & clustering, Alternation, staying in control.

UNIT-III (10 Lectures)

Subroutines Syntax, Semantics, parsing references, prototypes, subroutine attributes. Formats Format variables, footers. References Creating References, using hard references, symbolic references, Braces, Brackets and Quotes.

UNIT-IV (10 Lectures)

Data Structure Arrays of Arrays, Hashes of arrays, Arrays of Hashes, Hashes of Hashes, Hashing as function , Elaborate records, Hashes of functions. CGI Programming CGI Basic, Forms, Methods.

UNIT-V (10 Lectures)

Here Docs, More CGI Emailing, Cookies, File uploading, E-mail.

TEXT BOOKS

1. Tom Christiansen, Brian D Foy, Larry Wall, Jon Orwant, *Programming Perl*, O'Reily, 3rd Edition, 2010.

Scott Guelich, *CGI Programming with Perl*, O'Reily, et al., SPD publication , 2nd Edition , 2008.

INTRODUCTION TO SOFT COMPUTING

CCSN-213

UNIT - I INTRODUCTION TO SOFT COMPUTING 9

Concept of computing systems. "Soft" computing versus "Hard" computing, characteristics of Soft computing, Some applications of Soft computing techniques.

UNIT - II FUZZY LOGIC 12

Fuzzy sets, logic operations, and relations; Fuzzy decision-making; fuzzy inference systems; design steps in fuzzy logic controller; application of fuzzy logic controller in Electrical engineering.

UNIT III – NEURAL NETWORKS 12

Basic concepts and major classes of neural networks, supervised and unsupervised learning, Single-layer perceptron, Multi-layer perceptron, Back Propagation Neural network, Recurrent neural networks, support vector machine, Application of neural network modelling / control problems in Electrical engineering

UNIT – IV OPTIMIZATION TECHNIQUES: 12

Genetic algorithms, Evolutionary Algorithm, Simulated Annealing, Ant colony optimization - Applications to Electrical engineering problems.

TEXT BOOKS

1. George J.Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic, Second Edition, PHI, 2006.
2. J.M.Zurada, Introduction to artificial neural systems, Jaico Publishing House, 2006
3. D.E. Goldberg, Genetic algorithms in search, optimization, and machine learning, Addison-Wesley.

REFERENCES

S.N.Sivanandam, and S.N.Deepa, Principles of Soft computing, Second Edition, Wiley India Pvt. Ltd, 2013.

1. N.P.Padhy and S.P.Simon, Soft computing with MATLAB programming, Oxford publishers, 2015.
2. http://nptel.ac.in/courses/106106046/41
3. https://www.coursera.org/learn/neural-networks
4. http://www.iitk.ac.in/kangal/deb.shtml

MATLAB Programming For Engineers

CCSN-215

Unit I

Introduction to MATLAB; Basics of MATLAB: windows - input & output - platform dependence - file types - general commands

Unit II

Script Files; Function files: Functions – Sub functions; Global Variables, Loops, Branches and control-flow

Unit III

Tutorials: Basics - Creating and working with arrays - Creating and Printing simple plots - Creating, saving and executing a script - Creating and executing a function file - Working with arrays and matrices - Importing and Exporting data - Files and Directories - Publishing reports

Unit IV

Graphics; Plotting simple graphs; Basic 2D plots: Style Options – Labels, title and legend –

Axis Control, zoom in and zoom out – Using plot editor - Overlay plots – Specialized 2D Plots; Examples: fplot – semilogx – semilogy – loglog – fill – bar – barh – area – pie – hist – stem – stairs – compass – comet – pcolor; subplots

Unit V

3D plots; View: view(2) and view(3) with examples; Mesh and surface plots; Examples:

plot3 – fill3 – surf – surfc -surf1 – meshz – waterfall – pie3 – stem3

REFERENCES

1. Getting started with MATLAB- RudraPratap, Oxford University Press.
2. Mastering MATLAB 7- Duane Hanselma and Bruce Littlefield, Pearson Education.
3. Understanding MATLAB- S N Alam, I K International Publishing House.
4. Programming in MATLAB- Patel and Mittal, Pearson Education India
5. Web resource: www.mathworks.com

CCSN-251 **DATA STRUCTURE USING 'C' LAB**

1. Implement insertion, deletion, and display functions for a singly linked list.
2. Create a program to perform insertions and deletions in a doubly linked list.
3. Use arrays to implement a stack with push, pop, and display operations.
4. Create a queue using arrays, including enqueue, dequeue, and display functions.
5. Implement a circular queue with necessary operations.
6. Implement a stack using a linked list and perform standard operations.
7. Create a BST with functions for insertion, deletion, and traversal (in-order, pre-order, post-order).
8. Use adjacency list and matrix to represent a graph, including a function to add edges.
9. Implement DFS for graph traversal.
10. Create a program to perform BFS on a graph.
11. Implement a simple hash table with collision handling using chaining.
12. Create a max-heap and implement insert and delete operations.
13. Implement basic sorting algorithms (Bubble, Selection, Insertion).
14. Write a program to perform merge sort on an array.
15. Create a dynamic array that can grow and shrink in size, with functions for insertion and deletion.

CCSN-253 **DBMS Lab Syllabus**

List of Experiments:

1. Introduction SQL-SQL*Plus
2. Road way travels E-R Diagrams
3. Various Data Types
4. Tables
5. My SQL Installation
6. DDL and DML Commands with Examples
7. Key Constrains-Normalization
8. Aggregate functions
9. Joins
10. Views
11. Index
12. PL/ SQL
13. Exception handling
14. Triggers
15. Cursors
16. Subprograms-procedure PL/ SQL
17. Functions of PL/ SQL

CCSN-255 **JAVA PROGRAMMING LAB**

1) A simple program that prints "Hello, World!" to the console.
2) Implement a basic calculator that performs addition, subtraction, multiplication, and division.
3) Write a program to calculate the factorial of a number using both iterative and recursive methods.
4) Create a program to check if a given string is a palindrome.
5) Generate and display the Fibonacci series up to a specified number of terms.
6) Implement bubble sort, selection sort, and insertion sort algorithms for an array of integers.
7) Write a program to perform linear search on an array.
8) Implement binary search on a sorted array.
9) Create a program that performs various string operations (substring, concatenation, length, etc.).
10) Implement a singly linked list with methods for insertion, deletion, and traversal.
11) Create a stack using arrays with push, pop, and display operations.
12) Implement a queue using linked lists with enqueue, dequeue, and display operations.
13) Create a binary tree and implement in-order, pre-order, and post-order traversal methods.
14) Demonstrate the use of HashMap for storing and retrieving key-value pairs.
15) Write a program to read from a file and display its contents on the console.

CCSN- 202 Object Oriented Programming Using C++ L T P Cr
3 1 0 4

UNIT I: Introduction to C++: History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O: Declaring, Defining and Initializing Variables, Scope of Variables, Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

UNIT II: Expressions, Conditional Statements and Iterative Statements: Operators in C++, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

UNIT III: Functions: Utility of functions, Call, Functions returning value, void functions, Inline Functions, Return data type of functions, Functions parameters, Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments, virtual function.

Arrays: Creating and Using One Dimensional Arrays- (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops, use various types of arrays (integer, float and character arrays / Strings).

Two-dimensional Arrays- (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Derived Data Types (Structures and Unions), Pointers and References in C++,

Memory Allocation in C++: static and dynamic memory allocation, use of new and delete operators, storage of variables in static and dynamic memory allocation.

UNIT IV: File I/O, Preprocessor Directives: Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros. **Using Classes in C++:** Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Function overloading in classes, Class level variable and local variable, Objects as parameters, Specifying the Protected and Private Access, Overview of Template classes and their use.

UNIT V: Overview of Function Overloading and Operator Overloading

Need of Overloading functions and operators, Overloading functions by number and type of arguments, looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators), friend function in C++.

Inheritance, Polymorphism and Exception Handling

Inheritance, types of inheritance, Polymorphism (compile time and run time), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books

1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003

CCSN- 204	Design And Analysis of Algorithm	Cr L T P 4 3 1 0

Unit- I

Introduction: Basics of Algorithms, Characteristics of Algorithms, pseudo code for expressing algorithms, performance analysis-space complexity, time complexity, asymptotic notation- big (O) notation, omega notation, theta notation.

Unit- II

DIVIDE AND CONQUER: General method, applications-analysis of binary search, quick sort, merge sort, AND OR Graphs.

GREEDY METHOD: General method, Applications-job sequencing with deadlines, Fractional knapsack problem, minimum cost spanning trees, Single source shortest path problem.

Unit- III

GRAPHS (Algorithm and Analysis): Breadth first search and traversal, Depth first search and traversal, spanning trees, connected components and bi-connected components, Articulation points. DYNAMIC PROGRAMMING: General method, applications - optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

Unit- IV

BACKTRACKING: General method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles. BRANCH AND BOUND: General method, applications - travelling sales person problem, 0/1 knapsack problem- LC branch and bound solution, FIFO branch and bound solution.

Unit- V

NP-HARD AND NP-COMPLETE PROBLEMS: Basic concepts, non-deterministic algorithms, NP-hard and NP-complete classes, Cook‘s theorem

Text books:

1) Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall of India.
2) E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
3) Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education, 2008.

References:

1) Jon Kleinberg and ÉvaTardos, Algorithm Design, Pearson, 2005.
2) Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
3) Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997 Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.
4) Harsh Bhasin,”Algorithm Design and Analysis”,FirstEdition,Oxford University Press.
5) Gilles Brassard and Paul Bratley,Algorithmics:Theory and Practice,Prentice Hall,1995

Internet and Web Technology

CCSN- 206 **Cr L T P 4 3 1 2**

Unit 1

Introduction web: WWW, History, Protocols, Creating website for individual and corporate, Identification of objects, Cyber Laws, Web team, Communication, Quality assurance, Search Engine, Designing strategies, Database to web applications.

Unit 2

HTML: History of HTML, Header, HTML Tags: concept of Tag, types of HTML tags, structure of HTML program, Text formatting through HTML: Paragraph breaks, line breaks, background and BGcolor attributes, Emphasizing material in a web page: Heading styles, drawing lines, text styles, Text styles and other text effects-centering, spacing, controlling font size & color, Lists: Using unordered, ordered, definition lists Adding Graphics To HTML Documents: Using Image tag, attributes of Image tag, changing width & height of image, tables, linking documents, Forms,

Unit 3

Cascade Style Sheets: introduction to CSS, Need for CSS, basic syntax and structure, using CSS, font attributes, color and background attributes, text attributes, border attributes, margin related attributes, list attributes Using class and span tag, External Style Sheets, Creating Divs with ID style, Creating Tag& Class style, creating borders, Navigation links, creating effects with CSS.

Unit 4

JavaScript: Introduction, Variables, Conditional statements, Operators, Popup box, Functions, Loops, Strings, Events, JavaScript and HTML, JavaScript Object Oriented Programming, use of JavaScript in web pages. Understand JavaScript event model, Variable declaration, Operators, Control Statements, Error Handling, Understanding arrays, Function Declaration, Built In Functions, Standard Date and Time Functions, Working with Objects, Call method in JavaScript.

Unit 5

Introduction to PHP, Syntax, Common PHP Script Elements, Variables, String, Operators, If...Else, Switch, Arrays, Looping, Functions, Forms, $_GET, $_POST, Date, Include, Error, Exception, Filter, Working With Forms, Processing Forms, Form Validation

Reference Books:

1) Ivan Bayross" HTML, DHTML and JavaScript", Prentice Hall Inc., 3rd Edition, 2003.
2) Uttam K. Roy, "Web Technoologies", Oxford, 1st Edition 2010.
3) TanweerAlam, "Internet and Java Programming", Khanna Book Publication, 1st Edition, 2010.

CCSN-208 **COMPUTER NETWORKS** **L T P Cr**
3 1 0 4

UNIT I

Introduction - History of Computer Networking and the Internet, Goals and Applications of Networks, Network structure and architecture, The Layered Architecture: Protocol Layering, The OSI Reference Model and the TCP/IP protocol, Network Topology Design – Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods.

UNIT II

Data Link Layer: Communication at the Data Link Layer; Nodes and Links, Examples of Data Link layer protocols.

Design Issues: Framing techniques: Byte Oriented and Bit Oriented Protocols; Error Control: Error Detection and Correction; Sliding Window Flow Control Protocols.

Media Access Control: Aloha, CSMA, CSMA/CD, CSMA/CA; Collision free protocols with Controlled Access; Limited Contention Protocols; Channelization: FDMA, TDMA, CDMA; Wavelength Division Multiple access for Fiber-Optic Data Communication.

IEEE LAN standards: Ethernet (Physical specifications, Encoding, Frame Format & MAC protocol); Token Ring and FDDI, Introduction to Wireless Networks: IEEE 802.11 Wireless LAN

UNIT III

Network Layer: Services, Routing Algorithms: Shortest path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

Network layer in TCP/IP: Basic characteristics of IP protocol; addressing and header format of IPv4 ; IPv6: Major goals& features.

Congestion Control & Quality of Service: General Principals; Congestion control in Virtual – Circuit Subnets; Congestion Control in Datagram Subnets: Choke packets, Load Shedding; Random Early Detection, Jitter Control; Over provisioning, Buffering, Traffic Shaping, Leaky bucket, token bucket, Resource Reservation, Admission Control, Packet Scheduling.

UNIT IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Datacompression techniques, cryptography - TCP - Window Management.

UNIT V

Application Layer: Application Layer: File Transfer, Access and Management, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Application Layer Protocols: The Web and http: Persistent and Non- persistent connections, http message format, cookies, proxy server, Email: smtp, mail message formats, mail access protocols: pop3, imap, MIME DNS: Service

Text Books:

1.Computer Networks, by Andrew S Tanenbaum, PHI. (2010)
2.Data and Computer Communications , by Walliam Stallings, PHI. (2002)

Reference Books:

1.Data Communications, Computer networking on OSI , by Fred Halsall, Addison Wesley Publishing Co.1998

2.Computer Networking -A Top-Down Approach Featuring the Internet , James F. Kurose and Keith W. Ross , Addison Wesley Publishing Co. 2004
3.Computer Networks: Protocols standards and interfaces , by Uyless Black, Prentice Hall.2002
4.Data communication & Networks , by Behrou A. Forouzan, Tata McGraw Hill. 2002

CCSN- 210 **Formal Languages & Automation Theory** **L T P Cr**
3 1 0 4

COURSE OBJECTIVES: The objectives of this course are to:
1. Introduce the student to the concepts of theory of computation in computer science.
2. Acquire insights into the relationship among formal languages, formal grammars, and automata.
3. Learn to design automats and Turing machine.

COURSE OUTCOMES: On successful completion of the course, the student will be able to: 1. Apply the knowledge of automata theory, grammars & regular expressions for solving the problem.
2. Analyze the give automata, regular expression & grammar to know the language it represents.
3. Design Automata & Grammar for pattern recognition and syntax checking.
4. Distinguish between decidability and un-decidability of problems.
5. Identify limitations of some computational models and possible methods of proving them.

UNIT I:
Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem

UNIT II:
Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA, Chomsky Hierarchy.

UNIT III:
Context Free Languages – Leftmost and rightmost derivation, parsing and ambiguity, ambiguity in grammar and languages, normal forms
Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF.

UNIT IV:
Pushdown Automata – NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, closure properties of CFLs.

UNIT V:
Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Decidability, Undecidable problems about TMs. Post

correspondence problem (PCP), Modified PCP, Other Undecidable Problems Introduction to recursive function theory.

Textbooks:

1.An Introduction to Formal Languages and Automata, by Peter Linz, Third Edition, Narosa Publishers (1998)
2. Hopcroft, Ullman, “Introduction to Automata Theory,Languages and Computation”, Pearson Education 3. K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science : Automata, Languages and Computation”, PHI Learning Private Limited, Delhi India.
4.Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishing house.
5. Y.N.Singh “Mathematical Foundation of Computer Science”, New Age International.
6. Papadimitrou, C. and Lewis, C.L., “Elements of the Theory of Computation”, PHI Learning Private Limited, Delhi India.
7. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation, Pearson Education.
8. Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd.
9. MichealSipser, “Introduction of the Theory and Computation”, Thomson Learning.

NANO SCIENCES

CCSN 212

UNIT I

Introduction to Nanotechnology: Introduction, definition, history, effects of nanoscience and nanotechnology in different fields.

Properties of nanomaterials: Size and shape and based properties, colour, melting point, density of states, band gap and magnetism.

UNIT II

Nanoparticles synthesis: Top down and bottom-up approach, colloids, emulsions, micelles, polymers, mechanical attrition and high energy ball milling.

UNIT III

Nanomaterials characterization: Scanning electron microscopy, Transmission electron microscopy, Fourier transform infrared spectroscopy, Energy dispersive spectroscopy, Atomic force microscopy, X-ray diffraction, Dynamic light scattering,UV-Vis spectrophotometer.

UNIT IV

Fabrication: Lithography, chemical vapor deposition, physical vapor deposition, sol-gel synthesis, molecular self-assembly, crystal growth, epitaxy, etching, masking.

UNIT V

Applications of nanotechnology in chemical industry: Catalysis, fuel cells, drug delivery and diagnostics, coatings, nanocomposite polymers, fluid inks, dyes, block copolymers, dendrimers, carbon nanotubes applications.

Text Books:

1. Nanoscale materials in Chemistry, K.J. Klabunde, Wiley, 2001.
2. Introduction to Nanotechnology, C.P. Poole Jr. and F.J.Owens, Wiley, 2003.
3. Nanotechnology, M. A. Ratner and D. Ratner, Pearson, 2003.
4. The Chemistry of Nanomaterials: Synthesis, Properties and Applications, C.N.R Rao, Achim Müller, A. K. Cheetham, Wiley, 2004.

References:

1. Hand book of Nanostructured Materials and Nanotechnology, H. Nalwa, Vol. 1 to 5, Academic Press, 1999.
2. Hand book of Nanotechnology, B. Bhusan, Springer, 2004.
3. Nanomaterials, Nanotechnologies and Design: An Introduction for Engineers and Architects, D. Schodek, P. Ferreira, M.F. Ashby, 2009.

CBSN-202 **Technical English** **L T P**

2 0 2

Unit -1 Fundamentals of Technical Communication: Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

Unit - II Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Key-Note Speech: Introduction & Summarization; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration.

Unit - III Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Unit - IV Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

Unit - V Kinesics & Voice Dynamics: Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: Vowel & Consonant Sounds. Reference Books

1. Technical Communication – Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.

2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.

3. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.

4. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.

5. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.

6. Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.

7. Business Communication for Managers by PayalMehra, Pearson Publication, Delhi.

Course Outcomes

1. Students will be enabled to understand the nature and objective of Technical Communication relevant for the work place as Engineers.

2. Students will utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions.

3. Students would imbibe inputs by presentation skills to enhance confidence in face of diverse audience.

4. Technical communication skills will create a vast know-how of the application of the learning to promote their technical competence.

5. It would enable them to evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics.

BUSINESS COMMUNICATION

CBSN-202A	L	T	P	Credits
	3	1	0	4

Unit 1: Nature of Communication:

Process of Communication, Types of Communication (verbal & Non Verbal), Importance of Communication, Different forms of Communication Barriers to Communication Causes, Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers

Unit 2 Business Correspondence:

Letter Writing, presentation, Inviting quotations, Sending quotations, Placing orders, Inviting tenders, Sales letters, claim & adjustment letters and social correspondence, Memorandum, Inter -office Memo, Notices, Agenda, Minutes, Job application letter, preparing the Resume.

Unit 3 Report Writing:

Business reports, Types, Characteristics, Importance, Elements of structure, Process of writing, Order of writing, the final draft, and check lists for reports.

Unit 4 Vocabulary:

Words often confused, Words often misspelt, common errors in English.

Unit 5 Oral Presentation:

Importance, Characteristics, Presentation Plan, Power point presentation, Visual aids.

Suggested Readings:

1. Bovee, and Thill, Business Communication Today, Pearson Education

2. Lesikar, R.V. &Flatley, M.E. Kathryn Rentz; Business Communication Making Connections in Digital World, 11th ed., McGraw Hill Education.

3. Shirley Taylor, Communication for Business, Pearson Education

4. Locker and Kaczmarek, Business Communication: Building Critical Skills, TMH

5. LeenaSen, Communication Skills, PHI Learning

Technical Writing

CBSN-202B	L	T	P	Credits
	3	1	0	4

Unit 1

What is technical writing? Difference between technical writing and other forms of writing. Qualities and qualifications of technical writers.

Unit 2

End products of technical writing. Professionals involved - project manager/editor, writers, graphic artists; liaison with product engineers/scientists and clients.

Unit 3

Roles and responsibilities of writers, editors/project managers.7 Cs of effective writing: Document formats – hard and soft copy versions designs.

Unit 4

Principles of technical writing; styles in technical writing; clarity, precision, coherence and logical sequence in writing.

Unit 5

Stages of Technical writing. Document development process, Technical documentation, Planning, Tools, architecture, templates, content development, technical reviews, editorial reviews. Quality control.

Books for References

1. Technical writing style by – Dan Jones , Sam Dragga
2. Handbook of Technical writing by- Walter.E.ollu -1976
3. Technical Writing by- Serena Henning
4. Technical writing process by – Kieran Morgan and SanjaSpejic -2015
5. A guide to Technical writing by – T.A. Rickard

INTERCULTURAL COMMUNICATION

CBSN-202C	L	T	P	Credits
	3	1	0	4

Objectives:

Thiscourseintroducesyoutothefundamentalprinciplesandissuesofintercultural communicationfromaninterdisciplinaryperspective.Itproposestodevelopaperception ofandappreciationfordifferentculturalperspectivesandvalues.

UNIT–I

LanguageandCulture-studyingcultureandcommunication-VariousDefinitionsof Culture-basicapproachestotheconceptofculture-CommunicationandCulture-Interculturalcommunication:InteractioninaDiverseWorld-historicoverviewofthe field-theacademicfieldofinterculturalcommunication–"Culture"intheFieldof InterculturalCommunication-ThreePrinciplesofInterculturalism-DMIS:Denial–Defense–Minimization.

UNIT–II

Identity-Racialidentity-Ethnicidentity-Culturalidentity;PluralityofIdentity; PropertiesofCulturalIdentity-Individual-relationalandcommunalidentity;Socialand CulturalIdentities-Genderidentities-Ageidentities-Spiritualidentity-Classidentity-Nationalidentity-Regionalidentity-Personalidentity;Stereotypes-CulturalDiversityin Perception:AlternativeViewsofReality.

UNIT–III

Verbalandnonverbalcommunication(includingconversationstyles,politeness,and expectationsrelatedtotimeandspace)-lowandhighcontextcommunication processing-communicationstyles-culturalspeakingrulesPoliteness-perception, interpretationandevaluation;nonverbalCommunication;Proxemics-Contact/low contact-Kinesics-Gestures,facialexpressions,bodylanguage,eyecontact;artifacts-Clothing,artifacts,livingenvironments.

UNIT–IV

Culturalvaluesandcommunication-Cross-culturalStudies-Individualismand collectivism-Hierarchyandpowerdistance;InterculturalStudies–Intercultural encountersandadaptation-Encountersandemotions-CultureShock-Intercultural adaptation-U-curvemodel-honeymoonperiod-crisisperiod-adjustmentperiod-iculturalismperiod-W-curvemodel-Stress-Adaptation-Growth-emigrantassignment cycle.

UNIT–V

Interculturalcompetence-InterculturalCompetentPerson-interculturalsensitivity-MiltonBennett'sdevelopmentalmodelofinterculturalsensitivity-Acceptance, AdaptationandIntegrationMeasurementofInterculturalSensitivity;Theorytopractice-Culturalinfluencesoncontext–thebusinesssetting,theeducationalsettingandthe healthcaresetting.

REFERENCES:

Bennett,M.J.1986.Adevelopmentalapproachtotrainingforinterculturalsensitivity. InternationalJournalofInterculturalRelations,10(2),179-196.

Bennett,M.J.1993.Towardsethnorelativism:Adevelopmentalmodelofinterculturalsensitivity.In R.M.Paige(ed.),Educationfortheintercultural experience.Yarmouth,ME:InterculturalPress.21-71.

Bennett,M.J.(ed.).1998.BasicConceptsofInterculturalCommunication,selectedreadings. Yarmouth,Maine:InterculturalPress,Inc.

Bennett,M.J.1998.InterculturalDevelopmentInventoryManual.Portland:The InterculturalCommunicationInstitute.

Bhawuk,D.P.S.& H.C.Triandis.1996.Theroleofculturetheoryinthestudyofcultureandintercultural training.InD.Landis&R.S.Bhagat(eds.).Handbookof InterculturalTraining.ThousandOaks,CA:SagePublications.17-34.

CCSN-252 OBJECT ORIENTED PROGRAMMING USING C++ LAB

1	Write a program to print HELLO WORLD in C++.
2	Write a program to add two numbers using C++.
3	Write a program to Swap two numbers using C++.
4	Write a program to Find Simple Interest in C++.
5	Write a program to Check Even or Odd Integers using if and else in C++.
6	Write a program to create object and class in C++.
7	Write a program to achieve compile time polymorphism in C++.
8	Write a program to using single inheritance in ++.
9	Write a program to using multiple Inheritances in C++.
10	Write a program to using virtual function in C++.
11	Write a program to create parameterized constructor in C++.
12	Write a program to using friend function in C++.
13	Write a program to create function overriding in C++.
14	Write a program to print matrix in C++.
15	Write a program to print addition of a single dimensional array in C++

DESIGN AND ANALYSIS OF ALGORITHMS LAB

CCSN-254

LIST OF EXPERIMENTS: (Any 12 experiments from the following list to be performed)

1. Implement Selection sort and find how many steps are required to sort 10 elements.

2. Implement and Analysis factorial of a number program using iterative and recursive methods.

3. Implement Insertion Sort and analyses the time complexity.

4. Given two strings, find the minimum number of edits required to convert one string to another.

5. Write a program to find the Greatest Common Divisor of two numbers using recursion and find how many steps are required to execute it.

6. Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n (the number of elements in the list to be sorted) and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

7. Write a program to check whether a given graph is connected or not using the DFS method.

8. Apply Greedy method to compress the given data using Huffman encoding.

9. Implement fractional knapsack problem using Greedy Strategy.

10. Implement minimum spanning tree using Prim's algorithm and analyses its time complexity.

11. Apply dynamic programming methodology to implement 0/1 Knapsack problem.

12. Solve the longest common subsequence problem using dynamic programming.

13. Find the length of the longest subsequence in a given array of integers such that all elements of the subsequence are sorted in strictly ascending order.

14. Apply dynamic programming methodology to find all pairs shortest path of a directed graph using Floyd's algorithm.

15. Implement matrix chain multiplication and find the optimal sequence of parentheses.

INTERNET AND WEB TECHNOLOGY LAB

CCSN-256

1. Create a simple webpage using HTML to display a personal profile, including text, images, and links.
2. Develop a webpage that uses CSS to style elements such as headings, paragraphs, and lists. Implement a navigation bar and footer.
3. Write a JavaScript program to validate user input in an HTML form, ensuring that required fields are filled out correctly.
4. Design a webpage that adapts to different screen sizes using CSS media queries. Test it on various devices or emulators.
5. Create a webpage that uses AJAX to fetch data from a public API and display it dynamically without reloading the page.
6. Build a webpage that dynamically updates its content using JavaScript. For example, create a simple to-do list where users can add and remove items.
7. Develop a web application that integrates with a third-party API, such as a weather API, to display current weather information based on user input.
8. Implement a web application that uses localStorage or sessionStorage to save user preferences or a simple note-taking feature.
9. Create a simple PHP application that connects to a MySQL database, allowing users to insert, update, and delete records.
10. Develop a web application that includes user registration and login functionality using PHP and a database.
11. Build a basic CMS that allows users to create, edit, and delete blog posts, using PHP and MySQL.
12. Create a simple chat application using WebSockets to enable real-time communication between users.
13. Develop a web application that allows users to upload images, storing them on a server and displaying them on the site.
14. Design an e-commerce product page using HTML, CSS, and JavaScript, including features like product descriptions, images, and a shopping cart.
15. Build a simple single-page application using a JavaScript framework (like React orVue) that allows users to navigate between different views without refreshing the page.

CBSN-204

Operations Research L T P 4 0 0

UNIT-I

Introduction: Definition and scope of operations research (OR), Necessity of operation research in industry .phases of OR study. Linear Programming: Two variable Linear Programming model and Graphical method of solution

Unit-II

Game Theory: uses of game theory ,some applications and examples payoffs, characterstic of game theory ,Two person zero-sum game ,Pure and Mixed strategies, Saddle point and its existence.

Unit-III

Queuing Theory in operation research , Two phase method, Dual Simplex method, special cases of Linear Programming, duality, Dual Simplex algorithm.

UNIT-IV

Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-V

Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem. Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

Text / Reference Books:

1. Wayne L. Winston,"Operations Research" Thomson Learning,2003.

2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education,2003.

3. R. PanneerSeevam, "Operations Research" PHI Learning, 2008.

4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

SOFTWARE ENGINEERING

CCSN-301 **Cr L-T-P**
4 3- 1-0

COURSE OBJECTIVES: The objectives of this course are to
1. Learn and understand the principles of Software Engineering.
2. Learn methods of capturing, specifying, visualizing, and analyzing software requirements. 3. Apply Design and Testing principles to S/W project development.
4. Understand project management through life cycle of the project.

COURSE OUTCOMES: On successful completion of the course, the student will be able to
1. Identify appropriate software design model based on requirement analysis.
2. Formulate Software Requirements Specification (SRS) reports for the real world application.
3. Translate a specification into a design and identify the components to build the architecture. 4. Plan a software engineering process to account for quality issues and non-functional requirements.
5. Estimate the work to be done, resources required and the schedule for a software project plan.

UNIT – I- Introduction to Software Engineering:Introduction, software applications, importance of software evolution of software, Software Components, Software Characteristics, Software Crisis & myths, Software Engineering paradigms, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model,RAD model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT - II

Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA):Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT - III

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

UNIT - IV

software testing strategies: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Top-Down and Bottom-Up Testing Strategies: Structural Testing (white box), Functional Testing (black box testing), validation testing, system testing, debugging, Alpha and Beta Testing of Products.

UNIT - V

Software Reliability and Software Project Management: fault avoidance and tolerance, exception handling, defensive programming. Software Maintenance: maintenance characteristics, maintainability, maintenance tasks, maintenance side effects. CASE: introduction, levels of case,

architecture, case building blocks, objectives, case repository, characteristics of case tools, categories,Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

References:

1.RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2.PankajJalote, Software Engineering, Wiley
3.Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4.KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
5.Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6.IanSommerville, Software Engineering, Addison Wesley.
7.Kassem Saleh, "Software Engineering", Cengage Learning.
8.Pfleeger, Software Engineering, Macmillan Publication

COMPILER DESIGN

CCSN303 **Cr L-T-P**
4 3- 1- 0

Unit - I

Introduction to Compiler: Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchers

Implementation of lexical analyzers, lexical-analyzer generator, LEX compiler, Formal grammars

and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

Unit – II

Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables.

Unit - III

Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address

code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations and case statements.

Unit - IV

Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

Intermediate Code Generation Different Intermediate Forms - Abstract Syntax tree, Polish Notation, 3 address code, Implementation of 3 address code-Quadruple, Triples and Indirect triples

Unit - V

Code Generation: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, "*Principles of Compiler Design"*, Narosa Publication, 2002
2. A.V. Aho, R. Sethi and J.D Ullman, "*Compiler: principle, Techniques and Tools"*, Addision Wesley, 2nd Edition, 2006.

3. H.C. Holub, "*Compiler Design in C"*, Prentice Hall Inc, Second Edition, Digitized Edition, 2010.
4. O.G. Kakde, "*Compiler Design"*, Laxmi Publication, Seventh Edition, 2007

OBJECT ORIENTED ANALYSIS AND DESIGN

CCSN-305 **Cr L-T-P 4 3-1-0**

Unit – I

Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class and abstract function, inheritance and multiple inheritance, Meta data.

Unit – II

Dynamic Modeling: Events and states, operations, nested state diagrams, advanced dynamic modeling concepts, sample dynamic model.

Unit – III

Functional Modeling: Data flow diagram, specifying operations, a sample functional model. OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, JSD.

Unit – IV

Java Programming: Introduction, Operator, Data types, Variables, Methods & Classes, Static methods, Static block, Interfaces, final method and classes, Multithread Programming, Thread life cycle, I/O, Java Applet. Java Library: String Handling, Input/Output exploring Java.io, Networking, Applets classes, Event Handling, Introduction to AWT, Working with window, Graphics, AWT Controls, Layout Manager and Menus, Images, AWT Basics, Event Handling, AWT Button, AWT Label, AWT TextField, AWT TextArea, AWT Checkbox.

Unit – V

Software Development using Java: Java Beans, Java Swing, java Servlets, Servlets Basic Concepts, JSP, Features of JSP, creating simple JSP page, Application of java, Dynamic Billboard Applet, Image Menu: An image based menu, Lavatron Applets, Scrabblets, JDBC, Brief functioning of upper layer E-mail and their applications.

Text Books:

1. James Rumbaughetal, “Object Oriented Modeling and Design”, PHI
2. Herbert Schieldt, “The Complete Reference: Java”, TMH.
3. E. Balagurusamy, “Programming in JAVA”, TMH.

References:

1. Booch Grady, “Object Oriented Analysis & Design with application 3/e”, Pearson Education, New Delhi.
2. BjarneStroustrup, “C++ Programming Language”, Addison Wesley
3. E. Balagurusamy, “Object Oriented Programming with C++”, TMH

CRYPTOGRAPHY AND INFORMATION SECURITY

CCSN-307 **Cr L-T-P**
4 3-1-0

Unit - I
Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security .
Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

Unit - II
Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers**.**
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange and Knapsack Algorithm.

Unit - III
Cryptographic Hash Functions: Message Authentication, Secure hash algorithm(SHA-512)
Message Authentication Codes: Authentication requirements.
Digital signatures Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

Unit - IV
Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)
Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

Unit - V
E-Mail Security: Pretty Good Privacy, S/MIME
IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange.
Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.
Reference Books:

1. William Stallings," *Cryptography and Network Security: Principles and Practice"*, Pearson Education, 5th edition, First impression 2011.
2. Forouzan A. Behrouz, "*Cryptography and Network Security* ", Tata McGraw Hill , 2nd Edition, 2008

INTERNET WEB PROGRAMMING

CCSN 309

Unit 1: Introduction to Web Development

This unit introduces the fundamentals of web development, including an overview of the web's architecture. Students will learn about the roles of clients and servers, the basics of HTTP, and the difference between static and dynamic web pages.

Unit 2: HTML and CSS

In this unit, students will explore HTML for structuring web content and CSS for styling it. They will learn to create semantic HTML documents, apply CSS styles, and understand the box model, layout techniques, and responsive design principles.

Unit 3: JavaScript Basics

This unit focuses on JavaScript as the programming language of the web. Students will learn about variables, data types, functions, control structures, and the Document Object Model (DOM). They will practice manipulating HTML elements and responding to user events.

Unit 4: Advanced JavaScript and AJAX

Building on the basics, this unit covers more advanced JavaScript concepts, including asynchronous programming, callbacks, and promises. Students will learn about AJAX for making asynchronous requests to servers, enabling dynamic content updates without reloading the page.

Unit 5: Introduction to Front-End Frameworks

In this unit, students will be introduced to popular front-end frameworks such as React, Angular, or Vue.js. They will learn about component-based architecture, state management, and how to create interactive user interfaces.

GRAPH THEORY

CCSN 311

UNIT 1

Introduction: Graphs, Sub-graphs, Regular graph, Adjacency and incidence matrices, Finite and infinite graph, Incidence and degree, Isolated vertex, Pendent vertex and null graph, Turan's theorem.

UNIT 2

Paths and Circuits: Isomorphism, Walk, Cycle, Paths and circuits, Simple and proper circuit, Connected and disconnected graph, Euler graphs, Operations on graphs, Hamiltonian paths and circuits, Bipartite graph, Berge theorem, Hall's theorem, Edge connectivity, Blocks, Menger's theorem.

Trees and Fundamental Circuits: Trees, Properties of tree, Pendant vertices in a tree, Distance and centers in a tree, Spanning tree, Cayley's Formula, Minimal spanning tree, Prim and Kruskal's algorithm, Matrix Tree theorem, Dijkstra's Shortest Path Algorithm, Floyd-Warshall algorithm, Huffman's Coding Algorithm, Depth-first and breath first algorithm.

UNIT 3

Cuts sets and cut-vertices: Cut sets, Properties of cutset, all cut sets in a graph, 1-isomorphism, 2isomorphism.

Planar graph and dual graphs: Planar graphs, Homoeomorphic graph, Kuratowski's Two Graphs, Different representation of a planar graph, Tutte's f-factor theorem, Detection of planarity, Geometric dual, Combinatorial dual.

UNIT 4

Coloring, Covering and Partitioning: Chromatic number, Chromatic Partitioning, Chromatic Polynomial, Covering, Four colour conjecture, Five-colour theorem, Dirac Theorem, Brooks theorem, Vizing theorem.

UNIT 5

Directed Graphs: Directed graph, Diagraph and binary relations, Directed Paths, Euler diagraphs, Acyclic digraphs, Topological sorting, Warshall's algorithm, Bellman-Ford algorithm, Ramsey theorems.

Recommended Books:

1. DeoNarsingh, Graph Theory with applications to Engineering and Computer Science, PrenticeHall of India (2007).
2. Parmenter Michael M., Goodaire Edgar G., Discrete Mathematics with Graph Theory, Prentice-Hall of India (2007).
3. Rosen, Kenneth H. Discrete Mathematics and its Applications, Tata Mcgraw-Hill (2003).

Bondy, J.A. Murty U.S.R., Graph theory and Applications, North Holland Publications (1995).

COMPUTER VISION

CUCS 341

UNIT 1

Overview of computer vision and its applications: Image Formation and Representation: Imaging geometry, radiometry, digitization, cameras and Projections, rigid and affine transformation

UNIT 2

Image Processing: Pixel transforms, color transforms, histogram processing, histogram equalization, filtering, convolution, Fourier transformation and its applications in sharpening, blurring and noise removal

UNIT 3

Feature detection: edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors, Morphological operations

Segmentation: Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut

UNIT 4

Camera calibration: camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models.

Motion representation: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation

UNIT 5

Motion tracking: statistical filtering; iterated estimation; observability and linear systems; the Kalman filter

Object recognition and shape representation: alignment, appearance-based methods, invariants, image eigenspaces

Books:

1. Computer Vision: Algorithms and Applications, R. Szeliski, Springer, 2011.
2. Computer Vision: Algorithms and Applications, R. Szeliski, Springer, 2011.
3. Introductory techniques for 3D computer vision, E. Trucco and A. Verri, Prentice Hall, 1998.

ROBOTICS AND AUTOMATION

CUCS 343

Unit 1: Introduction to Robotics

This unit covers the fundamental concepts of robotics, including an overview of its applications across various industries. Students will explore the historical development of robotics, different types of robots, and the basic components that make up robotic systems.

Unit 2: Robotics Kinematics

In this unit, students will learn about kinematics and its significance in robotics. The focus will be on forward and inverse kinematics, the use of homogeneous transformation matrices, and methods for representing position and orientation in three-dimensional space.

Unit 3: Robot Dynamics

This unit delves into the principles of dynamics as applied to robotic systems. Students will study Newton-Euler and Lagrangian methods for dynamic modeling, gaining insights into the behavior of robotic manipulators through simulation.

Unit 4: Control Systems for Robotics

Students will be introduced to control theory, emphasizing feedback and feedforward control mechanisms. The unit will cover PID control in robotic applications as well as advanced control strategies such as adaptive and robust control.

Unit 5: Sensors and Perception

This unit focuses on the various types of sensors utilized in robotics. Students will learn about sensor fusion techniques, vision systems, image processing, and the role of lidar and other spatial perception technologies in enhancing robotic functionality.

HUMAN COMPUTER INTERACTION

CUCS 347

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions. Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and f low – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT III

Windows – New and Navigation schemes selection of window, selection of devices based and screen- based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT IV

HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.

TEXT BOOKS: 1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3 2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education Units 4,5

REFERENCE BOOKS: 1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia. 2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech. 3. User Interface Design, Soren Lauesen , Pearson Education. 4. Human –Computer Interaction, D. R. Olsen, Cengage Learning. 5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

CUCS-345 **CLOUD COMPUTING**

Cr. L T P

4 3 1 0

Unit - I

Introduction to Cloud Computing: Evolution and History of Cloud Computing, Why Cloud Computing is Becoming Highly Important, Features of Cloud Computing, Advantages of Cloud Computing, Characteristics of Cloud Computing, Limitations of Cloud Computing. Cloud Computing Applications, Cloud Technologies, Security Risks of Cloud Computing Cloud Service Provider Companies.

Unit - II

Cloud Models and Types: Deployment Models, Service Models. Layers and Types of Cloud, Components of Cloud Computing, Cloud Computing Service Providers, Software as a Service (SaaS): Software as a Service, Evolution of SaaS, Brief Introductory part of Software as a Service, Characteristics of SaaS, Services Provided by SaaS, Advantages/ Disadvantages of SaaS, SaaS Providers and their services.

Unit -III

Platform as a Service (PaaS): Introduction to PaaS, Advantages of PaaS, Disadvantages of PaaS, Evolution of PaaS, PaaS Service Providers- Amazon AWS, Google App Engine, Force.com, PaaS Application Framework, PaaS Operator Verbs, PaaS Developer Verbs, Challenges of PaaS

Unit -IV

Infrastructure as a Service (IaaS): Evolution, IaaS Architecture- Advantages and Disadvantages of Infrastructure as a Service, IaaS Providers, IaaS Architecture, Advantages and Disadvantages of Infrastructure as a Service Data in Cloud: Evolution of Network Storage in Cloud, Data as a Service, Database as a Service, Cloud Based Data Storage, Advantages and Limitations of Cloud Based Storage Solution, Cloud Based Data Storage Service Providers

Unit - V

Virtualization: Introduction to Virtualization and its Technical Evolution, History of Virtualization, Types of Virtual Machines, Advantages of Virtualization, Components of Virtualization, Types of Virtualization, Cloud Hypervisor,

Infrastructure Security Network level security, Host level security, Application level security. Data privacy and security Issues. Access Control and Authentication in cloud computing.

Reference Books:

1. MIChael Miller, "*Cloud Computing: Web based application that change the way you work and collaborate*", Kindle , First Edition, 2011.
2. Barrie Sosinsky, "*Cloud Computing bible*", Wiley publishing INC, First Edition ,2011
3. George Reese, "*Cloud Application architecture*" O'Reilly, First Edition, 2009.

ENERGY STUDIES

CBSN-301 **Cr L-T-P**

2 2-0-0

UNIT 1: Energy Sources - Fossil fuels, Nuclear fuels, hydel, solar, wind and bio fuels in India, Energy conservation, Nuclear energy through fission and fusion processes.

UNIT 2: Energy Conversion- Energy conversion from source to utility, Solar, Nuclear, Geothermal, Tide and Wind Energies.

UNIT 3: Global Energy Scenario- Role of energy in economic development and social transformation, Overall energy demand, availability and consumption, Depletion of energy resources and its impact on economy, Non proliferation of nuclear energy. International energy policies of G-8, G-20, OPEC and European Union countries.

UNIT 4: Indian Energy Scenario- Commercial and noncommercial forms of energy, Utilization pattern in the past, present and also future prediction, Sector wise energy consumption.

UNIT 5: Energy Policy: Energy policy issues at global level, national level and state level, Energy conservation act 2001, Electricity act 2003, Energy pricing and its impact on global variations.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understanding Energy Sources
2. Energy Conversion Processes
3. Global Energy Dynamics
4. Indian Energy Landscape
5. Energy Policy and Regulation
6. Sustainability and Conservation
7. Research and Communication Skills
8. Critical Thinking and Problem Solving

Text Books:

1. Jose Goldenberg, Thomas Johanson, and Reddy, A.K.N., Energy for Sustainable World, WileyEastern, 2005.

2. Charles E. Brown, World Energy Resources, Springer Publication, New York, 2002.

3. Culp, A.W., Principles of Energy Conversion, McGraw Hill New York, 2004. 80

Reference Books:

1. Bukhootsow, B., Energy Policy and Planning, Prentice Hall of India, New Delhi, 2003.

2. TEDDY Year Book, The Energy Research Institute (TERI), 2011

SUPPLY CHAIN MANAGEMENT

CBSN-301A

UNIT 1

Introduction

Introduction, Generic Types of supply chain, Various Definitions and Implications, Major Drivers of Supply chain.

Strategic Decisions- in Supply Chain Management

Introduction, Business Strategy, Core Competencies in Supply Chain, Strategic SC Decisions, Customer Reletationship Management Strategy, Supplier Relationship Management Strategy

Source of Management in Supply Chain

Introduction, Elements of Strategic Sourcing, A Collaborative Perspective, Development of Partnership.

UNIT 2

Inventory Management in Supply Chain

Introduction, Types of Inventory, Supply/ Demand Uncertainties, Inventory costs, Selective Inventory Control, Vendor Manage Inventory system, Inventory Performance Measure

Logistics In Supply Chain Management

Introduction, Strategy, Transportation Selection, Trade-off, Models for Transportation and Distribution, Third Party Logistics,, Overview of Indian Infrastructure for Transportation

UNIT 3

Information Technology in Supply Chain

Introduction, Types of IT Solutions like Electronic Data Inter change (EDI), Intranet/ Extranet, Data Mining/ Data Warehousing and Data Marts, E-Commerce, E- Procurement, Bar Coding Technology.

Information System in Supply Chain

Introduction, Computer Based Information Systems, Computer Models and Perceptions about ERP, ERP & SCM

Application of Mathematical Modeling in Supply Chain

Introduction, Modeling, Consideration in Modeling SCM System, Structuring the Logistic chain, Concept of Modeling.

UNIT 4

Reverse Supply Chain

Introduction, Reverse Supply Chain v/s Forward Supply Chain, Types of Reverse Flows, Issues in Management of Reverse Supply Chain, Reverse Supply Chain for Food items, Reverse

Logistic and Environment Impact.

Integration & Collaborative Supply Chain

Introduction, Evolution of collaborative SCM, Efficient Customer response, Collaboration at various levels, Imperatives for Successful Integrative Supply Chains.

UNIT 5

Agile Supply Chain

Introduction, Source of Variability, Characteristics of Agile Supply Chain, Achieving Agility in Supply Chain.

Cases of Supply Chain

Cases of Supply Chain like, News Paper Supply Chain, Book Publishing, Mumbai Dabbawala, Disaster management, Organic Food, Fast Food.

Text Books & Reference Books:

1 Supply Chain Management Theories & Practices, R. P. Mohanty, S. G. Deshmukh, Dreamtech Press, 19-A, Anari Road, Daryaganj, New Delhi

2 Supply Chain Management Strategy, Planning & Operation by Sunil Chopra, Peter Meindl

3 Total Supply Chain Management by Ron Basu, J. Nevan Wright

4 Supply Chain Management, Chopra, Pearson

5 Logistics Engineering and Management, Blanchard, pearson

TRANSPORTATION

CBSN-301B

UNIT 1

Introduction to Transportation Engineering, Classification of roads, Typical cross sections of roads in urban and rural area, Requirements and factors controlling alignment of roads Introduction to geometric design of highways, Design controls and criteria, Design of highway cross section elements, Design of horizontal alignment - Stopping sight distance, Overtaking sight distance, super elevation, transition curve, length and shift of transition curve, extra widening. Vertical alignment (introduction only)

UNIT 2

Introduction to highway materials, Desirable properties and testing of road aggregates, bituminous materials and sub grade soil. Introduction of flexible and rigid pavements, Factors influencing the design of flexible pavements, Design of flexible pavements by CBR method and IRC 37: 2018. Construction of bituminous pavements

UNIT 3

Introduction to traffic engineering, Traffic characteristics, Capacity and Level of Service, Design Speed, Traffic surveys, Types of road intersections, Traffic control devices (introduction only), Design of isolated signals by Webster's method.

UNIT 4

Railway Engineering - Component parts of a railway track - functions, concept of Gauges, coning of wheels, cant deficiency, compensation of gradients Tunnel Engineering: Tunnel – sections, tunnel surveying - alignment, transferring centre grade into tunnel. Harbours – classification, features, requirements. Break waters - necessity and functions, classification. Docks – Functions and types - dry docks, wet docks (Introduction only)

UNIT 5

Introduction to Airport Engineering, Components of airport, selection of site for airport. Runway orientation, basic runway length and corrections required, Taxiways and aprons

Text Books

1. Khanna, S.K. and Justo C.E.G., Highway Engineering, Nem Chand & Bros., 20152. Kadiyali, L. R. and N.B Lal, Principles and Practices of Highway Engineering, KhannaPublishers, 20133. Khanna, S. K. and Arora. M. G., Airport Planning and Design, Nemchand& Bros4. Mundrey J. S, Railway Track Engineering, Tata McGraw Hill, 2009

Environment And Sustainability

CBSN-301 C

UNIT 1

Ecosystem: Structure of ecosystem, Biotic & Abiotic components, Aquatic (Lentic and Lotic) and terrestrial ecosystem.Global warming - Causes, effects, ,GreenHouse Effect, Ozone depletion.

UNIT 2

Air Pollution: Air pollution, Natural and manmade sources of air pollution, Effects of air pollution. Air Pollutants and Types.Control of air pollutants by Cyclone separator and Electrostatic Precipitator, Air (prevention and control of pollution) act 1981.

Noise Pollution: Noise pollution: sources of pollution, measurement of pollution level, Effects and Control of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000.

UNIT 3

Water and Soil Pollution: Water pollution and Sources of water pollution, Types of water pollutants, Characteristics of water pollutants, control measures of water pollution.. Definition and list unit operations in water and WasteWater Treatment process,Water (prevention and control of pollution) act 1974, Water conservation – Importance of Rain Water Harvesting. Soil pollution, Causes, Effects and Preventive measures of Soil Pollution due to Excessive use of Fertilizers, Pesticides and Insecticides.

UNIT 4

Renewable sources of Energy: Solar Energy: Basics of Solar energy. Definition and advantages of advanced solar collectors. Solar water heater and Solar stills and their uses. Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Wind energy: Current status and future prospects of wind energy. Wind energy in India. Need of new Energy sources, Different type's new energy sources.Environmental benefits of New Energy Sources-Hydrogen energy, Ocean energy resources, Tidal energy conversion.

UNIT 5

Solid Waste Management and Environmental: Solid waste generation, Sources and characteristics of Municipal solid waste, Solid Waste Management rules 2016- 3R in SWM. E-Waste generation,Sources and characteristics, E waste management rules 2016 Plastic Waste generation,Sources and characteristics, Recycled plastic rules 2016 Importance of Environment (protection) act 1986 Occupational health and safety measures.

References:

(a) Suggested Learning Resources: Books:

1. S.C. Sharma & M.P. Poonia, Environmental Studies,Khanna Publishing House,NewDelhi

2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.

3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and

4. Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099.

5. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.

CCSN-351 **Software Engineering Lab**

List of Experiments:

1. To prepare problem statement for any project.
2. Create a problem statement for an online learning platform.
3. Develop an understandingandSoftware Requirements Specification(SRS).
4. To draw a sample Entity Relationship Diagram for library management system.
5. To prepare DataFlow Diagram Online shopping management system.
6. To prepare the student / university management system Use Case Diagram
7. To draw a sample activity diagram for enterprise architectural modeling.
8. To draw a sample Class diagram for seminar.
9. To draw a Sequence Diagram for Online Shopping Checkout Process
10. Todraw a Component Diagram for Library Management System.
11. Todraw a Deployment Diagram for University Management System.
12. Develop a testing strategy for an online banking application.
13. Create a presentation that explains each phase of the SDLC with examples.

COMPILER DESIGN LAB

CCSN-353

1. Create a lexer using Lex/Flex to tokenize input source code and print tokens with types.
2. Build a recursive descent parser or use Yacc/Bison to parse a grammar and display parse trees for valid inputs.
3. Implement a semantic checker that traverses the parse tree to identify type mismatches and undeclared variables.
4. Develop a module that converts the parse tree to intermediate representation (e.g., three-address code).
5. Apply optimization techniques like constant folding and dead code elimination to the intermediate code.
6. Create a generator that translates intermediate code into assembly language for a specified target architecture.
7. Implement error detection and reporting for lexical, syntax, and semantic errors with meaningful messages.
8. Use ANTLR or LLVM to construct a complete compiler from grammar definitions to code generation.
9. Measure compilation time and memory usage, and evaluate the efficiency of the generated code.
10. Develop a mini compiler for a simple language combining all components: lexer, parser, semantic analyzer, optimizer, and code generator.

OBJECT ORIENTED ANALYSIS AND DESIGN LAB

CCSN-355

1. Design a class diagram for a simple system (e.g., library management) using UML notation.
2. Implement a program to create objects of defined classes and initialize their attributes.
3. Write a program demonstrating method overloading in one class and method overriding in a subclass.
4. Develop a class that uses private and public access modifiers to encapsulate data and provide getter/setter methods.
5. Create a base class and derive multiple subclasses, demonstrating the use of inherited properties and methods.
6. Implement a program that uses both compile-time (method overloading) and runtime (method overriding) polymorphism.
7. Design an interface and an abstract class, then implement classes that adhere to these definitions.
8. Write a program to illustrate the differences between composition and aggregation through class relationships.
9. Implement a design pattern (e.g., Singleton, Factory) in a sample application to demonstrate its utility.
10. Create use case and sequence diagrams for a given scenario to illustrate interactions and functionality.

Computer Graphics

CCSN 302 **L T P 4 0 2**

Unit – I

Fundamentals of Computer Graphics: Introduction, Area and Applications of computer Graphics, Graphical Input-Output Devices, Random scan displays, Raster scan displays. Cathode Ray Tube

GraphicsPrimitives: Algorithms for drawingvarious output primitives - Line, Circle, arcs &sectors, Polygon: PolygonRepresentation, Enteringpolygons, BoundaryFill& Flood Fillalgorithm

Unit – II

TwoDimensional Transformations: Introduction, Types of Transformation : Translation, Rotation, Scaling, Shear, Reflection, Homogenouscoordinate system, Composite transformations.

Unit – III

Viewing&Clippingin 2-D: 2D Windowing, Window to View port transformation, Line ClippingAlgorithms : Cohen Sutherland, LiangBarsky Line clippingalgorithms, Polygonclippingalgorithm : Sutherland Hodgeman,

Unit – IV

ThreeDimensional Transformation : 3-D geometry primitives, transformations**.** Viewing&Clipping: 3-D Viewing, Projections : Parallel and Perspective projections.

Curves&Surfaces: CurvedLines& surfaces, Interpolation & Approximation splines, Parametric&GeometricContinuity conditions, BezierCurves& surfaces, B-splinecurves& surfaces.

Unit – V

Illumination & Visible Surface DetectionMethods: : Classification of visible surface detectionalgorithms, Depth buffer method, Scan-line method, Depth-Sortingmethod, Subdivision Algorithm.

Illumination Models& Surface Rendering: Light sources, Light and Color, Phong Model, Surface Renderingmethods, Basic Ray tracingalgorithm.

Text Books:

1. Donald D Hearn, M. Pauline Baker, “Computer Graphics, C version”, 2nd Edition,Pearson Education (1997).
2. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, “Computer
3. Graphics: Principles & Practice in C”, 2nd Edition, Addison Wesley Longman (1995).

Reference Books:

1. Donald Hearn and M Pauline Baker, “Computer Graphics with OpenGL”, Pearsoneducation, 2004.
2. Zhigang Xiang, Roy A Plastock, “Computer Graphics”, Schaums Outline, TMH(2007).

3. Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis, “OpenGL ProgrammingGuide: The Official Guide to Learning OpenGL” (2013).

CCSN 304 Data Warehousing & Data Mining L T P 4 0 2

UNIT I

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- Architecture of A Typical Data Mining Systems- Classification Of Data Mining Systems.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section..

UNIT IV

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT V

Mining Object, Spatial, Multimedia, Text and Web Data:

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

TEXT BOOKS

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India /Morgan Kauffman, 2001. (UNITs 1 to IV)
2. Alex Berson and Stephen J. Smith, “Data Warehousing, Data mining and OLAP”, Tata McGraw-Hill, 2004. (UNIT V)

REFERENCES

1. Margaret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2004.
2. Sam Anahory and Dennis Murry, “Data Warehousing in the Real World”, Pearson Education, 2003.

MOBILE COMPUTING

CCSN-306 | **Cr. L T P**
4 3 1 0

UNIT I: Introduction To Mobile Computing
Mobile Communications and Computing, Mobile Computing, novel applications, limitations, and architecture.
GSM : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT II: Cellular Concept And System Design Fundamentals
Introduction to wireless communication: Evolution of mobile communications, mobile radio systems-Examples, trends in cellular radio and personal communications. Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and
grade of service, Improving Coverage and capacity in Cellular systems. SDMA, FDMA, TDMA, CDMA.

UNIT III: Mobile Radio Propagation
Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

UNIT IV: Medium Access Control
(Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

UNIT V: Wireless Lan Standards
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications

TEXT BOOKS

1. Jochen Schiller,―Mobile Communications‖,Addison-Wesley. (Chapters 4,7,9,10,11), second edition, 2004.
2. Stojmenovic and Cacute, ―Handbook of Wireless Networks and Mobile Computing‖, Wiley, 2002. (Chapters 11, 15, 17, 26 and 27)

REFERENCE BOOKS

1. Reza Behravanfar, ―Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML‖, ISBN: 0521817331, Cambridge University Press, October 2004.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, ―Fundamentals of Mobile and Pervasive Computing‖, ISBN: 0071412379, McGraw-Hill Professional, 2005

KNOWLEDGE MANAGEMENT& EXPERT SYSTEM

CCSN-308 **Cr. L T P**
4 3 1 0

Unit - I
Introduction to knowledge Management Distinction between data, information & knowledge. Concept of knowledge creation, Intellectual Capital Creation, Human Capital, Customer Capital and Organizational Capital. History of KM, Importance of KM, Information Management to Knowledge Management, K M Cycle, Industrial Economy to Knowledge Economy

Unit-II
Socio-cultural aspects & organizational aspects Tacit & Explicit knowledge & Knowledge Organization. Knowledge Storage and Distribution, KM tools, Data warehouse, Data mining, knowledge management evaluation & Valuation of Knowledge. Mechanics of Knowledge Management–Tools and Technologies, Communities of Practice and Knowledge conversion, The knowledge Management Matrix.

Unit-III
Social Nature of Knowledge, Social Network Analysis, Obstacles to knowledge sharing, Organizational learning & Social Capital. Knowledge Application – Individual level, Group level & Organization Level.

Unit – IV
Km Team–Roles & Responsibilities, Political issues in KM, Ethics in KM, Strategies issues in Knowledge Management, Future of Knowledge Management. Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self-Explaining System, User and expert systems.

Unit-V
KM Strategy, Knowledge audit, GAP Analysis, Road Map, KM Metrics, Balance Score Card.KM Tools – Knowledge Capture & Creation tools, Knowledge sharing & Dissemination Tools, Knowledge Acquisition & Application tools. K-Initiative, K-Strategic issues in knowledge management, K-Commerce

Reference Books:

1. SudhirWarrier, “Knowledge Management”, Vikas publishing House, New Delhi, First edition, 2007.
2. Thotharti Raman, “Knowledge Management”, Excel Books ,New Delhi, First Edition,2004.
3. Stuart Barnes “Knowledge Management Systems: Theory & Practice”, Thomson Learning Press, New Delhi, First Edition, 2002.
4. Ronald Maier, “Knowledge Management System”, Springer, Germany, Second Edition,2002.
5. AmritTiwana, “Knowledge Management Tool Kit”, Pearson Education, New Delhi, First Edition, 2002.

SOFTWARE PROJECT MANAGEMENT

CUCS-342 **Cr. L T P**
4 3 1 0

COURSE OBJECTIVES: The objectives of the course are to:

1. Introduce the primary important concepts of project management related to managing software development projects.
2. Become familiar with the different activities involved in Software Project Management
3. Know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.

COURSE OUTCOMES: Upon completion of this course, the students will be able to
1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics in successful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project
5. Manage the people and control the defects.

Unit – I

Introduction and Software Project Planning, Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Managing Human Resource and Technical Resource, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Costing and pricing of projects, Decision process.

Unit – II

Project Organization and Scheduling

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

Unit - III

Project Monitoring and Control

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV),Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.

Unit – IV

Software Quality Assurance and Testing

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and

Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

Unit – V

Project Management and Project Management Tools

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk issues in Software Development and Implementation, Identification of Risks , Resolving and Avoiding risks, Tools and Methods for Identifying Risk Management. Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

TEXT BOOK(S)

1. Royce and Walker, “Software Project Management”, 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Bob Hughes and Mike Cotterell, “Software Project Management”, 5th Edition, Tata McGrawHill, 2011.

2. Kelker, S. A, “Software Project Management”, 2nd Edition, Prentice Hall, 2003.

3. Gopalaswamy Ramesh, "Managing Global Projects", 1st Reprint Edition, Tata McGraw Hill,2006.

4. Robert K. Wysocki, “Executive's Guide to Project Management”, 2nd Edition, John Wiley &Sons, 2011.

5. Teresa and luckey, Joseph Phillips, “Software project Management for dummies”, 3rdEdition, Wiley publishing Inc., 2006.

MICROWAVE ENGINEERING

CUCS 344

Unit 1: Introduction to Microwave Engineering

This unit introduces the fundamental concepts of microwave engineering, defining microwaves and their applications in modern technology. Students will explore the characteristics of microwave signals, the frequency range of microwaves, and the importance of microwave engineering in telecommunications, radar, and medical devices.

Unit 2: Microwave Transmission Lines

In this unit, students will study the principles of microwave transmission lines, including their types and characteristics. The unit will cover the concept of impedance, standing wave ratio (SWR), and the analysis of transmission line parameters. Students will also learn about microstrip and stripline technology.

Unit 3: Microwave Components and Devices

This unit focuses on the various components and devices used in microwave engineering. Students will learn about passive components such as waveguides, couplers, and filters, as well as active devices like microwave amplifiers, oscillators, and mixers. The principles of operation and design considerations for these components will be discussed.

Unit 4: Microwave Measurement Techniques

Students will explore microwave measurement techniques in this unit. The unit will cover methods for measuring power, voltage standing wave ratio (VSWR), frequency, and attenuation. Students will learn about the use of vector network analyzers and spectrum analyzers in microwave testing.

Unit 5: Microwave Circuit Design

This unit delves into the principles of microwave circuit design. Students will study design methodologies for amplifiers, oscillators, and filters, focusing on techniques for achieving stability and performance at microwave frequencies. The unit will include design software tools for simulation and analysis.

SUPPLY CHAIN MANAGEMENT-PLANNING

CUCS 346

Unit 1: Introduction to Supply Chain Management

This unit introduces the fundamental concepts of supply chain management, emphasizing its importance in modern business operations. Students will explore the key components of a supply chain, the roles of various stakeholders, and the impact of effective supply chain planning on organizational performance.

Unit 2: Demand Forecasting

In this unit, students will study the techniques and methodologies used for demand forecasting. The unit will cover qualitative and quantitative forecasting methods, including time series analysis and causal models. Students will learn how to analyze historical data and market trends to make informed predictions about future demand.

Unit 3: Inventory Management

This unit focuses on inventory management strategies within the supply chain. Students will learn about different types of inventory, inventory control systems, and the Economic Order Quantity (EOQ) model. The unit will also address the challenges of inventory management, including stockouts, overstocking, and the impact of lead times.

Unit 4: Production Planning and Scheduling

Students will explore the principles of production planning and scheduling in this unit. The unit will cover strategies for capacity planning, master production scheduling, and materials requirements planning (MRP). Students will learn about the importance of aligning production schedules with demand forecasts to optimize resource utilization.

Unit 5: Supply Chain Network Design

In this unit, students will learn about the design and optimization of supply chain networks. The unit will cover factors influencing network design, including facility location, transportation modes, and distribution strategies. Students will study models and tools used for network optimization and decision-making.

SOFTWARE TESTING

CUCS 348

Unit 1: Introduction to Software Testing

This unit introduces the fundamental concepts of software testing, defining its purpose and importance in the software development lifecycle. Students will explore the goals of testing, the difference between verification and validation, and the various levels of testing from unit to system testing.

Unit 2: Testing Principles and Strategies

In this unit, students will learn about the core principles of software testing. The unit will cover fundamental testing strategies, including black-box testing, white-box testing, and grey-box testing. Students will understand how to select appropriate testing strategies based on project requirements.

Unit 3: Test Planning and Design

This unit focuses on the process of test planning and design. Students will learn how to create effective test plans, define test objectives, and identify test cases. The unit will also cover techniques for test design, including equivalence partitioning, boundary value analysis, and decision table testing.

Unit 4: Test Execution and Defect Reporting

Students will explore the test execution process in this unit. The unit will cover the execution of test cases, the use of test management tools, and the process of logging and reporting defects. Students will learn how to document test results and communicate effectively with development teams.

Unit 5: Automated Testing

In this unit, students will examine automated testing methods and tools. The unit will cover the benefits and challenges of automation, scripting for automated tests, and the use of popular testing frameworks such as Selenium and JUnit. Students will also learn about continuous integration and its role in automated testing.

CBSN-302 ENVIRONMENTAL STUDIES L T P 2 0 0

Unit 1: Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

Unit 2: Ecosystems

- Ecosystem: Structure & function of ecosystem;
- Forest ecosystem, Aquatic ecosystems, Desert ecosystem
- Energy flow in an ecosystem: food chains, food webs and ecological succession.

Unit 3: Natural Resources: Renewable and Non-renewable Resources

- Land resources; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, water conflicts.
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.

Unit 4: Biodiversity and Conservation

- Biodiversity & Levels of biodiversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots.
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Importance of biodiversity services

Unit 5: Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution human health risks
- Solid waste management: Control measures of urban and industrial waste.

Unit 6: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water Conservation (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation, Environmental communication and public awareness.

Suggested Readings:

1) Environment By Shankar IAS Academy- 2024.
2) Gadgil, M., &Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3) Ecology And Environment P.D. Sharma (Paperback, P.D Sharma) 2022 Ed.
4) Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment

&Security. Stockholm Env. Institute, Oxford Univ. Press.
5) Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6) Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7) McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8) McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9) Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10) Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11) Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12) Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.

Environmental Science

CBSN-302A

Unit I: Concept and scope of Environmental Science; Environmental Science as a multidisciplinary subject; Nature, Man & Society; Introduction to natural resources and its depletion, life support system.

Unit II: Introduction to the Earth Systems: Composition, structure and evolution of lithosphere, hydrosphere and atmosphere; Geological time scale and Past records of life.

Unit III Chemical potential, acid base reaction, solubility of gases in water, the carbonate system, Classification of elements, Chemical speciation, Redox Potential, Concept of pH, Eh and their variations in water.

Unit IV: Fundamental concept of genetics: Concept of nucleic acids, replication, transcription, translation, operon concept; Fundamental concept of microbes: Microbial growth, kinetics, stress response and control; Fundamental concept of statistical hypothesis testing: Mean, mode, median, concept of p- Value, t- test and chi- square test,ANOVA.

References:

1. Botkin, D.B.& Keller, E.A Environmental Science: Earth as a Living Planet, John Weily, NY
2. College Botany, Vol. I, II & III- Gangulee, Kar and Das
3. Cunningham, W.P.& Cunningham, M.A., Environmental Science, Tata McGraw Hill. ND
4. Santra, S.C., Environmental Science
5. Maier, Pepper & Gerba, Environmental Microbiology.

Das, N.G., Statistical Methods (Volume 1 and 2)

NATURAL RESOURCE MANAGEMENT

CBSN-302 B

Unit 1: Introduction to Natural Resource Management

This unit introduces the concept of natural resource management, highlighting its significance in sustainable development. Students will explore different types of natural resources, including renewable and non-renewable resources, and discuss the relationship between natural resources and human well-being.

Unit 2: Ecosystem Services and Biodiversity

In this unit, students will learn about ecosystem services and their role in supporting life on Earth. The unit will cover the importance of biodiversity, the threats it faces, and strategies for conservation. Students will explore how healthy ecosystems contribute to natural resource management.

Unit 3: Water Resource Management

This unit focuses on the management of freshwater resources, including rivers, lakes, and groundwater. Students will examine water conservation techniques, the challenges of water scarcity, and integrated water resource management (IWRM). Topics such as watershed management and water quality assessment will also be covered.

Unit 4: Soil and Land Management

In this unit, students will explore soil conservation and land management practices. The unit will cover soil types, erosion control methods, land use planning, and sustainable agricultural practices. The impact of land degradation and strategies for rehabilitation will also be discussed.

Unit 5: Forest and Wildlife Management

This unit addresses the management of forest resources and wildlife conservation. Students will learn about sustainable forestry practices, the role of forests in carbon sequestration, and the importance of protecting wildlife habitats. Topics such as community-based forest management will also be explored.

POLLUTION CONTROL

CBSN-302C

Unit 1: Introduction to Pollution

This unit provides an overview of pollution, defining its types and sources. Students will learn about the environmental and health impacts of pollution, as well as the importance of pollution control in achieving sustainable development.

Unit 2: Air Pollution

In this unit, students will explore the sources and types of air pollutants, including particulate matter, nitrogen oxides, and volatile organic compounds. The unit will cover the effects of air pollution on human health and the environment, along with strategies for monitoring and controlling air quality.

Unit 3: Water Pollution

This unit focuses on the causes and effects of water pollution, examining pollutants such as heavy metals, nutrients, and pathogens. Students will study the methods for assessing water quality and the technologies used for water treatment and pollution prevention.

Unit 4: Soil Pollution

Students will learn about soil contamination in this unit, including sources such as industrial waste, agricultural chemicals, and landfill leachate. The unit will cover the impacts of soil pollution on ecosystems and human health, as well as remediation techniques and sustainable land management practices.

Unit 5: Noise Pollution

This unit addresses the sources and effects of noise pollution on communities and wildlife. Students will explore noise measurement methods, regulatory standards, and noise control strategies, including urban planning and sound insulation techniques.

COMPUTER GRAPHICS LAB

CCSN-352

1. Implement a program to draw basic shapes like lines, circles, and rectangles using a graphics library (e.g., OpenGL, SDL).
2. Create a program that demonstrates 2D transformations such as translation, rotation, and scaling on shapes.
3. Implement line clipping algorithms (e.g., Cohen-Sutherland or Liang-Barsky) to clip lines within a defined viewport.
4. Write a program that implements polygon filling algorithms (e.g., scan-line filling or flood fill) to color enclosed areas.
5. Develop a program to draw and manipulate Bézier curves using control points.
6. Create a program that renders simple 3D objects (e.g., cubes, spheres) and applies basic lighting effects.
7. Implement a program that demonstrates 3D transformations including translation, rotation, and scaling on 3D models.
8. Write a program to apply textures to 3D objects and demonstrate different texture filtering techniques.
9. Create a simple animation program that moves an object across the screen using keyframe interpolation.
10. Implement a program that simulates shadows in a 3D scene using shadow mapping or ray tracing techniques.

DATA WAREHOUSING & DATA MINING LAB

CCSN-354

1. Create a star or snowflake schema for a given business scenario using a database management system.
2. Develop an Extract, Transform, Load (ETL) process to populate a data warehouse from multiple data sources.
3. Implement Online Analytical Processing (OLAP) operations such as slicing, dicing, and drilling down on a data cube.
4. Write a program to clean a dataset by removing duplicates, handling missing values, and standardizing formats.
5. Implement the Apriori algorithm to discover frequent itemsets and generate association rules from transaction data.
6. Develop a program to apply clustering algorithms (e.g., K-means or DBSCAN) on a dataset and visualize the clusters.
7. Create a program that implements a decision tree algorithm for classification tasks and visualizes the tree structure.
8. Write a program to perform linear regression analysis on a dataset and evaluate the model's performance.
9. Develop a program to visualize data mining results using charts, graphs, or dashboards with tools like Matplotlib or Tableau.
10. Implement a predictive model using machine learning techniques to forecast future trends based on historical data.

MINI PROJECT

CCSN-356

1. Develop a console or web-based application for managing book inventory, user registrations, and transactions.
2. Create an e-commerce website that allows users to browse products, add to cart, and complete purchases.
3. Implement a system to manage patient records, appointments, and billing within a hospital environment.
4. Develop a program that stores and manages student data, including enrollment, grades, and attendance.
5. Create a personal finance application that allows users to track expenses, categorize them, and generate reports.
6. Build an application that fetches weather data from an API and displays current conditions and forecasts.
7. Implement a real-time chat application using sockets that enables users to send messages to each other.
8. Develop a task management application that allows users to create, update, and prioritize tasks.
9. Create a quiz platform that presents questions to users, records their responses, and provides instant feedback.
10. Build a dashboard that aggregates social media feeds and allows users to interact with their accounts from one interface.

EMBEDDED COMPUTING SYSTEMS

CCSN 310

Unit 1: Introduction to Embedded Systems

This unit introduces the fundamental concepts of embedded systems, defining what they are and their significance in modern technology. Students will explore the various types of embedded systems and their applications across different industries, as well as the basic components that make up an embedded system.

Unit 2: Microcontrollers and Microprocessors

In this unit, students will learn about the architecture and functioning of microcontrollers and microprocessors. The unit will cover different types of microcontrollers, their internal components, and how they differ from general-purpose processors. Practical examples of microcontroller applications will be discussed.

Unit 3: Programming Embedded Systems

This unit focuses on programming techniques for embedded systems. Students will learn about programming languages commonly used in embedded development, such as C and C++. The unit will also cover development environments, debugging techniques, and best practices for writing efficient embedded code.

Unit 4: Real-Time Operating Systems (RTOS)

Students will explore the principles of real-time operating systems in this unit. The unit will cover the characteristics of RTOS, task scheduling, inter-process communication, and resource management. Practical examples of RTOS in embedded applications will be provided.

Unit 5: Interfacing and Communication Protocols

This unit examines the various interfacing techniques and communication protocols used in embedded systems. Students will learn about digital and analog interfacing, as well as protocols such as UART, SPI, I2C, and CAN. Hands-on examples will illustrate how to implement these protocols in projects.

SIMULATION AND MODELING

CCSN 312

Unit 1: Introduction to Simulation and Modeling

This unit introduces the fundamental concepts of simulation and modeling, defining their significance in various fields such as engineering, science, and economics. Students will explore the types of models, the modeling process, and the applications of simulation in problem-solving and decision-making.

Unit 2: Types of Models

In this unit, students will learn about different types of models, including physical, mathematical, and computational models. The unit will cover deterministic versus stochastic models, continuous versus discrete models, and the advantages and limitations of each type.

Unit 3: Simulation Methodologies

This unit focuses on various simulation methodologies, including discrete-event simulation, system dynamics, and agent-based modeling. Students will explore the characteristics of each methodology and how to choose the appropriate one for specific applications.

Unit 4: Statistical Concepts for Simulation

Students will study the statistical concepts essential for simulation in this unit. The unit will cover probability distributions, random number generation, and statistical analysis techniques. Emphasis will be placed on the role of statistics in validating and interpreting simulation results.

Unit 5: Simulation Software Tools

In this unit, students will become familiar with various simulation software tools commonly used in industry and research. The unit will provide hands-on experience with tools such as MATLAB, Simulink, AnyLogic, or Arena, focusing on their features and applications.

APPROXIMATION OF ALGORITHMS

CCSN 314

Unit 1: Introduction to Approximation Algorithms

This unit introduces the concepts of approximation algorithms, defining their purpose and significance in solving NP-hard problems. Students will explore the challenges posed by computational complexity and the need for approximate solutions in practical applications.

Unit 2: Complexity Classes and NP-Hard Problems

In this unit, students will learn about complexity classes, particularly focusing on NP, NP-hard, and NP-complete problems. The unit will cover fundamental concepts such as polynomial-time reductions and the implications of these classifications for algorithm design.

Unit 3: Performance Metrics for Approximation Algorithms

This unit focuses on the metrics used to evaluate the performance of approximation algorithms. Students will learn about approximation ratios, worst-case guarantees, and the concept of efficiency in relation to exact solutions. The trade-offs between accuracy and computational efficiency will also be discussed.

Unit 4: Greedy Algorithms

In this unit, students will explore greedy algorithms as a fundamental approach to approximation. The unit will cover classic problems that can be solved using greedy techniques, including the Knapsack problem and Minimum Spanning Tree. Students will analyze the performance of greedy algorithms in these contexts.

Unit 5: Dynamic Programming and Approximation

Students will study how dynamic programming can be leveraged to develop approximation algorithms in this unit. The unit will examine problems like the Subset Sum and Longest Common Subsequence, focusing on how dynamic programming techniques can lead to effective approximations.

ARTIFICIAL INTELLIGENCE

CCSN-401 **Cr L-T-P**
4 3- 1-0

Unit - I

Introduction: Introduction to Artificial Intelligence, History, Importance of AI, and goal. AI programming techniques; Introduction to Intelligent Agents: Agents and environments. Game Playing: Minimax search, Mini-Max algorithm, Search algorithms: Informed search, Uninformed search, Hill Climbing, Depth first search, Best first search, A*, And or graph.

Unit - II

Processing and understanding Natural Languages: Natural Language processing: Steps in NLP, Applications of Natural Languages, Components of NLP, Understanding Natural Languages: Machine Translation (MT), Automated Reasoning, Question Answering, Speech Recognition: Types of Speech Recognition, Applications of Speech Recognition, , Production Rules: parsing techniques: Rules of parsing, Top down parsing, Bottom up parsing, Transformational grammars, Context free grammar, Transition networks, Fillmore's grammars, Shanks Conceptual Dependency.

Unit - III

Knowledge Representation: Graphs, Frames structures and related structures, Semantic Nets and predicate logic, Scripts, Frames, inheritance, Introduction to PROLOG, Knowledge Based systems, Inference engine, Forward deductions and backward deductions, Scientific Analysis, Medical Diagnosis Financial Analysis

Unit - IV

Expert System – Introduction, Basic concepts, Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, how expert systems works, problem areas addressed by expert systems, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit - V

Pattern Recognition Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception, Semantic & Model, Object Identification, visual perception,.

Reference Books :

1. Char Nick, "*Introduction to Artificial Intelligence"*, Addision Wesley, 2007.
2. Stuart Russell and Peter Norvig, ``*Artificial Intelligence: A Modern Approach*.", Prentice Hall, Third Edition, 2010.

3. Elaine Rich, Kevin Knight and ShivashankarB.Nair, "*Artificial Intelligence*", Tata McGraw-Hill, Third edition, 2009.

DISTRIBUTED COMPUTING SYSTEMS

CCSN-403 **Cr. L T P**
4 3 1 0

Unit–I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models. Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's& vectors logical clocks. Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

Unit-II

Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging. Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems

Unit–III

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system. Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

Unit–IV

Inter Process Communication: Introduction, The API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX. Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI.

Unit –V

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

REFERENCES:

1. Singhal&Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna,Gehrke," Database Management Systems", McGraw Hill
3. Vijay K.Garg Elements of Distributed Compuitng , Wiley
4. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education

ADVANCED COMPUTER SYSTEM ARCHITECTURE

CCSN-405 **Cr L-T-P**
4 3- 1-0

Unit - I

Parallel computer model: Evolution of computer architecture, system performance attributes, Multiprocessors and Multicomputer: shared memory multiprocessors and distributed memory multicomputer, Vector supercomputers, Program and network properties: conditions of parallelism: Data and Resource Dependences, Bernstein's Conditions, program partitioning and scheduling, program flow mechanism, System Interconnect Architectures.

Unit – II

Principles of scalable performance: Performance metrics and measures: parallelism profile in programs, harmonic mean performance, efficiency utilization and quality, standard performance measure, Parallel Processing Applications: scalability of parallel algorithms, Speedup performance laws: Amdahl's law for fixed workload, Gustafson's law for scaled problems, Memory bounded speedup model.

Unit – III

Processor and Memory hierarchy: Advanced processor technology: Design Space of Processors,Instruction set Architectures, CISC Scalar Processors, RISC Scalar Processors, superscalar and vector processor: Superscalar Processors, The VLIW Architecture, Vector and Symbolic Processors.Memory hierarchy technology: Hierarchical Memory Technology, Inclusion, Coherence, and Locality, Memory Capacity Planning, virtual memory technology.

Unit – IV

Bus, cache and shared memory: Backplane bus system: bus specification, addressing and timing protocol, arbitration, transaction, and interrupt, cache memory organization: addressing models, direct mapping and associative caches, set-associative and sector cache, shared memory organization: Interleaved memory organization.

Unit – V

Pipelining: Linear pipeline processors: Asynchronous and Synchronous Models, Clocking and Timing Control, Speedup, Efficiency and Throughput. Nonlinearpipeline processors: Reservation and Latency Analysis,Instruction pipeline design.

Reference Books:

1. Kai Hwang, "Advanced Computer Architecture", McGraw-Hill, Revised Edition,2003
2. Hwang and Briggs, "Computer Architecture and Parallel Processing", McGraw Hill, International Edition, 1986.
3. Moreshwar R. Bhujade, "*Parallel Computing*", New Age International(P) Ltd, Publishers, First Edition Reprint, 2004.
4. John L. Hennessy, David A. Patterson, "*Computer Architecture: A Quantitative Approach*", Elsevier Inc., Fifth Edition, 2011
5. Sima, Terence Fountain, PéterKacsuk, "*Advanced Computer Architecture*", Pearson Education, Seventh Impression, 2009.

DIGITAL IMAGE PROCESSING

CCSN-407

UNIT I DIGITAL IMAGE FUNDAMENTALS

Digital Image Representation – Fundamental steps in Image Processing)– Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - colour models.

UNIT II IMAGE ENHANCEMENT

Spatial Domain: Gray level transformations – Histogram processing – Basics of SpatialFiltering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: 2D Fourier Transform – Smoothing and Sharpening frequency domain filters

UNIT III IMAGE RESTORATION AND SEGMENTATION

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering. Segmentation: Edge detection Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.

UNIT IV IMAGE COMPRESSION AND REPRESENTATION

Compression: Fundamentals – Image Compression models – Error Free Compression – Lossy compression– Image Compression standards

UNIT V IMAGE REPRESENTATION AND RECOGNITION

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TEXT BOOKS

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.
2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.

REFERENCES

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.
3. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.

MULTIMEDIA COMPUTING

CCSN-409

Unit 1: Introduction

Global Structure of Multimedia; Multimedia Application; Medium; Multimedia System and Properties; Characteristics of a Multimedia System; Challenges for Multimedia Systems; Components of a Multimedia System

Unit 2: Sound /Audio System

Concepts of Sound System; Music and Speech; Speech Generation; Speech Analysis; Speech Transmission

Unit 3: Images and Graphics

Digital Image Representation; Image and graphics Format; Image Synthesis, analysis and Transmission

Unit 4: Video and Animation

Video Signal Representation; Computer Video Format; Computer-Based animation; Animation Language; Methods of Controlling Animation; Display of Animation; Transmission of Animation

Unit 5: Data Compression

Storage Space; Coding Requirements; Source, Entropy and Hybrid Coding; Lossy Sequential DCT-based Mode; Expanded Lossy DCT-based Mode; JPEG and MPEG

Recommended Books:

1. Multimedia: Computing, Communications and Applications, Ralf Steinmetz and Klara Nahrstedt, Pearson Education Asia
2. Multimedia Communications, Applications, Networks, Protocols and Standards, Fred Halsall, Pearson Education Asia
3. Multimedia Systems, John F. Koegel Buford, Pearson Education Asia

PATTERN RECOGNITION

CCSN-411

UNIT-1

Basics of Probability, Random Processes and Linear Algebra: Probability: independence of events, conditional and joint probability, Bayes' theorem; Random Processes: Stationary and nonstationary processes, Expectation, Autocorrelation, Cross-Correlation, spectra; Linear Algebra: Inner product, outer product, inverses, eigen values, eigen vectors; Bayes Decision Theory

UNIT-2

Bayes Decision Theory: Minimum-error-rate classification, Classifiers, Discriminant functions, Decision surfaces, Normal density and discriminant functions, discrete features

UNIT-3

Parameter Estimation Methods: Maximum-Likelihood estimation: Gaussian case; Maximum a Posteriori estimation; Bayesian estimation: Gaussian case

UNIT-4

Unsupervised learning and clustering: Criterion functions for clustering; Algorithms for clustering: K-Means, Hierarchical and other methods; Cluster validation; Gaussian mixture models; Expectation-Maximization method for parameter estimation; Maximum entropy estimation

UNIT-5

Sequential Pattern Recognition: Hidden Markov Models (HMMs); Discrete HMMs; Continuous HMMs

Text Books:

R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001
S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009
C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006:

C# PROGRAMMING

CCSN-413

Unit 1: Introduction to C#

Explore the fundamentals of C# as a programming language. Understand its origins, features, and its role within the .NET framework. Learn about the development environment, including Visual Studio, and how to set up projects.

Unit 2: Basic Syntax and Data Types

Delve into C# syntax, including variables, constants, and data types. Examine how to declare and initialize variables, use built-in data types, and understand the concept of type conversion and type safety.

Unit 3: Control Structures

Study control flow statements in C#, including conditional statements like if, else, and switch, as well as looping constructs such as for, while, and do-while. Analyze how to control program execution and manage decision-making processes.

Unit 4: Methods and Parameters

Learn about the definition and invocation of methods in C#. Explore method parameters, return types, method overloading, and the concept of optional parameters. Understand the importance of methods in structuring code.

Unit 5: Object-Oriented Programming Concepts

Examine the principles of object-oriented programming (OOP) as applied in C#. Discuss classes, objects, inheritance, polymorphism, encapsulation, and abstraction. Analyze how these concepts contribute to code reusability and organization.

Python Programming

(CCSN-415)

Unit - I

Introduction To Python Programming: Importance of Python, Installing and working with Python in Windows, Using Python as calculator, Comments, How to define main function in Python The concept of data types - Variables, Arithmetic Operators and Expressions String manipulations - Subscript Operator, Indexing, Slicing a string, Converting strings to numbers and vice versa, split function Control flow - if statements, for and while loops, nested loops, range() function, break and continue statements, pass statements, **Functions** Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Unit - II

Data Structures in Python:Lists - Basic list operations, Replacing, inserting, removing an element; Searching and sorting a list, Methods of list objects, List and nested list Comprehensions
Strings, Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Unit- III

Dictionaries, Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozen set.

Unit - IV

File and Exception Handling in Python - Reading keyboard input, opening and closing file, Read, Write and Append mode, Create and Read a text file, Looping over a file object, Writing on a file, with statements, splitting lines in a text file, Renaming and Deleting files. Exception Handling - Exceptions, Why use exceptions, Raising an exception, try and except, try, except and else clause; try and finally **Regular Expressions in Python:** Regular Expressions - re module, Searching a string (match and search), Finding a string (findall), Break string into substrings (split), Replace part of a string (sub)

Unit - V

Object-Oriented Programming, Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.

TEXT BOOK

Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS / WEBLINKS:

Text Books:

• Kenneth A. Lambert, "The Fundamentals of Python: First Programs", Cengage Learning., 2011

Reference Books:

• Laila M. Dawson, "Python Programming for the Absolute Beginner "

• Zed A.Shaw ,"Learn Python the Hard Way "

• Mark Putz, "Learning Python"

• Python Documentation (https://docs.python.org)

Client Server Computing

CUCS-441

Unit 1

Client Server System Concepts – Introduction – Concepts – Client Server Architecture – Two-Tier Architecture – Three-Tier Architecture – N-Tier Architecture – N-Tier vs 2-Tier Architecture – Case Study of N-Tier Architecture – Client Server Models – Gartner Classification – Middleware – Characteristics and types of Server – File Server – Database Server – Communication Server – Object Server – Groupware Server – Transaction Server – Characteristics and types of Clients – Thin Client – Fat Client.

Unit 2

Components of Client Server Computing – Client – Role of the Client – Client Services – Request for Service – Components of Client Server Computing – Server – Role of the Server – Server Functionality in detail – Components of Client Server Applications – Connectivity – OSI – Communications Interface Technology.

Unit 3

Client Server System Architecture – Client Server Building Blocks – Hardware – Client Hardware – Server Hardware – Client Server Building Blocks – Software – Client Server Systems Development Methodology – Project Management – Architecture Definition – Systems Development Environment – Middleware – Types of Middleware – DCE, MOM, TP – Monitors – ODBC – Design Overview of ODBC – ODBC Architecture – Components – Applications – Driver Managers – Database Drivers – ODBC Data Sources – Network Operating System – Base Services – External Services.

Unit 4

SQL Database Servers – Server Architecture – Multithread Architecture – Hybrid Architecture – Stored Procedures – Triggers – Client Server Transaction Processing – Rules of Client Server Transaction Processing – Transaction Models – Chained and Nested Transactions – Transaction Management Standards – Data Warehousing – Warehousing Techniques – Data Mining.

Unit 5

Client Server Protocols – RPC – IPC – Recent Trends – Intranet – Extranet – Internet – CORBA.

Text Books

1. Robert Orfali, Dan Harkey and Jerri Edwards: Essential Client/Server Survival Guide, John Wiley &Sons Inc 1996

Reference

1. Alex Berson: Client Server Architecture
2. Patrick Smith, Steve Guengerich: Client Server Computing, Second Edition, Prentice Hall of India Pvt Ltd.

NEURAL NETWORK

CUCS-443

UNIT -I Introduction to Artificial Neural Networks :
Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between them and the Computer, Comparison Between Artificial and Biological Neural Network Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network (ANN) terminologies.

UNIT - II Fundamental Models of Artificial Neural Networks :
Introduction, McCulloch - Pitts Neuron Model, Learning Rules, Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square(LMS)Rule,Competitive Learning Rule, Out Star Learning, Boltzmann Based Learning, Hebb Net. Perceptron Networks : Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks.

UNIT - III Adaline and Madaline Networks:
Introduction, Adaline, Madaline. Associative Memory Networks: Introduction, Algorithms for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi-directional Associative Memory.

UNIT – IV Feedback Networks:
Introduction, Discrete Hopfiled Net, Continuous Hopfiled Net, Relation between BAM and Hopfiled Nets. Feed Forward Networks: Introduction, Back Propagation Network (BPN), Radial Basis Function Network (RBFN).

UNIT – V Self Organizing Feature Map :
Introduction, Methods Used for Determining the Winner, Kohonen Self Organizing Feature Maps, Learning Vector Quantization (LVQ),Max Net, Maxican Hat, Hamming Net

Adaptive Resonance Theory : Introduction, ART Fundamentals, ART 1, ART2

TEXT BOOKS:

1. Sivanandam, S Sumathi, S N Deepa; “Introduction to Neural Networks”, 2nd ed.,TATA McGraw HILL : 2005.

REFERENCES BOOKS:

1. Simon Haykin, “Neural networks A comprehensive foundations”, 2nd ed., Pearson Education, 2004.
2. B Yegnanarayana, “Artificial neural networks”, 1st ed., Prentice Hall of India P Ltd, 2005.
3. Li Min Fu, “Neural networks in Computer intelligence”, 1st ed., TMH, 2003

Engineering System Modelling and Simulation

CUCS - 445

Unit 1: Introduction to System Modelling

Explore the fundamental concepts of systems and their modeling. Understand the definitions and types of systems, the importance of modeling in engineering, and the relationship between real-world systems and their representations.

Unit 2: Mathematical Foundations

Delve into the mathematical tools used in system modeling, including linear algebra, calculus, and differential equations. Learn how these mathematical concepts are applied to describe dynamic systems and their behavior.

Unit 3: System Dynamics

Study the principles of system dynamics, focusing on feedback loops, time delays, and system stability. Analyze dynamic systems using block diagrams and stock-and-flow diagrams to visualize system interactions.

Unit 4: Control Systems

Examine the fundamentals of control theory as it applies to system modeling. Discuss open-loop and closed-loop systems, stability analysis, and the design of control strategies to achieve desired system behavior.

Unit 5: Discrete Event Simulation

Learn about discrete event simulation techniques and their applications. Understand the components of discrete event systems, including events, state variables, and queues, and explore simulation modeling tools and methodologies.

CUCS 447 COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

L T P 4 0 0

Unit I: Computer Arithmetic and Errors

Errors, Types of error, Floating-point representation, Significant digits and precision, , Associative and Distributive Laws in Floating Point arithmetic, Error propagation and Numerical Instability.

Unit II: Nonlinear Equations and Linear Systems

Bisection method, Secant method, Regula-Falsi method, Newton-Raphson method for nonlinear systems, Gauss-elimination method with and withoutpartial pivoting, LU decomposition and Cholesky decomposition, Iterative methods for linear systems: Jacobi, Gauss-Jordan and Gauss-Seidel methods.

Unit III: Interpolation and Approximation

Lagrange's interpolation formula, Newton's divided difference formula, Piecewise polynomial interpolation: Linear, Quadratic, and Cubic spline, Least Squares Approximation, Orthogonal polynomials: Legendre and Chebyshev

Unit IV: Numerical Differentiation and Integration

Finite difference operators: forward, backward, and central differences, Richardson extrapolation, Numerical integration: Trapezoidal rule, Simpson's rule, and Romberg integration, Gaussian quadrature: Gauss-Legendre and Gauss-Hermite, Monte Carlo methods for integration,

Unit V: Ordinary Differential Equations

Euler's method, Modified Euler's methods: Heun and Mid-point methods, Runge-Kutta methods: 2nd and 4th order,Multi-step methods: Adams-Bashforth and Adams-Moulton, Finite difference methods for ODEs: explicit and implicit schemes.

REFERNCE BOOKS:

1. Gupta, R. S. (2009). Elements of numerical analysis. Macmillan India Ltd.
2. Jain, M. K. (1991). Numerical solution of differential equations. John Wiley & Sons.
3. Snedden, I. N. (2006). Elements of partial differential equations. Courier Dover Publications.
4. Gerald, C.F., & Wheatley, P.O. (2004). Applied numerical analysis. Pearson Education India
5. Jain, M. K., Iyengar, S. R. K., & Jain, R. K. (2019). Numerical methods for scientific and engineering computation (7th ed.). New Age International Pvt. Ltd.
6. Sastry, S. S. (2012). Introduction to numerical analysis (5th ed.). Prentice Hall of India.

CBSN-401 Law for Engineers

Module 1A:

Constitutional Law covering the Preamble; Fundamental Rights, JudicialActivism including Equality and Social Justice; Directive principles of State policy; Fundamental Duties; Emergencyprovisions – kinds, legal requirements and legal effects; (5 Lectures)

Module 1B:

Human Rights and Public International Law covering Human Rights in International Law-Theoretical foundation, UN Mechanism and specialized agencies, (UNICEF, UNESCO, WHO, ILO, FAO, etc.);

International NGOs – Amnesty International, Human Rights Watch, Greenpeace Foundation;

Enforcement of Human Rights in India including Supreme Court, High Courts, Public International Law covering: Customs, Treaties, State territories including Recognition of States and governments, Law of Sea; (5 Lectures)

Module 2A:

General Principles of Contract under Indian Contract Act, 1872 covering General principles of contract – Sec. 1 to 75 of Indian Contract Act and including Government. as contracting party, Kinds of government contracts (4 Lectures)

Module 2B:

Arbitration, Conciliation and ADR system covering Arbitration – meaning, scope and types, Arbitration tribunal – appointment, challenge, Distinction between conciliation, negotiation, mediation and arbitration, (5 Lectures)

Module 3A:

Law relating to Intellectual property covering Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets;Other new forms such as plant varieties and geographical indications; International instruments on IP – Berne convention, TRIPS, Paris convention and international organizations relating IPRs, WIPO, WTO etc; Law relating to Copyright in India, including Historical evolution of Copy Rights Act, 1957, Law relating to Trademarks under Trademark Act, 1999; Law relating to Patents under Patents Act, 1970, Patent protection for computer programs, Duration of patents – law and policy considerations, Infringement and related remedies; (8 Lectures)

Module 3B:

Right to Information Act, 2005 covering, Evolution and concept; Practice and procedures; Official Secret Act, 1923; Indian Evidence Act, 1872; Information Technology – legislation and procedures, Cyber crimes – issues and investigations; (3 Lectures)

Module 4A:

Labour Laws, covering Industrial Disputes Act, 1947; Collective bargaining; Workmen's Compensation Act, 1923; (3 Lectures)

Module 4B:

Corporate Law, covering Meaning of corporation; Law relating to companies, public and private (Companies Act, 1956) general provisions; FEMA 1999, collaboration agreements for technology transfer; Corporate liability, civil and criminal; (4 Lectures)

Module 4C:

Election provisions under Indian Constitution (Art.324–329); Superintendence, directions and control of elections to be vested in Election Commission; Prohibition as to ineligibility for inclusion in electoral roll on ground of religion, race, caste or sex; Power of parliament to make provisions with respect to elections to legislatures; Bar to interference by courts in electoral matters; Offences relating to elections under IPC1860 (Sec.171-A to 171-I). *(4 Lectures)*

Module 5:

Gender Studies,covering Meaning of gender, international perspective andnational perspective; Laws relating women in India; Judicial approach and responses Vishaka V/s State of Rajasthan 1997 SC; Rights enforcement mechanism in India; Landmark judicial decisions of Supreme Court relating to women; *(4 Lectures)*

Text/Reference Books:

1. D.D. Basu (1996), *Shorter Constitution of India*, Prentice Hall of India
2. M.P. Jain (2005), *Indian Constitutional Law*, Wadhwa& Co.
3. M.P. Singh (1998), *Constitutional Law of India,* Eastern Book Co.
4. P.M. Bakshi (2003), *Constitution of India,* Universal Law Publishing Co.
5. H.M. Seervai (1993), *Constitutional Law of India,* Tripathi Publications
6. *Constituent Assembly Debates* (1989), Vol.1 - 12
7. Agarwal H.O.(2008), *International Law and Human Rights,* Central Law Publications
8. S.K. Awasthi& R.P. Kataria(2006), *Law relating to Protection of Human Rights*, Orient Publishing
9. S.K. Kapur(2001), *Human Rights under International Law and Indian Law,* Central Law Agency
10. MeenaRao (2006), *Fundamental concepts in Law of Contract, 3rd Edn.* Professional Offset
11. NeelimaChandiramani (2000),*The Law of Contract: An Outline, 2nd Edn*. Avinash Publications Mum
12. Avtarsingh(2002), *Law of Contract,* Eastern Book Co.
13. Dutt(1994), *Indian Contract Act,* Eastern Law House
14. Anson W.R.(1979), *Law of Contract,* Oxford University Press
15. Kwatra G.K.(2005), *The Arbitration & Conciliation of Law in India with case law on UNCITRAL*
Model Law on Arbitration, Indian Council of Arbitration
16. Avtarsingh (2005), *Law of Arbitration and Conciliation,* Eastern Book Co.
17. Cornish W. R. (2008), *Intellectual Property Rights, Patents, Trademarks, Copyrights & Allied Rights*,Sweet& Maxwell
18. Wadhera (2004), *Intellectual Property Rights,* Universal Law Publishing Co.
19. P. S. Narayan (2000), *Intellectual Property Rights*, Gogia Law Agency
20. T. Ramappa (2010), *Intellectual Property Rights Law in India,* Asia Law House
21. Bare text (2005), *Right to Information Act*
22. O.P. Malhotra, *Law of Industrial Disputes*, N.M. Tripathi Publishers
23. K.M. Desai(1946), *The Industrial Employment (Standing Orders) Act*
24. RustamjiR.F.,*Introduction to the Law of Industrial Disputes*, Asia Publishing House

INTELLECTUAL PROPERTY RIGHTS

CBSN-401 A

Unit-1

INTRODUCTION TO IPR: Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights Introduction to TRIPS and WTO.

Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge.

Unit-2

PATENT RIGHTS AND COPY RIGHTS— Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. – 6 hours

COPY RIGHT—Origin, Definition &Types of Copy Right, Registration procedure, Assignment &licence, Terms of Copy Right, Piracy, Infringement, Remedies, Copy rights with special reference to software.

Unit-3

TRADE MARKS— Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties. Domain Names on cyber space.

Unit-4

DESIGN- Meaning, Definition, Object, Registration of Design, Cancellation of Registration, International convention on design, functions of Design. Semiconductor Integrated circuits and layout design Act-2000.

Unit-5

BASIC TENENTS OF INFORMATION TECHNOLOGY ACT-2000 – IT Act - Introduction

E-Commerce and legal provisions E- Governance and legal provisions Digital signature and Electronic Signature.

Course outcomes:

The students once they complete their academic projects, they get awareness of acquiring the patent

They also learn to have copyright for their innovative works.

They also get the knowledge of plagiarism in their innovations which can be questioned legally.

TEXT BOOKS:

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy

2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra

3. IPR by P. Narayanan

4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni

CBSN-401 B **EMPLOYMENT LAW**

Unit 1: Introduction to Employment Law

In this unit, students will be introduced to the fundamental concepts of Employment Law, including its definition and significance in contemporary society. The historical evolution of labor laws will be explored, starting from the Industrial Revolution and highlighting key legislative milestones such as the Fair Labor Standards Act and the National Labor Relations Act.

Unit 2: Employment Contracts

The focus of this unit will be on employment contracts, which are essential to the employment relationship. Students will explore the different types of employment contracts, including written, oral, and implied agreements. Emphasis will be placed on the key elements that constitute a valid employment contract, such as offer, acceptance, consideration, and essential terms like job duties and compensation.

Unit 3: Employment Rights and Obligations

In this unit, students will delve into the rights of employees and the corresponding obligations of employers. The discussion will include employees' rights to fair wages, benefits, and safe working conditions, as well as protections against retaliation for exercising these rights. The unit will provide an overview of the legal framework governing minimum wage laws and overtime regulations under the Fair Labor Standards Act.

Unit 4: Discrimination in the Workplace

This unit will address the critical issue of discrimination in the workplace. Students will learn about various types of discrimination based on protected classes, including race, gender, age, disability, and religion. The legal framework surrounding discrimination, particularly Title VII of the Civil Rights Act, the Americans with Disabilities Act, and the Age Discrimination in Employment Act, will be thoroughly examined.

Unit 5: Health and Safety Regulations

In this unit, students will study the Occupational Safety and Health Act (OSHA) and its implications for workplace safety. The unit will cover employer responsibilities regarding safety protocols and training, as well as the rights of employees to a safe work environment. Students will learn about the right to refuse unsafe work and the protections available for whistleblowers who report safety violations.

Dispute Resolution And Litigation

CBSN 401-C

UNIT-1. INTRODUCTION:

Evolution of mediation/conciliation as a mode of settlement of disputes, distinction between arbitration, mediation, conciliation, negotiation.
Nature, Scope, Limitations and necessity of alternative models of disputes resolution
Introduction of ADRMs in the Indian Legal System
What is Alternative Dispute Resolution Methods?
Advantages of ADRMs over the Conventional Adjudicatory System
Dispute Resolution at grass root level, LokAdalats, NyayaPanchayath, Legal Aid, Preventive and Strategic legal aid.
International Perspective/International Scenario

UNIT-2. ARBITRATION: [ARBITRATION AND CONCILIATION ACT, 1996]

Origin and Development of Arbitration
Meaning, features, theories and types of arbitration
Arbitration Agreement – Formation, essentials, validity, rule of severability, parties to arbitration agreement.
Arbitral Tribunal – Structure, Powers, Functions and Jurisdiction
"Fast Track" arbitration
Arbitration proceedings

UNIT-3. CONCILIATION: [ARBITRATION AND CONCILIATION ACT, 1996]

Meaning, features and modes and techniques of Conciliation
Appointment and role of conciliators
Conciliation proceedings – submission of statements – communication between conciliator and parties, suggestions for settlement – confidentiality of information – Admissibility of evidence in other proceedings, Termination of conciliation proceedings; costs and deposits.
Contractual provisions about conciliation
Difference between Arbitration and Conciliation

UNIT-4. MEDIATION

What is Mediation?
Characteristics of Mediation, Essential Elements of Mediation,
Advantages/ Benefits of Mediation,
What Kinds of Cases Can Be / Cannot Be Mediated?
Convening for Mediation, Guidelines to the Parties and Mediator, Training of the Mediator.

UNIT-5. NEGOTIATION

Eight Pillars of Negotiation Wisdom, Qualities of a Good Negotiator, Various phases in Negotiation, disadvantages of Negotiation and Setting the Stage for Productive Negotiations Certain Specific Titles in the Negotiation Process, Alternative Paths.
Practical Approach towards Concepts – Mixed Motive Exchange, Winner's Curse, and Interest based Bargaining, Negotiation 'Dance', BATNA, WATNA, MALATNA
Integrative Negotiation & Distributive Negotiation

Suggested Readings:

G. K. Kwatra-The New Arbitration &Conciliation Law of India, ICA,1998.
Gabrielle Kaufmann- Online Dispute Resolution: Challenges for Contemporary Justice, Kohler & Thomas Wolters Kluwer, UK Schultz.
"Law & Practice of Alternative Dispute Resolution in India – A Detailed Analysis", by AnirbanChakraborty; 2016 Edition, LexisNexis, Gurgaon.
Madabhushi Sridhar – Alternative Dispute Resolution, Butterworth Lexis Nexis, (Reprint 2010) Ist edition.
O. P. Malhotra &Indu Malhotra, The Law and Practice of Arbitration and Conciliation, 3 rd ed. (2014).

Environmental law

CBSN-401 D

UNIT-1

Basic Concepts in Environmental Law.An introduction to the legal system; Constitution, Acts, Rules, Regulations; Indian Judiciary, Doctrine of precedents, judicialreview, Writ petitions, PIL–liberalization of the rule of locusstandi, Judicial activism.Introduction to environmental laws in India; Constitutional provisions, Stockholm conference; Bhopal gas tragedy; Rioconference.General principles in Environmental law: Precautionaryprinciple; Polluter pays principle; Sustainable development; Public trust doctrine.Overview of legislations and basic concepts.

UNIT-2

Forest, Wildlife and Biodiversity related lawsEvolution and Jurisprudence of Forest and Wildlife laws; Colonial forest policies; Forest policies after independenceStatutory framework on Forests, Wildlife and Biodiversity: IFA, 1927; WLPA, 1972; FCA, 1980; Biological Diversity Act, 2002; Forest Rights Act, 2006.

Strategies for conservation–Project Tiger, Elephant, Rhino, Modulew leopard

UNIT-3

Air, Water and Marine Laws National Water Policy and some state policies Laws relating to prevention of pollution, access and management of water and institutional mechanism: Water Act, 1974; Water Cess Act, 1977, EPA, 1986. Pollution Control Boards Ground water and law Judicial remedies and procedures Marine laws of India; Coastal zone regulations. Legal framework on Air pollution: Air Act,1981; EPA, 1986

UNIT-4

Environment protection laws and large Projects Legal framework on environment protection-Environment Protection Act as the framework legislation–strength and weaknesses; EIA; National Green tribunal The courts infrastructure projects

UNIT-5

Hazardous Substances and Activities Legal framework: EPA and rules made thereunder; PLI Act, 199 Principles of strict and absolute liability

Suggested readings

1. Birnie P. (2009) et al., International Law and the Environment, 3rd ed., Oxford.
2. Desai A. (2002) Environmental Jurisprudence, 2nd ed., Modern Law House, Allahabad.
3. Gadgil M. and Guha R. (1995) Ecology and Equity, Oxford, New Delhi.
4. Gadgil M. and Guha R. (1997) This Fissured Land, Oxford, New Delhi.
5. Guha R. (2000) Environmentalism: A Global History, Oxford, New Delhi.
6. Kamala S. and Singh U.K. (eds.) (2008) Towards Legal Literacy: An Introduction to Law in India, Oxford, New Delhi.
7. Leelakrishnan P. (2006) Environmental Law Case Book, 2nd ed, Lexis Nexis, India.
8. Sands P. (2002) Principles of International Environmental Law, 2nd ed, Cambridge.

9. Singh C. (1986) Common Property and Common Poverty, Oxford, New Delhi.
10. Upadhyay S. and Upadhyay V. (2002) Hand Book on Environmental Law- Forest Laws, Wildlife Laws and the Environment; Vols. I, II and III, Lexis Nexis- Butterworths-India, New Delhi.

ARTIFICIAL INTELLIGENCE LAB (CCSN-451)

Course Objectives: This course is designed to:

1. Explore the methods of implementing algorithms using artificial intelligence techniques

2. Illustrate search algorithms 3. Demonstrate building of intelligent agents

List of Experiments:

1. Write a program to implement DFS

2. Write a program to implement BFS

3. Write a Program to find the solution for travelling salesman Problem

4. Write a program to implement Simulated Annealing Algorithm

5. Write a program to find the solution for wampus world problem

6. Write a program to implement 8 puzzle problem

7. Write a program to implement Towers of Hanoi problem

8. Write a program to implement A* Algorithm

9. Write a program to implement Hill Climbing Algorithm

10. Build a bot which provides all the information related to you in college.

11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

12. The following is a function that counts the number of times a string occurs in another string:

DISTRIBUTED COMPUTING SYSTEMS LAB (CCSN-453)

EXPERIMENT-1

Implement concurrent echo client-server application

EXPERIMENT-2

Implement concurrent day-time client-server application.

EXPERIMENT-3

Configure following options on server socket and tests them: SO_KEEPALIVE, SO_LINGER, SO_SNDBUF, SO_RCVBUF, TCP_NODELAY

EXPERIMENT-4

Incrementing a counter in shared memory.

EXPERIMENT-5

Create CORBA based server-client application

EXPERIMENT-6

Design XML Schema and XML instance document

EXPERIMENT-7

WSDL based: Implement ArithmeticService that implements add, and subtract operations / Java based: Implement TrigonometricService that implements sin, and cos operations.

EXPERIMENT-8

Configuring reliability and security options

EXPERIMENT-9

Monitor SOAP request and response packets. Analyze parts of it and compare them with the operations (java functions) headers.

EXPERIMENT-10

Design and test BPEL module that composes ArithmeticService and TrigonometricService.

EXPERIMENT-11

Test open source ESB using web service. LABWORK BEYOND CURRICULA

EXPERIMENT-12

Implementing Publish/Subscribe Paradigm using Web Services, ESB and JMS

EXPERIMENT-13

Implementing Stateful grid services using Globus WS-Core-4.0.3

Seminar and Group Discussion

CCSN-481

- **Educational technology**

  A common topic at Decamps, this includes practical examples of using modern tools in the classroom and how to solve problems that technology can cause.

- **Current events**

  Students can track current events and create a news show or podcast about them.

- **Artificial intelligence**

  Seminars can help you learn about responsible AI development and deployment, and build a professional network.

- **Case studies and debates**

  These activities can help students engage with the material and develop communication, critical analysis, and teamwork skills.

- **Classroom management**

  This includes strategies and techniques for creating a learning environment that reduces disruptions.

- **Global issues in education and research**

  This can include topics such as the impact of crisis on education, ethical issues in education, and technology in teaching and learning.

- **Psychology**
  This includes core areas such as biological, cognitive, developmental, social, and individual differences.

INTERNSHIP AND Report Presentation

CCSN-462

Unit 1: Introduction to Internship

This unit introduces the concept of internships, highlighting their importance in bridging the gap between academic learning and practical experience. Students will explore the goals of internships, types of internships available, and the expectations from both interns and organizations.

Unit 2: Preparing for the Internship

In this unit, students will learn how to prepare for their internship experience. Topics will include resume writing, crafting cover letters, interview preparation, and professional networking. The unit will also cover the importance of setting clear learning objectives for the internship.

Unit 3: Workplace Skills and Professionalism

This unit focuses on essential workplace skills and professionalism. Students will learn about effective communication, teamwork, time management, and problem-solving in a professional environment. The unit will emphasize the importance of ethical behavior and adaptability in the workplace.

Unit 4: Intern Responsibilities and Learning Outcomes

Students will explore their responsibilities during the internship in this unit. The unit will cover how to identify key tasks, contribute to team projects, and seek feedback. Students will learn to document their learning experiences and the skills they develop throughout the internship.

Unit 5: Project Development and Implementation

In this unit, students will engage in project development related to their internship roles. They will learn how to define project goals, plan and execute tasks, and assess progress. The unit will also emphasize the importance of collaboration with supervisors and colleagues.

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Bachelor of Engineering, Four Year Programme

Semester System

(w.e.f. session 2013-14)

Approved and adopted in the year 2015 (5th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO 1 Graduates will acquire a strong foundation in engineering principles, enabling them to design, develop, and implement innovative solutions to complex engineering problems across various industries.

PEO 2 Graduates will develop the ability to apply critical thinking, problem-solving skills, and engineering techniques to analyze, evaluate, and resolve real-world challenges in their chosen engineering discipline.

PEO 3 Graduates will gain hands-on experience in using modern engineering tools, software, and technologies, enabling them to effectively design, model, and optimize engineering systems and processes.

PEO 4 Graduates will demonstrate the ability to work collaboratively in multidisciplinary teams, manage engineering projects, and communicate technical information effectively to both technical and non-technical stakeholders.

PEO 5 Graduates will adhere to professional and ethical standards, ensuring their engineering solutions are socially responsible, environmentally sustainable, and aligned with industry best practices and regulatory requirements.

PEO 6 Graduates will develop leadership and management skills, preparing them to take on roles of responsibility in both technical and managerial aspects of engineering projects.

PEO 7 Graduates will engage in lifelong learning and stay current with emerging technologies, ensuring continuous professional growth and adaptability to the evolving engineering landscape.

PEO 8 Graduates will contribute to the betterment of society by creating innovative solutions that address societal challenges, promote sustainable development, and enhance the quality of life globally.

Programme Specific Objectives (PSO's)

PSO 1 To equip students with a solid foundation in core engineering concepts, preparing them to design, analyze, and develop solutions for complex technical challenges in various fields.

PSO 2 To develop proficiency in modern engineering tools, techniques, and technologies, enabling students to effectively design, model, and optimize engineering systems and processes across diverse applications.

PSO 3 To enhance problem-solving skills, encouraging students to apply engineering principles and critical thinking to develop innovative and sustainable solutions for real-world challenges in their discipline.

PSO 4 To foster a strong understanding of professional ethics, environmental sustainability, and social responsibility, ensuring students create engineering solutions that are both technically sound and socially beneficial.

PSO 5 To provide hands-on experience through laboratory work, internships, and projects, helping students gain practical exposure to the application of engineering concepts in real-world scenarios.

PSO 6 To nurture teamwork, leadership, and communication skills, preparing students to effectively collaborate in multidisciplinary teams, manage engineering projects, and communicate complex ideas to diverse audiences.

PSO 7 To ensure students develop a global perspective on engineering practices, preparing them to adapt and innovate in response to technological advancements and the needs of a rapidly changing world.

PSO 8 To foster lifelong learning habits, ensuring students remain adaptable and stay updated with the latest trends, technologies, and advancements in their engineering field throughout their careers.

Programme Outcome Objectives (POO's)

POO 1 Graduates will have a strong foundation in engineering fundamentals, enabling them to apply core principles and methodologies to solve real-world engineering problems across various disciplines.

POO 2 Graduates will possess the ability to analyze complex engineering systems, design innovative solutions, and optimize processes while considering technical, environmental, and societal constraints.

POO 3 Graduates will be proficient in using modern engineering tools, software, and technologies to model, simulate, and solve engineering problems, ensuring efficient and effective system designs.

POO 4 Graduates will develop critical thinking, problem-solving, and decision-making skills to address engineering challenges, ensuring that solutions are feasible, sustainable, and aligned with industry standards.

POO 5 Graduates will demonstrate the ability to work effectively in multidisciplinary teams, manage projects, and communicate technical information clearly to diverse audiences, both within and outside of engineering fields.

POO 6 Graduates will adhere to ethical, professional, and legal standards in engineering practice, ensuring their solutions positively impact society, the environment, and the global engineering community.

POO 7 Graduates will be capable of undertaking independent research, applying engineering principles to explore new solutions, and contributing to advancements in technology and engineering practices.

POO 8 Graduates will have strong leadership and interpersonal skills, enabling them to manage engineering projects, lead teams, and coordinate with stakeholders to achieve desired outcomes.

POO 9 Graduates will demonstrate an understanding of sustainability, applying green engineering principles to minimize the environmental impact of their designs and promote socially responsible engineering practices.

POO 10 Graduates will embrace lifelong learning, continuously updating their knowledge and skills to stay relevant with evolving technologies, methodologies, and trends in engineering, ensuring professional growth throughout their careers.

Scheme of Teaching

TEACHING SCHEME OF B.TECH. 1ST YEAR (1ST SEMESTER)

(COMMON FOR ALL BRANCHES)

CODE	SUBJECT	CREDIT	L	T	P
CMAN-101 CMAN-101 A/ CMAN-101 B/ CMAN-101 C/ CMAN-101 D	MATHEMATICS-I STATISTICAL TECHNIQUES IN COMPUTER SCIENCE I MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE I APPLIED MATHEMATICS I ADVANCED APPLIED MATHEMATICS I	4	3	1	0
CMEN-101 CMEN-101 A/ CMEN-101 B/ CMEN-101 C/ CMEN-101 D	ENGINEERING MECHANICS INTRODUCTION TO ENGINEERING MECHANICS MATERIAL SCIENCE AND ENGINEERING DYNAMICS OF MACHINERY THERMODYNAMICS	4	3	1	0
CECN-101 CECN-101 A/ CECN-101 B/ CECN-101 C/ CECN-101 D	FUNDAMENTALS OF ELECTRONICS INTRODUCTION TO ELECTRONICS OPERATIONAL AMPLIFIERS AND THEIR APPLICATIONS DIGITAL SIGNAL PROCESSING EMBEDDED SYSTEMS	4	3	1	0
CESN-101 CESN-101 A/ CESN-101 B/ CESN-101 C CESN-101 D	ENGINEERING CHEMISTRY AND ENVIRONMENTAL SCIENCE INTRODUCTION TO ENGINEERING CHEMISTRY CHEMICAL THERMODYNAMICS MATERIALS SCIENCE AND ENGINEERING GREEN CHEMISTRY AND SUSTAINABLE PRACTICES	4	3	1	0
CPCN-101 CPCN-101 A/ CPCN-101 B/ CPCN-101 C/ CPCN-101 D	PRESENTATION AND COMMUNICATION SKILLS INTRODUCTION TO COMMUNICATION SKILLS INTERPERSONAL COMMUNICATION TECHNICAL WRITING COMMUNICATION IN DIGITAL MEDIA	3	3	0	0
CMEN-151	ENGINEERING WORKSHOP PRACTICE	1	0	0	2
CMEN-153	ENGINEERING GRAPHICS LAB	1	0	0	2
CPCN-151 CPCN-151 A CPCN-151 B CPCN-151 C CPCN-151 D	ENGLISH LAB INTRODUCTION TO COMMUNICATION SKILLS INTERPERSONAL COMMUNICATION TECHNICAL WRITING COMMUNICATION IN DIGITAL MEDIA	1	0	0	2

TOTAL		22	15	4	6

TEACHING SCHEME OF B.TECH. 1ST YEAR (2ND SEMESTER)

CODE	SUBJECT	CREDIT	L	T	P
CMAN-102	MATHEMATICS-II	4	3	1	0
CMAN-102 A	STATISTICAL TECHNIQUES IN COMPUTER SCIENCE II				
CMAN-102 B	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE II				
CMAN-102 C	APPLIED MATHEMATICS II				
CMAN-102 D	ADVANCED APPLIED MATHEMATICS II				
CPHN -102	ENGINEERING PHYSICS	4	3	1	0
CPHN -102 A	INTRODUCTION TO ENGINEERING PHYSICS				
CPHN -102 B	ELECTROMAGNETISM				
CPHN -102 C	MATERIALS SCIENCE AND ENGINEERING				
CPHN -102 D	WAVES AND VIBRATIONS				
CCSN-102	COMPUTER FUNDAMENTALS AND PROGRAMMING USING-C	4	3	1	0
CEEN-102	BASICS OF ELECTRICAL ENGINEERING	4	3	1	0
CEEN-102 A	INTRODUCTION TO ELECTRICAL ENGINEERING				
CEEN-102 B	ELECTRICAL MACHINES				
CEEN-102 C	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION				
CEEN-102 D	TRANSMISSION AND DISTRIBUTION SYSTEMS				
CPCN-102	TECHNICAL COMMUNICATION	3	3	0	0
CPCN-102 A	INTRODUCTION TO TECHNICAL COMMUNICATION				
CPCN-102 B	TECHNICAL DOCUMENTATION				
CPCN-102 C	TECHNICAL EDITING AND PROOFREADING				
CPCN-102 D	TECHNICAL RESEARCH AND ANALYSIS				
CPHN-152	ENGINEERING PHYSICS LAB	1	0	0	2
CPHN-152A	INTRODUCTION TO ENGINEERING PHYSICS LAB				
CPHN-152B	ELECTROMAGNETISM LAB				
CPHN-152C	MATERIALS SCIENCE AND ENGINEERING LAB				
CPHN-152D	WAVES AND VIBRATIONS LAB				
CCSN-152	COMPUTER PROGRAMMING USING C LAB	1	0	0	2
CEEN-152	BASIC ELECTRICAL ENGINEERING LAB	1	0	0	2
CEEN-152A	INTRODUCTION TO ELECTRICAL ENGINEERING LAB				
CEEN-152B	ELECTRICAL MACHINES LAB				
CEEN-152C	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB				
CEEN-152D	TRANSMISSION AND DISTRIBUTION SYSTEMS LAB				
TOTAL		22	15	4	6

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

Effective from 2015

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

III semester

Code	Course Title	Cr.	L	T	P
CCSN-201	DATA STRUCTURE USING 'C'	4	3	1	0
CCSN-203	DBMS	4	3	1	0
CCSN-205	OPERATING SYSTEMS (UNIX PROGRAMMING)	4	3	1	0
CCSN-207	JAVA PROGRAMMING	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-I	4	3	1	0
CBSN-201 CBSN-201 A CBSN-201 B CBSN-201 C CBSN-201 D	VALUE EDUCATION, HUMAN RIGHTS ANDLEGISLATIVE PROCEDURES PERSONALITY DEVELOPMENT- I BEHAVIOUR SKILL- I LANGUAGE PROFICIENCY AND ENGLISH I PUBLIC SPEAKING AND PRESENTATION I	2	2	0	0
CCSN-251	DATA STRUCTURE USING 'C' LAB	1	0	0	2
CCSN-253	DBMS LAB	1	0	0	2
CCSN-255	JAVA PROGRAMMING LAB	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-I

1. CCSN 209 DISCRETE MATHEMATICS
   - i. CCSN 209 A ENGINEERING MATHEMATICS-I
   - ii. CCSN 209 B BASIC MATHEMATICS
   - iii. CCSN 209 C STATISTICAL TECHNIQUES IN COMPUTER SCIENCE
   - iv. CCSN 209 D ELEMENTARY MATHEMATICS
2. CCSN 211 PERL PROGRAMMING
3. CCSN 213 INTRODUCTION TO SOFT COMPUTING (Neural Networks, Fuzzy Logic and Genetic Algorithm)
4. CCSN 215 MATLAB PROGRAMMING FOR ENGINEERS

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

Effective from 2015

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

IV semester

Code	Course Title	Cr.	L	T	P
CCSN-202	OBJECT ORIENTED PROGRAMMING USING C++	4	3	1	0
CCSN-204	DESIGN AND ANALYSIS OF ALGORITHMS	4	3	1	0
CCSN-206	INTERNET AND WEB TECHNOLOGY	4	3	1	0
CCSN-208	COMPUTER NETWORKS	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-II	4	3	1	0
CBSN-202 CBSN-202 A CBSN-202 B CBSN-202 C CBSN-202 D	TECHNICAL ENGLISH TECHNICAL COMMUNICATION TECHNICAL PRESENTATION SKILLS USER MANUALS AND GUIDES BUSINESS COMMUNICATION	2	2	0	0
CCSN-252	OBJECT ORIENTED PROGRAMMING USING C++ LAB	1	0	0	2
CCSN-254	DESIGN AND ANALYSIS OF ALGORITHMS LAB	1	0	0	2
CCSN-256	INTERNET AND WEB TECHNOLOGY LAB	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-II

1. CCSN 210 FORMAL LANGUAGES & AUTOMATION THEORY
2. CCSN 212 NANO SCIENCES

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

Effective from 2015

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

V semester

Code	Course Title	Cr.	L	T	P
CCSN-301	SOFTWARE ENGINEERING	4	3	1	0
CCSN-303	COMPILER DESIGN	4	3	1	0
CCSN-305	OBJECT ORIENTED ANALYSIS AND DESIGN	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-III	4	3	1	0
CUCS-XXX	OPEN ELECTIVE-I	4	3	1	0
CBSN-301	ENERGY STUDIES	2	2	0	0
CCSN-351	SOFTWARE ENGINEERING LAB	1	0	0	2
CCSN-353	COMPILER DESIGN LAB	1	0	0	2
CCSN-355	OBJECT ORIENTED ANALYSIS AND DESIGN LAB	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-III

1. CCSN 307 CRYPTOGRAPHY & INFORMATION SECURITY
2. CCSN 309 INTERNET WEB PROGRAMMING
3. CCSN 311 GRAPH THEORY

OPEN ELECTIVE-I

1. CUCS 341 COMPUTER VISION
2. CUCS 343 ROBOTICS AND AUTOMATION
3. CUCS 345 WEB SERVICE AND SERVICE ORIENTED ARCHITECTURE
4. CUCS 347 HUMAN COMPUTER INTERFACE

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

Effective from 2015

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

VI Semester

Code	Course Title	Cr.	L	T	P
CCSN-302	COMPUTER GRAPHICS	4	3	1	0
CCSN-304	DATA WAREHOUSING & DATA MINING	4	3	1	0
CCSN-306	MOBILE COMPUTING	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-IV	4	3	1	0
CUCS-XXX	OPEN ELECTIVE-II	4	3	1	0
CBSN-302	ENVIRONMENTAL STUDIES	2	2	0	0
CCSN-352	COMPUTER GRAPHICS LAB	1	0	0	2
CCSN-354	DATA MINING LAB	1	0	0	2
CCSN-356	MINI PROJECT	1	0	0	2
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-IV

1. CCSN 308 KNOWLEDGE MANAGEMENT & EXPERT SYSTEM
   - i. CCSN 308 A Introduction to Knowledge Management
   - ii. CCSN 308 B Information Systems and Technology
   - iii. CCSN 308 C Organizational Learning
   - iv. CCSN 308 D Emerging Trends in Knowledge Management
1. CCSN 310 EMBEDDED COMPUTING SYSTEMS
2. CCSN 312 SIMULATION AND MODELING
3. CCSN 314 APPROXIMATION OF ALGORITHMS

OPEN ELECTIVE-II

1. CUCS 342 SOFTWARE PROJECT MANAGEMENT
   - i. CUCS 342 A Project Planning and Scheduling
   - ii. CUCS 342 B Risk Management in Software Projects
   - iii. CUCS 342 C Project Quality Management
   - iv. CUCS 342 D Stakeholder Management
2. CUCS 344 MICROWAVE ENGINEERING
3. CUCS 346 SUPPLY CHAIN MANAGEMENT-PLANNING
4. CUCS 348 SOFTWARE TESTING

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

Effective from 2015

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

VII Semester

Code	Course Title	Cr.	L	T	P
CCSN-401	DISTRIBUTED COMPUTING SYSTEMS	4	3	1	0
CCSN-403	ADVANCED COMPUTER SYSTEM ARCHITECTURE	4	3	1	0
CCSN-405	ARTIFICIAL INTELLIGENCE	4	3	1	0
CCSN-XXX	PROFESSIONAL ELECTIVE-V	4	3	1	0
CUCS-XXX	OPEN ELECTIVE-V	4	3	1	0
CBSN-401	LAW FOR ENGINEERS	2	2	0	0
CBSN-401 A	INTRODUCTION TO ENGINEERING LAW				
CBSN-401 B	INTELLECTUAL PROPERTY LAW				
CBSN-401 C	ETHICS AND PROFESSIONAL RESPONSIBILITY				
CBSN-401 D	LEGAL ASPECTS OF INTELLECTUAL PROPERTY IN ENGINEERING				
CCSN-451	DISTRIBUTED SYSTEM LAB	1	0	0	2
CCSN-453	ARTIFICIAL INTELLIGENCE LAB	2	0	0	4
	Total	25	17	5	6

PROFESSIONAL ELECTIVE-V

1. CCSN 407 DIGITAL IMAGE PROCESSING
2. CCSN 409 MULTIMEDIA COMPUTING
3. CCSN 411 PATTERN RECOGNITION
4. CCSN 413 VLSI DESIGN & ALGORITHMS

OPEN ELECTIVE-III

1. CUCS 441 CLIENT-SERVER COMPUTING
2. CUCS 443 NEURAL NETWORK
3. CUCS 445 ENGINEERING SYSTEM MODELING AND SIMULATION

SHOBHIT UNIVERSITY, GANGOH (SAHARANPUR)

TEACHING SCHEME

Effective from 2015

B. TECH. (COMPUTER SCIENCE & ENGINEERING)

VIII Semester

Code	Course Title	Cr.	L	T	P
CCSN-482	INTERNSHIP/MAJOR PROJECT	20	0	0	40
CCSN-484	PRESENTATION & VIVA	4	0	0	8

SYLLABUS

Mathematics-I

CMAM-101

Cr. L T P

4 3 1 0

Unit-I

Functions of Several Variables: Limit cotinuity and differentiability of functions of two variables; Euler's theorem, Tangent plane and normal, Change of variables, Chain rule; Jacobians, Taylor's Theorem for two variables; Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers.

Unit-II

Ordinary Differential Equations: Solution of linear differential equations with constant coefficients, Euler-Cauchy equations, Solution of second order differential equations by change of dependent and independent variables; Method of variation of parameters for second order differential equations.

Unit-III

Numerical Solution of ODE: Picard's method, Taylor's series, Euler method & Modified Euler method.

Infinite Series: Convergence of infinite series; Comparison test, Ratio test, Root test, Logarithmic test, De Morgan's test, Cauchy integral test.

Unit-IV

Solution in Series: Solution in series of second order linear differential equations with polynomial coefficients; Bessel and Legendre equations and their series solutions; Properties of Bessel functions and Legendre polynomials.

Unit-V

Matrix Algebra: Rank of a matrix, Inverse of a matrix by elementary operations; Solution of linear simultaneous equations and their numerical solutions by Gauss elimination and Gauss-Seidel methods, Eigenvalues and Eigenvectors of matrices by Cayley-Hamilton theorem; Diagonalisation of matrices; Orthogonal, Hermetian, Skew-Hermetian, Normal and Unitary matrices and their elementary properties; Quadratic forms.

Reference Books :

1. Kreyszig, E. *Advanced Engineering Mathematics*. 8th Edition. Wiley Eastern, 2004.
2. Grewal, B.S. *Engineering Mathematics*. 39th Edition. Khanna Publishers, 2005.

Statistical Techniques in Computer Science

CMAN-101 A

CREDIT	L	T	P
4	3	1	0

Course Objectives:

- To understand the fundamental concepts of statistics and their application in computer science.
- To analyze and interpret data using statistical methods.
- To apply statistical techniques in various areas such as machine learning, data mining, and software engineering.

Unit 1: Introduction to Statistics and Probability Theory

Definition and scope of statistics, Types of data: qualitative vs. quantitative, Levels of measurement: nominal, ordinal, interval, ratio, Descriptive statistics: measures of central tendency (mean, median, mode) and dispersion (variance, standard deviation, range),Basic concepts of probability, Conditional probability and Bayes' theorem ,Random variables and probability distributions, Discrete distributions: binomial, Poisson, Continuous distributions: normal, exponential, uniform

Unit 2: Inferential Statistics

Sampling methods and sampling distributions, Estimation: point estimation and confidence intervals, Hypothesis testing: types of errors, significance levels, p-values ,t-tests, chi-square tests, and ANOVA, Simple linear regression: assumptions, estimation, and interpretation, Multiple linear regression: model building and evaluation ,Correlation coefficients: Pearson's and Spearman's ,Application of regression analysis in predictive modeling

Unit 3: Non-parametric Methods

Introduction to non-parametric tests, Mann-Whitney U test, Wilcoxon signed-rank test, Kruskal-Wallis test, Applications in real-world scenarios, Control charts and process capability, Six Sigma principles, Applications in software testing and performance evaluation

Unit 4: Statistical Techniques in Machine Learning

Role of statistics in machine learning algorithms, Feature selection and dimensionality reduction techniques, Evaluation metrics for classification and regression models, Cross-validation techniques

Unit 5: Data Visualization and Interpretation

Importance of data visualization, Tools for data visualization (e.g., Matplotlib, Seaborn, Tableau)
Techniques for effective presentation of statistical findings

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE I

CMAN-101B
CREDIT L T P

4 3 1 0

1. Set Theory

Basics of sets, subsets, power sets, Operations on sets: union, intersection, difference, Cartesian products, Applications in database theory, Propositional logic: propositions, logical connectives, Truth tables, logical equivalences Predicate logic: predicates, quantifiers Proof techniques: direct proof, contradiction, induction

2. Functions and Relations

Definitions of functions: one-to-one, onto, bijections, Composition and inverse of functions, Relations: properties, equivalence relations, partial orders, Applications of relations in computer science

4. Graphs and Trees

Basic definitions: vertices, edges, degrees, Types of graphs: directed, undirected, weighted, Graph representations: adjacency matrix, adjacency list, Trees: binary trees, traversal algorithms (pre-order, in-order, post-order), Divisibility, prime numbers, and GCD, Modular arithmetic, Applications in cryptography.

5. Combinatorics

Basic counting principles: permutations and combinations, The pigeonhole principle, Binomial coefficients and the binomial theorem, Applications in algorithm analysis, Basic concepts: sample space, events, probability axioms, Random variables and expected value, Discrete and continuous probability distributions

Suggested Textbooks:

- "Discrete Mathematics and Its Applications" by Kenneth H. Rosen
- "Discrete Mathematics" by Richard Johnsonbaugh
- "Mathematics for Computer Science" by Eric Lehman, F. Thomson Leighton, and Albert R. Meyer (available online)

APPLIED MATHEMATICS I

CMAN-101C
CREDIT L T P

4 3 1 0

Unit 1: Calculus and Differential Equations
This unit focuses on the fundamentals of differential calculus, integration techniques, and first-order differential equations. The topics include limits, continuity, differentiability, techniques of integration, and solving linear differential equations. Applications to real-world problems in physics and engineering are explored.

Unit 2: Linear Algebra and Matrix Theory
This unit covers the basics of matrix operations, systems of linear equations, and vector spaces. Topics include matrix inversion, determinants, eigenvalues, eigenvectors, and diagonalization. The focus is on the application of linear algebra to solving systems of linear equations and analyzing transformations.

Unit 3: Vector Calculus and Applications
In this unit, the primary concepts of vector fields, gradient, divergence, and curl are studied. Theorems like Green's Theorem, Stokes' Theorem, and Gauss's Divergence Theorem are discussed, with applications to fluid dynamics, electromagnetism, and other fields requiring spatial analysis.

Unit 4: Probability and Statistics
This unit introduces basic concepts in probability theory, including conditional probability, random variables, and probability distributions. Key statistical methods, such as hypothesis testing, estimation, and regression analysis, are also covered, along with their applications in data analysis and decision-making processes.

Unit 5: Fourier Analysis and Partial Differential Equations
The final unit explores Fourier series and Fourier transforms, including their applications to solving partial differential equations. The focus is on classical problems in heat conduction, wave propagation, and diffusion. Methods for solving linear partial differential equations and their real-world applications are also discussed.

ADVANCED APPLIED MATHEMATICS I

CMAN-101 D

Unit 1: Advanced Calculus and Multivariable Analysis

This unit explores advanced topics in multivariable calculus, including partial derivatives, multiple integrals, and vector-valued functions. The theory behind gradients, directional derivatives, and the application of Green's, Stokes', and Gauss's Theorems in higher dimensions is emphasized. It also delves into the concept of higher-order derivatives and the method of Lagrange multipliers.

Unit 2: Ordinary and Partial Differential Equations

Focusing on advanced techniques for solving both ordinary and partial differential equations, this unit includes methods like separation of variables, integral transforms, and the use of Green's function. The theory behind second-order linear differential equations, boundary value problems, and the classification of partial differential equations is also covered.

Unit 3: Complex Analysis and its Applications

This unit examines complex variable theory, focusing on analytic functions, contour integration, residue calculus, and conformal mappings. Applications to fluid dynamics, electrostatics, and potential theory are explored. The unit also includes advanced topics such as Riemann surfaces and complex mappings.

Unit 4: Functional Analysis and Operator Theory

This unit introduces the concepts of normed vector spaces, Banach and Hilbert spaces, and continuous linear operators. The theory of spectral decomposition, compact operators, and Fourier series in function spaces is covered, as well as the application of these concepts in solving integral and differential equations.

Unit 5: Advanced Probability, Stochastic Processes, and Statistical Methods

The final unit delves into advanced probability theory, including stochastic processes, Markov chains, Brownian motion, and applications to queuing theory and reliability analysis. The unit also includes multivariate statistical methods, estimation theory, and large-sample theory, with applications in statistical inference and machine learning.

CMEN- 101 Engineering Mechanics

Cr.	L	T	P
4	3	1	0

UNIT-I

Two Dimensional Force Systems: Basic concepts, Laws of motion, Principle of Transmissibility of forces, Resultant of a force system, Simplest Resultant of Two dimensional concurrent and Non-concurrent Force systems, Lami's Theorem, Distributed force system, Free body diagrams, Types of supports- Support reactions for beams with different types of loading-Concentrated.

UNIT-II

Beam: Introduction, Shear force and Bending Moment, Shear force and Bending Moment Diagrams for Statically Determinate Beams

Trusses: Introduction, Method f Joints and Method of Sections.

UNIT-III

Kinematics of Rigid Body: Introduction, Plane Rectilinear Motion of Rigid Body, Plane Curvilinear Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity. Translation and Rotational Motion, Relative Velocity.

Friction: Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction,

UNIT-IV

Centroid and Moment of Inertia: Centroid of plane, curve, area and composite bodies,

Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Mass Moment of Inertia

Vibration: Definitions, concerts. Simple harmonic motion. Free vibrations. Simple, compound and torsional pendulum - Numerical problems

UNIT-V

Surveying: Introduction to Surveying

Reference Books :

1. "Engineering Mechanics: Statics" , J.L Meriam , Wiley
2. "Engineering Mechanics", V. Jayakumar and M. Kumar, PHI 10. "Engineering Mechanics", D. P. Sharma, PHI 11.
3. "Engineering Mechanics", M. V. Sheshagiri Rao, and D. Rama Durgaiah, University Press.
4. "Engineering Mechanics" , K L Kumar and V. Kumar, McGraw Hill
5. "Engineering Mechanics" , Bhattacharya , Oxford Press
6. "Engineering Mechanics " , Dr Sadhu Singh , Umesh Publications
7. "Engineering Mechanics " , Bhavikatti , New Age

Introduction to Engineering Mechanics

CMEN-101 A

Cr.	L	T	P
4	3	1	0

Unit 1: Fundamentals of Engineering Mechanics

This unit introduces the basic concepts of engineering mechanics, including the study of forces, moments, and equilibrium. It covers the vector representation of forces, the principle of static equilibrium, and the concepts of force systems. The unit also discusses the role of engineering mechanics in understanding the behavior of structures and mechanical systems.

Unit 2: Force Systems and Equilibrium

In this unit, the emphasis is on analyzing different types of force systems, including concurrent, parallel, and general force systems. The unit focuses on the conditions of equilibrium, both in two and three dimensions, and the application of these principles to solve static problems in engineering.

Unit 3: Properties of Areas and Centroid

This unit deals with the determination of the centroid and the moment of inertia of various geometric shapes. It covers the calculation of the first and second moments of area and their significance in structural analysis. Applications to the design of beams and other structural elements are also included.

Unit 4: Friction and Dynamics of Particles

Friction is introduced as a force that opposes motion, and the unit covers the principles of static and kinetic friction, as well as their applications in machines and structures. The unit also includes the study of particle dynamics, including the motion of particles under the influence of forces and the application of Newton's laws in dynamic analysis.

Unit 5: Kinematics and Kinetics of Rigid Bodies

This unit explores the motion of rigid bodies, including the concepts of displacement, velocity, and acceleration. The unit covers the kinematics of rigid body motion, both in planar and three-dimensional spaces. The kinetics section addresses the forces and moments responsible for the motion of rigid bodies, and the application of Newton’s laws of motion and work-energy principles.

Suggested Books:

1. **Engineering Mechanics: Dynamics** by J.L. Meriam and L.G. Kraige
2. **Engineering Mechanics: Statics and Dynamics** by R.C. Hibbeler

Reference Books:

1. **Vector Mechanics for Engineers: Statics and Dynamics** by Ferdinand P. Beer and E. Russell Johnston
2. **Engineering Mechanics** by S. Timoshenko and D.H. Young

CMEN-101 B

Material Science and Engineering

Cr.	L	T	P
4	3	1	0

Unit 1: Introduction to Materials Science and Engineering

This unit introduces the fundamental concepts of materials science, including the classification of materials, their properties, and their relationship with structure. The unit covers atomic structure, bonding in solids, and the role of crystallography in understanding material behavior. It provides an overview of the basic types of materials used in engineering, such as metals, ceramics, polymers, and composites.

Unit 2: Atomic and Crystal Structure of Materials

Focusing on the atomic and microscopic level, this unit explores the different types of crystal structures, the concept of unit cells, and crystallographic planes. The unit also delves into the principles of crystal defects, dislocations, and their impact on the mechanical properties of materials. The understanding of the relationship between crystal structure and material properties is emphasized.

Unit 3: Mechanical Properties of Materials

This unit deals with the mechanical behavior of materials under various loading conditions. Topics include stress, strain, and the different types of mechanical properties, such as tensile strength, hardness, ductility, and toughness. The unit also covers the behavior of materials under cyclic loading, fatigue, and fracture mechanics, as well as the principles behind material selection for different engineering applications.

Unit 4: Phase Diagrams and Heat Treatment of Materials

The unit provides a comprehensive study of phase diagrams, including binary phase diagrams and their application to materials design and processing. Topics include phase transformations, eutectic systems, and the relationship between microstructure and properties. The heat treatment processes, such as annealing, quenching, and tempering, are discussed in detail, focusing on their effect on the mechanical properties and microstructure of metals and alloys.

Unit 5: Materials Processing and Failure Analysis

This unit covers the various methods of material processing, such as casting, forging, welding, and additive manufacturing, and their impact on material properties. The unit also addresses the principles of

materials failure, including the causes of failure due to mechanical, thermal, and environmental factors. Failure analysis techniques, including fracture mechanics and corrosion analysis, are explored to understand how materials fail in real-world applications**.**

Suggested Books:

1. **Materials Science and Engineering: An Introduction** by William D. Callister Jr.
2. **Materials Science and Engineering** by V. Raghavan

Reference Books:

1. **Fundamentals of Materials Science and Engineering** by William D. Callister Jr. and David G. Rethwisch
2. **Mechanical Behavior of Materials** by Thomas H. Courtney

Dynamics of Machinery

CMEN-101 C

Unit 1: Introduction to Dynamics
4 3 1 0

- Definition and Importance of Dynamics in Machinery
- Types of Mechanisms: Kinematic Pairs, Chains, and Mechanisms
- Kinematic Analysis: Velocity and Acceleration Analysis

Unit 2: Kinematics of Machinery

- Types of Motion: Linear and Rotational Motion
- Instantaneous Center of Rotation
- Analysis of Simple Mechanisms: Four-Bar Chain, Slider Crank Mechanism

Unit 3: Dynamics of Machinery

- Forces in Mechanisms: Analysis of Forces and Couples
- Dynamic Equilibrium: Inertia Forces and their Applications
- Cam and Follower Mechanisms: Types and Applications

Unit 4: Balancing of Machinery

- Need for Balancing: Static and Dynamic Balancing
- Balancing of Rotating Masses: Single and Multiple Rotating Bodies
- Application of Balancing to Crank and Slotted Link Mechanisms

Unit 5: Vibration Analysis

- Types of Vibrations: Free and Forced Vibrations
- Natural Frequency and Damping
- Vibration Isolation and Control
- Applications of Vibration Analysis in Machinery

Suggested Books:

1. **Theory of Machines and Mechanisms** by G. K. Gupta
2. **Mechanism and Machine Theory** by A. G. Ambekar

Reference Books:

1. **Machine Design: An Integrated Approach** by Robert L. Norton
2. **Dynamics of Machinery** by J. B. Rao and R. V. Dukkipati

THERMODYNAMICS

CMEN-101 D

Unit 1: Introduction to Thermodynamics

This unit introduces the basic concepts of thermodynamics, including the laws of thermodynamics, energy, and the system-environment relationship. Topics include the classification of systems, properties, and state functions. The unit also covers the concepts of work, heat, and the energy balance in various thermodynamic processes.

Unit 2: First Law of Thermodynamics and Applications

Focusing on the first law of thermodynamics, this unit explores the principle of energy conservation, including internal energy, heat, and work. Applications to engineering systems, such as the analysis of closed and open systems, are discussed. The unit also covers specific heat, thermodynamic processes, and cyclic processes in engines and refrigerators.

Unit 3: Second Law of Thermodynamics and Entropy

This unit delves into the second law of thermodynamics, focusing on entropy and its significance in understanding irreversible processes. The unit includes the concept of entropy change, the Clausius and Kelvin-Planck statements, and the Carnot cycle. The laws are applied to real-world systems, including heat engines and refrigeration cycles, and the limitations imposed by the second law.

Unit 4: Thermodynamic Properties of Pure Substances

This unit focuses on the thermodynamic behavior of pure substances, including phase changes and the use of property tables and Mollier diagrams. Topics include the P-V, T-S, and H-S diagrams and the application of these properties to real-world thermodynamic cycles such as Rankine and Brayton cycles. The unit emphasizes the calculation of work and heat in different phases of the substance.

Unit 5: Power Cycles and Refrigeration Cycles

The final unit explores the working principles of various thermodynamic cycles, including the Rankine, Otto, Diesel, and Brayton cycles. The unit also covers refrigeration cycles, including the vapor-compression cycle and absorption refrigeration systems. Efficiency and performance analysis of these cycles are discussed, along with methods for improving cycle efficiency and minimizing losses in practical systems.

FUNDAMENTALS OF ELECTRONICS

	Cr.	L	T	P
CECN-101	4	3	1	0

Unit1:

Electronics and Semiconductor: Electronics: Application, History, Components, Voltage Source and Current Source, Classification of Solids, Forbidden Energy Gap, Insulator, Conductor, and Semiconductor: Types.

Unit 2:

Diodes and Applications covering, Semiconductor Diode – Diode, Operation, Forward Bias, Reverse Bias, Drift and Diffusion, Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications;

Unit 3:

Transistor Characteristics covering, Bipolar Junction Transistor (BJT) –
Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration

Unit 4:

Operational Amplifiers and Applications covering, Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications – Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator;

Unit 5:

Basic Digital Electronics covering, Binary Number Systems and Codes; Basic Logic Gates and Truth Tables, Boolean Algebra, De Morgan's Theorems, Logic Circuits.

Text/Reference Books:

1. R. L. Boylestad& Louis Nashlesky (2007), *Electronic Devices &Circuit Theory*, Pearson Education

2. SantiramKal (2002), *Basic Electronics- Devices, Circuits and IT Fundamentals*, Prentice Hall, India

3. David A. Bell (2008), *Electronic Devices and Circuits*, Oxford University Press

4. Thomas L. Floyd and R. P. Jain (2009), *Digital Fundamentals*, Pearson Education

5. R. S. Sedha (2010), *A Text Book of Electronic Devices and Circuits*, S.Chand& Co.

6. R. T. Paynter (2009), *Introductory Electronic Devices & Circuits – Conventional Flow*

Version, Pearson Education

Introduction to Electronics

CECN-101 A

Unit 1: Fundamentals of Electronics

This unit introduces the basic concepts of electricity, including voltage, current, resistance, and Ohm's Law. Students will learn about the fundamental circuit components such as resistors, capacitors, inductors, diodes, and transistors, along with an overview of integrated circuits.

Unit 2: Circuit Analysis Techniques

In this unit, students will explore Ohm's and Kirchhoff's Laws, focusing on the analysis of series and parallel circuits. They will study Thevenin's and Norton's theorems for circuit simplification, as well as techniques for analyzing both AC and DC circuits, including the use of phasors and impedance.

Unit 3: Semiconductor Devices

This unit covers the essential semiconductor devices, starting with diodes and their applications, such as PN junctions, Zener diodes, and rectifiers. Students will then delve into transistors, including bipolar junction transistors (BJTs) and field-effect transistors (FETs), learning about their configurations and characteristics. The unit will conclude with an introduction to operational amplifiers and their basic principles and applications.

Unit 4: Digital Electronics

In this unit, students will examine number systems and codes, including binary, octal, decimal, and hexadecimal systems, as well as ASCII and BCD codes. The unit will cover basic logic gates such as AND, OR, NOT, NAND, NOR, and XOR, along with Boolean algebra for simplifying logic expressions. Students will learn to design combinational and sequential logic circuits, including adders, multiplexers, and flip-flops.

Unit 5: Introduction to Circuit Design and Testing

The final unit introduces basic circuit design principles, emphasizing hands-on experience with breadboarding and circuit simulation tools. Students will learn testing and troubleshooting techniques using multimeters, oscilloscopes, and signal generators. The unit will also cover safety practices and best methods for handling electronic components and tools.

Course Objectives

Students will gain a foundational understanding of electronics, develop skills in circuit analysis and design, and acquire practical experience in testing and troubleshooting electronic circuits.

Recommended Textbooks

Key texts for this course include "Electronics Fundamentals: A Systems Approach" by Neil Storey, "Digital Design" by M. Morris Mano, and "Microelectronic Circuits" by Adel S. Sedra and Kenneth C. Smith.

OPERATIONAL AMPLIFIERS AND THEIR APPLICATIONS

CECN-101 B

Unit 1: Introduction to Operational Amplifiers This unit covers the basic concepts of operational amplifiers, including their structure, ideal and practical characteristics, and the significance of feedback in amplifier circuits. Students will learn about the different types of operational amplifiers and their key parameters.

Unit 2: Basic Operational Amplifier Configurations In this unit, students will explore various configurations of operational amplifiers, such as inverting and non-inverting amplifiers. The analysis of these configurations, including gain calculations and frequency response, will be emphasized.

Unit 3: Advanced Applications of Operational Amplifiers This unit delves into advanced applications, including integrators, differentiators, and active filters. Students will learn how to design and analyze these circuits for specific applications in signal processing.

Unit 4: Practical Considerations in Op-Amp Circuits Focusing on real-world applications, this unit addresses practical issues such as power supply considerations, input/output impedance, and noise. Students will also learn about the limitations of operational amplifiers and how to mitigate these effects in circuit design.

Unit 5: Specialized Op-Amp Configurations Students will study specialized configurations such as comparators, oscillators, and voltage followers. This unit emphasizes the unique characteristics and applications of these configurations in various electronic systems.

DIGITAL SIGNAL PROCESSING

CECN-101 C

Unit 1: Introduction to Digital Signal Processing This unit provides an overview of digital signal processing, including the fundamental concepts of signals and systems. Students will explore the differences between analog and digital signals, the sampling theorem, and quantization processes.

Unit 2: Discrete-Time Signals and Systems In this unit, students will learn about discrete-time signals, their representation, and the mathematical tools used to analyze them. The focus will be on linear time-invariant (LTI) systems, convolution, and the properties of discrete-time systems.

Unit 3: Fourier Analysis of Discrete-Time Signals This unit covers the Fourier analysis of discrete-time signals, including the Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Students will study the Fast Fourier Transform (FFT) algorithm and its applications in signal analysis.

Unit 4: Z-Transform and Its Applications Students will explore the Z-transform as a tool for analyzing discrete-time systems. This unit includes the properties of the Z-transform, inverse Z-transform, and applications in system stability and frequency response analysis.

Unit 5: Digital Filter Design This unit focuses on the design and implementation of digital filters, including both Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters. Students will learn about filter specifications, design techniques, and performance evaluation.

EMBEDDED SYSTEMS

CECN-101 D

Unit 1: Introduction to Embedded Systems
Overview of embedded systems, characteristics, and applications. Comparison with general-purpose computing systems. Components of embedded systems including hardware and software.

Unit 2: Microcontrollers and Microprocessors
Architecture and organization of microcontrollers and microprocessors. Instruction sets and addressing modes. Programming concepts and development tools for embedded applications.

Unit 3: Embedded System Design
Design methodologies for embedded systems. System design life cycle. Hardware/software co-design and integration. Real-time operating systems (RTOS) and their role in embedded systems.

Unit 4: Interfacing and Communication
Techniques for interfacing various peripherals (sensors, actuators, displays). Communication protocols (I2C, SPI, UART, CAN) and their applications in embedded systems.

Unit 5: Embedded Software Development
Software development life cycle in embedded systems. Programming languages commonly used (C, C++, assembly). Tools for debugging and testing embedded software.

CESN-101 Engineering Chemistry and Environmental Studies

Cr.	L	T	P
4	3	1	0

Unit 1: Fuels:
Introduction, Classification of fuels, Calorific value, Bomb Calorimeter, Theoretical Calculation of Calorific value of a fuel, Coal, Classification of coal by rank, Analysis of coal, Biomass, Biogas, Biodiesel: Definition, Types.

Unit 2 Polymers:
Introduction, Nomenclature of polymers, Functionality, Types of Polymerization, Synthetic Fibres, Ion-exchange resins, Rubbers (Elastomers), Vulcanization of rubber, Synthetic rubbers or elastomers, Application of rubber.

Unit 3 Water Technology:
Introduction, Hardness of water: Temporary and Permanent hardness; Equivalents of Calcium Carbonate, units of hardness, Disadvantage of hard water, Scale and sludge formation in boilers and their disadvantage, Boiler corrosion, Caustic embrittlement, Priming and foaming, water softening methods: Permutitprocess, De-ionization process.

Unit 4:Environmental pollution and its impact:
Environment and Atmosphere; Kinds of pollution; Air pollution: Greenhouse effect, Acid rains and global warming; Noise pollution; Water and Solid waste pollution: Industrial effluents and wastes, Ground water pollution, Marine pollution, Lead pollution, Fluoride pollution; Radiation and chemical toxicology.

Unit 5 Pollution Cleanup:
Prevention and control of air pollution: Source correction, Collection of pollutants, Cooling, Treatment; Stabilisation of the ecosystem, Reutilisation and Recycling of waste, Removal of Pollutants; Solid waste management: Collection, Disposal, etc.; Bioremediation: Introduction, Phytoremediation.

Reference Books:

- Jain, M. and Jain, P.C., Engineering Chemistry, 17th edition, DhanpatRai Publishing Company (P) Ltd., New Delhi.
- Kuriacose and Rajaram, Chemistry in Engineering and Technology, TMH, Delhi.
- Sharma, P.D., Ecology and Environment, 11th edition, Rastogi Publications, Meerut.
- Gupta, K.M. Environmental Studies, Umesh Publications, Delhi.
- Gopalan, R.R., Environmental Studies: from crisis to cure, Oxford University Press, New Delhi.

Introduction to Engineering Chemistry

CESN-101 A

Unit 1: Basic Concepts of Chemistry
This unit covers fundamental concepts, including atomic structure, periodic properties, and chemical bonding. It introduces molecular geometry and the principles of stoichiometry, along with discussions on states of matter and thermodynamics relevant to chemical processes.

Unit 2: Chemical Thermodynamics
Focuses on the laws of thermodynamics, concepts of enthalpy, entropy, and Gibbs free energy. The unit explores the principles of chemical equilibria, including equilibrium constants and Le Chatelier's principle, as well as applications in engineering processes.

Unit 3: Kinetics and Reaction Mechanisms
This unit examines the rates of chemical reactions, factors affecting reaction rates, and the Arrhenius equation. It also delves into reaction mechanisms, including elementary reactions and complex reaction pathways, with applications to industrial processes.

Unit 4: Electrochemistry
Covers the principles of electrochemical cells, standard electrode potentials, and Nernst equation. The unit explores applications of electrochemistry in batteries, fuel cells, and corrosion, along with methods of corrosion prevention and control.

Unit 5: Materials Chemistry
Focuses on the chemistry of materials, including metals, polymers, ceramics, and composites. It discusses properties, synthesis, and applications of various materials, as well as the principles of material selection in engineering applications.

CHEMICAL THERMODYNAMICS

CESN-101 B

Unit 1: Introduction to Thermodynamics Overview of thermodynamic principles; definitions of systems, surroundings, and the universe; types of systems (open, closed, isolated); thermodynamic processes and state functions.

Unit 2: Laws of Thermodynamics First law of thermodynamics: internal energy, work, and heat; applications of the first law; enthalpy and its significance. Second law of thermodynamics: concepts of spontaneity and equilibrium; Carnot cycle; efficiency of heat engines; introduction to entropy.

Unit 3: Thermodynamic Properties and State Functions Extensive and intensive properties; thermodynamic potentials: Gibbs free energy and Helmholtz free energy; relationships between different thermodynamic properties; Maxwell's relations.

Unit 4: Phase Equilibria and Phase Diagrams Concepts of phase, phase transitions, and phase equilibrium; Clausius-Clapeyron equation; phase diagrams for pure substances and binary mixtures; applications of phase rule.

Unit 5: Chemical Reactions and Thermodynamics Gibbs free energy change and spontaneity of reactions; standard state and standard enthalpy of formation; Hess's law; calculation of equilibrium constants and their relation to Gibbs free energy.

MATERIALS SCIENCE AND ENGINEERING

CESN-101 C

Unit 1: Introduction to Materials Science
Overview of materials science and engineering. Classification of materials: metals, ceramics, polymers, and composites. The importance of materials in engineering applications. Structure-property relationships and the role of atomic structure in material behavior.

Unit 2: Atomic Structure and Bonding
Atomic models and crystal structures. Types of bonding: ionic, covalent, metallic, and van der Waals. Crystallography basics, including unit cells, lattice parameters, and Miller indices. Defects in solids and their effects on material properties.

Unit 3: Thermodynamics of Materials
Fundamental thermodynamic principles as applied to materials. Phase diagrams and phase transformations. Gibbs free energy and its significance in phase stability. Concepts of equilibrium and non-equilibrium phase transformations.

Unit 4: Mechanical Properties of Materials
Stress-strain relationships and mechanical testing methods. Elastic and plastic deformation. Hardness, toughness, ductility, and fatigue. Overview of failure mechanisms and the role of microstructure in mechanical properties.

Unit 5: Materials Processing and Fabrication
Overview of various processing techniques for different materials. Techniques such as casting, forging, welding, and additive manufacturing. The influence of processing on microstructure and properties. Quality control and material selection in fabrication.

GREEN CHEMISTRY AND SUSTAINABLE PRACTICES

CESN-101 D

Unit 1: Introduction to Green Chemistry

This unit provides an introduction to the principles and concepts of green chemistry. It covers the basic philosophy of green chemistry, emphasizing the design of chemical processes that are environmentally benign, economically viable, and energy-efficient. The unit also explores the role of green chemistry in sustainability and its application to the reduction of hazardous substances in chemical products and processes.

Unit 2: Green Chemistry Principles and Practices

In this unit, the core principles of green chemistry are examined in detail, including the design of safer chemicals, the use of renewable resources, and the minimization of waste. Topics such as atom economy, the reduction of toxicity, and energy efficiency in chemical reactions are discussed. Practical examples and case studies illustrating the application of these principles in industrial and laboratory settings are also included.

Unit 3: Sustainable Materials and Alternative Energy Sources

This unit explores the use of sustainable materials in green chemistry and their role in reducing environmental impact. It covers the development and use of biodegradable materials, renewable raw materials, and the role of green chemistry in waste minimization and recycling. Additionally, the unit investigates alternative energy sources, including solar, wind, and biofuels, and their integration into sustainable chemical practices.

Unit 4: Environmental Impact of Chemical Processes

This unit focuses on assessing the environmental impact of chemical processes. Topics include life-cycle analysis, carbon footprint, green solvents, and the concept of "green engineering." The unit also discusses the importance of reducing the environmental footprint of chemical processes through cleaner production technologies, waste treatment methods, and pollution prevention techniques.

Unit 5: Green Synthesis and Industrial Applications

This unit covers the principles and methods of green synthesis, focusing on the design of chemical reactions that minimize environmental and economic costs. Topics include catalytic processes, solvent-free reactions, biocatalysis, and the use of renewable feedstocks in industrial processes. The unit also explores real-world applications in pharmaceuticals, agrochemicals, and materials production, illustrating the integration of green chemistry into industrial practices.

Presentation and communication skills

CPCN-101

L	T	P	Cr.
3	0	0	3

Unit – I

Essential Grammar: Basic Clause/Sentence Patterns, Correct Usage of Different Word-Classes, Articles, Tense, Syntactic Concord, Prepositions, Transformation, Synthesis, Graded Syntactic Structures.

Unit – II

Essential Vocabulary: Basic words, Synonyms, Antonyms, Homophones, One-Word Substitutes, Idioms and Phrases, Word-formation, Technical Vocabulary.

Linguistic Skills: Listening, Speaking, Reading, and Writing (Activities to be Selected by the Teacher).

Unit – III

Language Through Literature: Non-Fiction &/or Fiction, Verse, and Play

Bacon's *Essays* (Selection) and/or Lamb's *Tales from Shakespeare* (Selection)

Keats' *The Eve of St Agnes*

Tagore's *Chitra*

Unit – IV

Speaking Professionally: Job Interviews, Group-Discussions, Public Speaking, Argumentative Skills, Role-Plays, Presentation Skill.

Reference Books :

1. Hornby, A.S. *Guide to Patterns & Usage in English*. 2nded. New Delhi: Oxford University Press, 2002. Print.
2. Swan, Michael. *Practical English Usage*. 3rded. New Delhi: Oxford University Press, 2006. Print.
3. Carter, R. and M. McCarthy. *Cambridge Grammar of English*. New Delhi: Cambridge University Press, 2006.CD-ROM, Print.
4. McCarthy, M. and F. O'Dell. *English Vocabulary in Use*. New Delhi: Cambridge University Press, 2006. Print.
5. Kumar, E. Suresh and P. Sreehari. *A Handbook for English Language Laboratories*. New Delhi: Cambridge University Press, 2007. Print.

INTRODUCTION TO COMMUNICATION SKILLS

CPCN-101 A

Unit 1: Foundations of Communication
This unit covers the fundamental concepts of communication, including the definition, importance, and types of communication. Students will explore verbal and non-verbal communication, the communication process, and barriers to effective communication.

Unit 2: Interpersonal Communication
Focusing on one-on-one interactions, this unit emphasizes the skills needed for effective interpersonal communication. Topics include active listening, empathy, and building rapport. Students will practice techniques to enhance personal interactions in various contexts.

Unit 3: Group Communication
In this unit, students will learn about communication dynamics within groups. It covers group roles, decision-making processes, and conflict resolution strategies. The importance of collaboration and teamwork in achieving common goals will also be highlighted.

Unit 4: Public Speaking
This unit introduces the principles of public speaking. Students will learn how to prepare, structure, and deliver effective presentations. Techniques for engaging an audience, managing anxiety, and using visual aids will also be discussed.

Unit 5: Written Communication
Focusing on written forms of communication, this unit covers various types of writing, including emails, reports, and proposals. Emphasis will be placed on clarity, conciseness, and appropriate tone. Students will practice drafting and revising written documents.

INTERPERSONAL COMMUNICATION

CPCN-101 B

Unit 1: Introduction to Interpersonal Communication
This unit covers the foundational concepts of interpersonal communication, including definitions, significance, and the role it plays in personal and professional contexts. Students will explore the basic elements of communication, such as sender, message, channel, receiver, feedback, and noise.

Unit 2: Theories and Models of Communication
This unit delves into various theories and models that explain interpersonal communication processes. Students will examine classical and contemporary theories, including the Shannon-Weaver model, Schramm's model, and Barnlund's transactional model, discussing their relevance and application in real-world scenarios.

Unit 3: Verbal and Nonverbal Communication
In this unit, students will explore the intricacies of verbal communication, including language use, tone, and context. The unit will also emphasize nonverbal communication, covering body language, facial expressions, eye contact, and other nonverbal cues, and how these elements influence interactions.

Unit 4: Listening Skills
This unit focuses on the importance of listening as a key component of effective interpersonal communication. Students will learn different types of listening, barriers to effective listening, and strategies to enhance their listening skills, fostering better understanding and rapport in conversations.

Unit 5: Interpersonal Relationships
Students will examine the dynamics of interpersonal relationships, including stages of relationship development, maintenance, and dissolution. The unit will explore concepts such as trust, intimacy, and conflict, emphasizing the role of communication in shaping and sustaining relationships.

TECHNICAL WRITING

CPCN-101 C

Unit 1: Introduction to Technical Writing
This unit introduces the fundamentals of technical writing, focusing on its definition, purpose, and significance in various fields. Students will explore the characteristics of effective technical documents and the differences between technical writing and other forms of writing. Emphasis will be placed on understanding the audience and tailoring content to meet their needs.

Unit 2: Research and Information Gathering
In this unit, students will learn methods for conducting effective research and gathering information relevant to their writing projects. Techniques for identifying credible sources, evaluating information, and organizing research will be covered. Students will practice synthesizing data and extracting key points to support their writing.

Unit 3: Document Design and Formatting
This unit focuses on the principles of document design, including layout, typography, and visual elements. Students will learn how to create visually appealing and user-friendly documents. Topics such as the use of headings, lists, tables, and graphics will be discussed to enhance readability and comprehension.

Unit 4: Writing for Different Audiences
Here, students will explore the importance of audience analysis in technical writing. They will learn how to adjust tone, style, and complexity based on the target audience, whether they are experts in the field or laypersons. Practical exercises will help students develop strategies for effective communication.

Unit 5: Technical Reports and Proposals
This unit covers the structure and components of technical reports and proposals. Students will learn how to write clear and concise reports, including executive summaries, methodology, findings, and recommendations. The unit will also address the essential elements of proposals, focusing on persuasive writing techniques.

COMMUNICATION IN DIGITAL MEDIA

CPCN-101 D

Unit 1: Introduction to Digital Media and Communication

This unit introduces the concept of digital media, exploring its evolution and impact on communication in the modern world. It covers the different forms of digital media, including social media, blogs, podcasts, websites, and online video platforms. The unit also discusses the role of digital communication in shaping public discourse, personal interactions, and professional practices.

Unit 2: Digital Communication Tools and Platforms

This unit focuses on the various digital tools and platforms used for communication in the digital age. It covers the functionality, features, and best practices for using social media platforms, messaging apps, email, and collaborative tools. The unit also highlights emerging digital communication technologies such as virtual reality, augmented reality, and artificial intelligence in communication.

Unit 3: Content Creation and Digital Storytelling

In this unit, students learn about creating engaging content for digital media, including text, images, audio, and video. Topics include writing for the web, designing multimedia presentations, and the principles of digital storytelling. The unit explores how to craft compelling narratives that resonate with online audiences and effectively convey messages across different digital platforms.

Unit 4: Digital Media Ethics and Online Behavior

This unit addresses the ethical considerations of digital communication. It covers topics such as privacy, intellectual property, digital identity, and the challenges of misinformation and online security. The unit also discusses responsible online behavior, including the impact of digital media on mental health, cyberbullying, and the role of digital media in shaping societal norms and values.

Unit 5: Digital Media Strategy and Analytics

This unit focuses on the strategic use of digital media for communication purposes. It covers the planning and execution of digital media campaigns, with an emphasis on targeting specific audiences and achieving measurable outcomes. The unit also explores digital media analytics, including data collection, interpretation, and the use of analytics tools to evaluate the effectiveness of digital communication strategies.

ENGG. WORKSHOP PRACTICE

CMEN-151

Cr.	L	T	P
1	0	0	2

Sr No.	Experiment
1.	To obtain required diameters (steps) on a cylindrical work piece with the given lengths.
2.	To perform tapering and knurling operation on a cylindrical work piece of given length.
3.	To make a single v-butt joint, using the given mild steel pieces by arc welding.
4.	To make a double lap joint, using the given mild steel pieces by arc welding.
5.	To make a T-lap joint from the given reaper of size 50 x 35 x 250 mm.
6.	To make a mortise and tenon joint from the given reaper of size 50 x 35 x 250 mm.
7.	To file the given Mild Steel piece in to a square shape of 48 mm side from original dimension of 50 mm.
8.	To make V- fit from the given two MS plates after drilling and Tapping operations.
9.	To prepare a sheet metal tray using galvanized sheet.
10.	To prepare lap and single cover butt joints using sheet and rivets.

CMEM 153 ENGG. GRAPHICS LAB.

Cr. L T P

1 0 0 2

1. Draw Basic Geometric Entities.
2. Draw complicated Drawings using basic geometric entities.
3. Drawing using Trim operation
4. Drawing using Pattern operation
5. Drawing using Chamfer and Fillet operation
6. Draw 3D model of a Table
7. Draw 3D model of a Chair

COMMUNICATION LAB.

CPCN-151

C-L-T-P

1- 0- 0-2

1.Phonemes of English: Practising English Sounds
2.Stress in Speech: Practising the Accentual Patterns in English
3.Rhythm in Speech: Practising Strong and Weak-forms of Words
4.Intonation in Speech: Practising Patterns of Tones in English
5.Conversational Skills: Situational Dialogues, Telephonic Conversations
6.Reading Comprehension: Reading Newspapers/Magazines or Online/Offline Texts
7.Listening Comprehension: Comprehending Online/Offline Audio or Video

Reference Books :

1. Sethi, J. and P.V. Dhamija. *A Course in Phonetics & Spoken English*. 2nded. New Delhi: Prentice Hall of India, 2008. Print
2. Roach, Peter. *English Phonetics & Phonology: A Practical Course*. 4thed. New Delhi: Cambridge University Press, 2009. CD-ROM, Print
3. Hornby, A.S. *Oxford Advanced Learner's Dictionary*. 8thed. New Delhi: Oxford University Press, 2010. CD-ROM, Print.
4. Dutt, P.K., G. Rajeevan and C.L.N. Prakash. *A Course in Communication Skills*. New Delhi: Cambridge University Press, 2008. CD-ROM, Print.
5. Kumar, E. Suresh and P. Sreehari. *A Handbook for English Language Laboratories*. New Delhi: Cambridge University Press, 2007. Print.
6. Sethi, J., K. Sadanand and D.V. Jindal. *A Practical Course in English Pronunciation*. New Delhi: Prentice Hall of India, 2004. CD-ROM, Print.

INTERPERSONAL COMMUNICATION

CPCN-151 B

1. Build comfort among participants through icebreaker games.
2. Practice clarity and expression in role-playing scenarios.
3. Engage in group discussions focusing on articulation and tone.
4. Develop awareness of non-verbal cues with charades.
5. Interpret body language in observational exercises using videos.
6. Conduct paired listening exercises with summarization.
7. Participate in listening circles to practice attentive listening.
8. Role-play emotional scenarios to discuss appropriate responses.
9. Reflect on personal emotional triggers and management techniques.
10. Simulate conflict scenarios to practice negotiation skills.
11. Analyze real-life conflicts and brainstorm resolutions in groups.
12. Engage in trust-building exercises, such as trust falls.
13. Practice introducing oneself in networking simulations.
14. Discuss cultural norms and their impact on communication.
15. Analyze case studies of communication breakdowns in diverse settings.
16. Provide constructive feedback in practice sessions.
17. Reflect on personal experiences with feedback through journaling.
18. Collaborate on group projects that require effective communication.
19. Simulate mock interviews or networking events for professional practice

TECHNICAL WRITING

CPCN-151 C

1. Understand the purpose and audience of technical documents.
2. Analyze examples of technical writing for clarity and structure.
3. Practice writing clear and concise instructions for a specific task.
4. Create a user manual for a hypothetical product.
5. Develop an informative report based on research findings.
6. Collaborate in groups to write and edit a project proposal.
7. Use visual aids (charts, graphs, diagrams) to enhance written content.
8. Conduct peer reviews of technical documents for feedback.
9. Practice writing executive summaries for longer reports.
10. Create and present a technical presentation based on written content.
11. Familiarize with citation styles and ethical considerations in technical writing.
12. Learn to format documents for consistency and professionalism.

13. Write a press release for a new product or service launch.
14. Create a troubleshooting guide for common technical issues.
15. Develop a technical specification document for a project.
16. Simulate real-world scenarios to practice writing under deadlines.
17. Engage in exercises on adapting content for different audiences and formats.

COMMUNICATION IN DIGITAL MEDIA

CPCN-151 D

1. Explore the role of digital media in modern communication.
2. Analyze different digital platforms and their unique communication styles.
3. Practice crafting effective messages for various social media channels.
4. Engage in discussions about digital etiquette and professionalism online.
5. Create and edit multimedia content (images, videos, infographics).
6. Experiment with storytelling techniques using digital formats.
7. Conduct a case study on successful digital communication campaigns.
8. Simulate crisis communication strategies using digital platforms.
9. Develop a personal brand strategy for online presence.
10. Practice writing clear and engaging blog posts or articles.
11. Analyze audience engagement metrics for digital content.
12. Create a podcast episode or audio content on a relevant topic.
13. Collaborate on a group project to develop a digital marketing plan.
14. Learn about SEO best practices and apply them to content creation.
15. Explore tools for visual communication (e.g., Canva, Adobe Spark).
16. Conduct peer reviews of digital content for clarity and impact.
17. Reflect on the challenges and opportunities of digital communication.

MATHEMATICS-II

CMAM-102

	Cr.	L	T	P
	4	3	1	0

Unit-I **10**

Integral Calculus: Double and triple integrals, Change of order of integration, Change of variables; Gamma, Beta functions, Dirichlet's integral; Applications (Evaluation of surface area, volume, centre of gravity, moment of inertia).

Unit-II **08**

Vector Calculus: Differentiation of vectors; Gradient, Divergence, Curl and their physical meaning; Differential operators and their identities; Line and surface integrals; Green's Theorem in a plane; Gauss's Divergence theorem and Stokes's theorem and their applications.

Unit-III **06**

Fourier Series & Fourier Transform: Trigonometric Fourier series, Half range series, Harmonic analysis; Fourier Transform: Definition, Fourier sine and cosine transforms, Fourier integral formula and applications.

Unit-IV **10**

Laplace Transform: Definition, Shifting theorems, Transform of derivatives, Differentiation and integration of transforms, Heaviside unit step function and Dirac delta function; Solution of ordinary differential equations in problems of mechanics, Electric circuits and bending of beams using Laplace transform.

Unit-V **06**

Z-Transform: Definition of Z-transform of elementary functions; Shifting theorems, Convolution theorem, Initial and Final value theorems; Application to solution of difference equations.

Reference Books :

1. Thomas, G. and R.L. Finney. *Calculus and Analytical Geometry*. 6th Edition. Addision Wesley/Narosa, 1998.
2. Grewal, B.S. *Engineering Mathematics*. 39th Edition. Khanna Publishers, 2005.
3. Prasad, C. *Mathematics for Engineers*. 19th Edition. Prasad Mudralaya.

STATISTICAL TECHNIQUES IN COMPUTER SCIENCE II

CMAN-102 A

Unit 1: Introduction to Advanced Statistical Concepts
An overview of foundational statistical concepts, including a review of probability distributions, random variables, and key theorems essential for advanced analysis.

Unit 2: Inferential Statistics and Hypothesis Testing
Exploration of statistical inference techniques, focusing on hypothesis testing, confidence intervals, and the application of t-tests, chi-square tests, and z-tests.

Unit 3: Regression Analysis
In-depth study of linear and multiple regression models, examining parameter estimation, diagnostics, and the interpretation of results. Introduction to regularization techniques such as Lasso and Ridge regression.

Unit 4: Analysis of Variance (ANOVA)
Understanding the principles of ANOVA, including one-way and two-way ANOVA, and their applications in comparing multiple groups and experimental designs.

Unit 5: Non-Parametric Methods
Exploration of non-parametric statistical methods, including the Wilcoxon rank-sum test, Kruskal-Wallis test, and their use in situations where traditional assumptions may not hold.

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE II

CMAN-102 B

Unit 1: Discrete Structures
An exploration of discrete mathematics, focusing on topics such as sets, relations, functions, and combinatorial structures that form the basis of computer science.

Unit 2: Graph Theory
Study of graph concepts, including types of graphs, graph traversal algorithms, connectivity, and applications of graphs in computer networks and data structures.

Unit 3: Logic and Proof Techniques
Introduction to propositional and predicate logic, methods of proof including direct, indirect, and contradiction proofs, as well as mathematical induction.

Unit 4: Number Theory
Examination of number theory concepts, including divisibility, prime numbers, modular arithmetic, and their applications in cryptography and algorithms.

Unit 5: Algebraic Structures
Overview of algebraic systems such as groups, rings, and fields, emphasizing their relevance to coding theory and error detection.

APPLIED MATHEMATICS II

CMAN-102 C

Unit 1: Differential Equations
Introduction to ordinary differential equations, methods of solving first and second-order equations, and applications in modeling physical systems.

Unit 2: Partial Differential Equations
Study of partial differential equations, their classification, and techniques for solving heat, wave, and Laplace equations, with real-world applications.

Unit 3: Linear Algebra
Exploration of vector spaces, linear transformations, eigenvalues, eigenvectors, and matrix theory, emphasizing applications in computer graphics and engineering.

Unit 4: Numerical Methods
Introduction to numerical analysis techniques, including numerical solutions of equations, interpolation, numerical integration, and error analysis.

Unit 5: Optimization Techniques
Examination of optimization methods, including linear programming, the simplex method, and applications in resource allocation and decision-making.

ADVANCED APPLIED MATHEMATICS II

CMAN-102 D

Unit 1: Advanced Linear Algebra and Matrix Theory

This unit covers advanced topics in linear algebra, focusing on the theory and application of vector spaces, linear transformations, and advanced matrix techniques. Topics include spectral theory, the Jordan canonical form, singular value decomposition, and applications to solving large systems of equations. The unit also explores the use of matrix factorizations in computational methods and their importance in numerical analysis.

Unit 2: Advanced Ordinary Differential Equations

Focusing on higher-order ordinary differential equations, this unit examines methods for solving linear and nonlinear differential equations, including series solutions and special functions. Topics include boundary value problems, Sturm-Liouville theory, and the use of Green's functions in solving linear differential equations. The unit also discusses stability analysis, perturbation methods, and applications to mechanical and electrical systems.

Unit 3: Partial Differential Equations and Fourier Analysis

This unit introduces advanced techniques for solving partial differential equations, including the method of separation of variables, the Fourier transform, and the Laplace transform. Topics include the wave equation, heat equation, and Poisson's equation, along with their applications in physics and engineering. The unit also covers Fourier series and Fourier transforms, with an emphasis on their role in solving boundary value problems in various coordinate systems.

Unit 4: Complex Analysis and Its Applications

The focus of this unit is on advanced concepts in complex analysis, including the study of complex functions, analytic functions, and contour integration. Topics include residue theory, conformal mapping, and the use of the Cauchy-Riemann equations. The unit explores applications of complex analysis to potential theory, fluid dynamics, and electromagnetic theory, as well as its role in solving real-world engineering problems.

Unit 5: Probability Theory, Stochastic Processes, and Statistical Modeling

This unit delves into advanced probability theory, including random variables, expectation, variance, and covariance. It explores the theory of stochastic processes, including Markov chains, Poisson processes, and Brownian motion. The unit also includes an introduction to statistical modeling, hypothesis testing, regression analysis, and the use of probabilistic models in decision theory, reliability analysis, and machine learning.

CPHN-102 **ENGINEERING PHYSICS**

Cr.	L	T	P
4	3	1	0

UNIT-I :Relativstic Mechanics
Inertial and non inertial frames, Galliean transformation equation, Einstein's postulates, Length contraction and time dilation, Lorentz transformation equation, Variation of mass with velocity.

UNIT-II : Laser and Wave optics
Spontaneous and stimulated emission of radiation, Einstein's coefficients, construction and working of Ruby, He- Ne lasers. Application of lasers.
Interference of light, Biprism experiment, Polarization, Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, specific rotation, Optical activity.

-III : Wave Mechanics
Introduction to wave particle duality, de Broglie matter waves, phase and group velocities, Heisenberg's uncertainty principle and its applications, Wave function characteristics and significance. Particle in one dimensional rigid box.

UNIT- IV : Superconductivity and Nanomaterials
Temperaure dependence of resistivity, Effect of magnetic field (Meissner effect), isotope effect, London's equation, Temperature dependence of critical field, BCS theory, High temperature superconductors, Application of superconductors.
Introduction to nanomaterials,

UNIT- V : Electromagnetics
Maxwell's equations (intergral and differential forms), Equation of continuity, Transverse nature of EM waves, EM- wave propagation and its propagation in free space, Poynting vector. Statement of gauss divergence and stokes theorems and useful vector identities.

Reference Books :
1.S.K.Gupta 'Engineering Physics-I'KrishnaPrakashan Media (P) Ltd. Meerut.
2. .S.K.Gupta 'Engineering Physics-II'KrishnaPrakashan Media (P) Ltd. Meerut.
3. Avandhanulu, M.N. and P.G. Kshirsagar. A Text book of Engineering Physics. S. Chand Publication, New Delhi.
4. Subrahmanyam, N. and Brij Lal. A Textbook of Optics. S. Chand Publication, New Delhi.

INTRODUCTION TO ENGINEERING PHYSICS

CPHN -102 A

Unit 1: Classical Mechanics

This unit covers the fundamental principles of classical mechanics, including kinematics, dynamics, and the laws of motion. Students will explore concepts such as force, energy, work, and momentum, along with the application of Newton's laws in various physical scenarios.

Unit 2: Thermodynamics

This unit introduces the principles of thermodynamics, focusing on the laws of thermodynamics, heat transfer, and the behavior of gases. Topics include thermal properties of matter, heat engines, refrigeration cycles, and entropy, emphasizing real-world applications in engineering.

Unit 3: Waves and Oscillations

In this unit, students will study the nature of waves and oscillatory motion. Key topics include simple harmonic motion, wave properties, sound waves, and wave interference. The unit also explores practical applications of these concepts in engineering systems and technologies.

Unit 4: Optics

This unit focuses on the behavior of light and its interaction with matter. Topics include reflection, refraction, lenses, optical instruments, and wave optics. Students will learn about the principles behind imaging systems and the application of optical technologies in engineering.

Unit 5: Electromagnetism

This unit introduces the fundamental concepts of electromagnetism, covering electric fields, magnetic fields, and their interactions. Students will explore Maxwell's equations, electromagnetic waves, and applications in electrical engineering, including circuit analysis and electromagnetic devices.

ELECTROMAGNETISM

CPHN -102 B

Unit 1: Introduction to Electromagnetism

This unit provides an introduction to the fundamental concepts of electromagnetism, focusing on the relationship between electricity and magnetism. Topics include Coulomb's law, electric fields, electric potential, and the concept of the electrostatic force. The unit also introduces the basics of electric charge, electric flux, and Gauss's law, setting the stage for the study of electromagnetism in both static and dynamic contexts.

Unit 2: Electrostatics and Electric Fields

In this unit, the theory of electrostatics is explored in greater detail. The unit covers the behavior of electric fields, electric potential, and their interaction with charged particles. It includes a deeper analysis of Gauss's law, capacitors and dielectric materials, and the concept of energy stored in electric fields.

Unit 3: Magnetostatics and Magnetic Fields

This unit focuses on the study of magnetic fields and their interaction with electric currents. Topics include Biot-Savart law, Ampère's law, magnetic field due to steady currents, and the magnetic properties of materials.

Unit 4: Electromagnetic Induction and Maxwell's Equations

In this unit, electromagnetic induction and its applications are studied in detail. Topics include Faraday's law of induction, Lenz's law, self-induction, and mutual induction. The unit also introduces Maxwell's equations, which describe the behavior of electric and magnetic fields in a unified framework.

Unit 5: Electromagnetic Waves and Radiation

This unit covers the propagation of electromagnetic waves, focusing on wave equations, waveguides, and transmission lines. The unit examines the nature of electromagnetic radiation, including the characteristics of plane waves in free space, energy transfer, and Poynting's theorem.

MATERIALS SCIENCE AND ENGINEERING

CPHN -102 C

Unit 1: Introduction to Materials Science
This unit covers the fundamental concepts of materials science and engineering, including the classification of materials into metals, ceramics, polymers, and composites, as well as an overview of the relationships between structure and properties.

Unit 2: Atomic Structure and Bonding
This unit focuses on the atomic structure of materials, the periodic table, and the various types of atomic bonding such as ionic, covalent, metallic, and van der Waals forces. It explores how these bonding types influence material properties.

Unit 3: Crystal Structure and Defects
In this unit, students learn about different crystal systems, lattice structures, and unit cells, along with concepts of packing efficiency. The unit also examines defects in crystals, including point, line, and surface defects.

Unit 4: Mechanical Properties of Materials
This unit addresses the mechanical properties of materials, including stress, strain, and the methods used for mechanical testing. Topics include elastic and plastic deformation, hardness, toughness, ductility, and brittleness.

Unit 5: Phase Diagrams and Phase Transformations
Students will study phase diagrams, including the lever rule and phase equilibrium. This unit also covers processes such as solidification, diffusion, and phase transformations in solids.

WAVES AND VIBRATIONS

CPHN -102 D

Unit 1: Introduction to Waves and Vibrations

This unit covers the basic principles of waves and vibrations, including wave properties like amplitude, frequency, and velocity. It introduces different types of waves—mechanical, electromagnetic, longitudinal, and transverse—and explores wave propagation and superposition.

Unit 2: Simple Harmonic Motion (SHM)

Focusing on SHM, this unit examines oscillatory motion, the mathematical description of SHM, and its applications in systems like mass-spring and pendulum oscillators. It also discusses energy conservation in harmonic motion.

Unit 3: Wave Equations and Solutions

This unit addresses the wave equation, its solutions, and wave behavior. It covers wave propagation, reflection, refraction, diffraction, and interference, along with standing and traveling waves and their normal modes.

Unit 4: Forced Oscillations and Resonance

Exploring forced oscillations, this unit looks at the response of systems to external periodic forces, resonance phenomena, and damping. It also examines real-world applications of resonance in mechanical and electrical systems.

Unit 5: Nonlinear Waves and Solitons

This unit introduces nonlinear wave phenomena, focusing on solitons and their mathematical description. It explores the stability of soliton solutions and their applications in various fields like fluid dynamics and optics.

COMPUTER FUNDAMENTALS AND PROGRAMMING USING C

CCSN-102

Cr. L T P

4 3 1 0

Unit-I

Computer System: Basics of computer systems, history, types, capability and limitations of computer systems, Concept of assembler, compiler, interpreter, loader and linker. Genration of Computers.

Hardware Organization: Anatomy of a digital computer, CPU, Memory, processor, I/O Devices. **Memory Units:** Hierarchy, primary memory, cache; Auxiliary storage

Unit-II

Number System: Introduction to Number Systems-Types-Decimal, Binary, Octal, Hexadecimal; Conversion from one number system to other; Binary arithmetic operations; Representation of Negative Numbers.

Computer Fundamentals- Introduction of Operating system, Basics of computer networks, Introduction of software.

Idea of Algorithm: Representation of Algorithm, Flowchart, From algorithms to programs, source code.

Unit-III

Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language. Standard I/O in C, Fundamental data types, Storage classes.

Arithmetic expressions and precedence : Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.

Unit-IV

Conditional Branching: Applying if and switch statements, nesting if and else, use of break and default with switch.

Iteration and loops: use of while, do while and for loops.

Functions: Introduction, types of functions, Defining a Function, Function Declarations, Calling a Function , Passing parameters to functions, call by value, call by reference, recursive functions.

Unit-V

Arrays: Array notation and representation, manipulating array elements, using multi-dimensional arrays. Character arrays and strings, Structure, union, enumerated data types, Array of structures, Passing arrays to functions.

Pointers: Introduction, declaration, applications, Introduction to dynamic memory allocation (malloc, calloc, realloc, free)

File handling: File I/O functions

TEXT & REFERENCE BOOKS:

1. Fundamentals of computers and programming with C, A. K. Sharma, Dhanpat Rai Publications, Daryaganj New Delhi
2. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
3. C Programming – A modern approach by K.N. King, 1996, WW Norton & Co.
4. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH

Basic Electrical Engineering

CEEN-102

Cr. L T P

4 3 1 0

Unit-I

Network Fundamentals: Types of sources and elements. Kirchoff's laws, Mesh and node analysis of D.C. networks; Transient analysis: RL & RC circuits; Network theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power theorem, Star-delta transformation.

Unit-II

A.C. Fundamentals: Concept of phasor, impedance and admittance mesh and node analysis of single phase ac networks; Network theorems in AC networks, Active and reactive power in AC circuits, Resonance in series AC circuits; Introduction to 3-phase A.C. Circuits, Analysis of 3-phase balanced stard-delta circuits, Power in 3-phase circuits.

Unit-III

Magnetic Circuit Concepts: Analogy with electrical circuits, Calculation for series, parallel and series parallel magnetic circuits, Eddy current and Hysteresis losses, Single Phase Transformer: Basic constructional features and operating principle.

Unit-IV

D.C. Machines: Principle of operation, Basic constructional features, Emf and torques equation, Armature reaction, Types of D.C. motors starting and speed control of D.C. motors, Machines: Principle of operation of single phase motor and methods of starting of single phase motor, Three phase induction motor operating principle, Constructional features, Synchronous generator, Basic principle of operation, Emf equation, Constructional features.

Unit-V

Measurement of Electrical Quantities: Measurement of voltage current power and energy moving iron instruments. Measurement of 3 phase power, Accuracy class of meters.

Reference Books :

1. Kothari, D.P. and I.J. Nagrath. *Theory and Problems of Basic Electrical Engineering*. Prentice Hall of India, New Delhi 2000.
2. Mittle, V.N. and A. Mittle*Basic Electrical Engineering*. Tata McGraw Hill, New Delhi 2006.

INTRODUCTION TO ELECTRICAL ENGINEERING

CEEN-102 A

Unit 1: Fundamentals of Electrical Engineering

This unit covers the basic concepts of electrical engineering, including definitions of voltage, current, power, and energy. It introduces Ohm's Law, Kirchhoff's Laws, and the principles of series and parallel circuits. Students will learn about electrical units and measurements, circuit components, and basic electrical safety.

Unit 2: Circuit Analysis Techniques

Students will explore various methods for analyzing electrical circuits, including mesh and nodal analysis. This unit also introduces theorems such as Thevenin's and Norton's theorems, and the concept of superposition in circuit analysis. Practical applications and problem-solving techniques will be emphasized.

Unit 3: AC and DC Circuit Theory

This unit focuses on the differences between alternating current (AC) and direct current (DC) circuits. It includes the analysis of sinusoidal waveforms, phasors, and complex impedance. Students will also learn about AC power calculations, reactive components, and power factor correction.

Unit 4: Electrical Machines

An overview of various electrical machines is provided in this unit, including transformers, DC motors, and AC motors. The principles of operation, efficiency, and applications of these machines will be discussed, along with introductory concepts of electromagnetic induction and magnetic circuits.

Unit 5: Control Systems

This unit introduces the fundamentals of control systems, covering open-loop and closed-loop systems. Students will learn about system stability, transfer functions, and block diagrams. The unit will also touch on feedback control and its applications in electrical engineering.

ELECTRICAL MACHINES

CEEN-102 B

Unit 1: Introduction to Waves and Vibrations

This unit covers the basic principles of waves and vibrations, including wave properties like amplitude, frequency, and velocity. It introduces different types of waves—mechanical, electromagnetic, longitudinal, and transverse—and explores wave propagation and superposition.

Unit 2: Simple Harmonic Motion (SHM)

Focusing on SHM, this unit examines oscillatory motion, the mathematical description of SHM, and its applications in systems like mass-spring and pendulum oscillators. It also discusses energy conservation in harmonic motion.

Unit 3: Wave Equations and Solutions

This unit addresses the wave equation, its solutions, and wave behavior. It covers wave propagation, reflection, refraction, diffraction, and interference, along with standing and traveling waves and their normal modes.

Unit 4: Forced Oscillations and Resonance

Exploring forced oscillations, this unit looks at the response of systems to external periodic forces, resonance phenomena, and damping. It also examines real-world applications of resonance in mechanical and electrical systems.

Unit 5: Nonlinear Waves and Solitons

This unit introduces nonlinear wave phenomena, focusing on solitons and their mathematical description. It explores the stability of soliton solutions and their applications in various fields like fluid dynamics and optics.

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

CEEN-102 C

Unit 1: Introduction to Electrical Measurements

This unit introduces the basic principles of electrical measurements, focusing on the need for accurate measurements in electrical systems. It covers the classification of electrical quantities, units of measurement, and the principles behind various types of electrical measuring instruments.

Unit 2: Measuring Instruments for Voltage, Current, and Resistance

This unit explores the working principles and applications of instruments used to measure voltage, current, and resistance. It covers analog and digital voltmeters, ammeters, and ohmmeters, as well as their calibration, accuracy, and limitations in electrical circuits.

Unit 3: Power and Energy Measurement

The unit focuses on the measurement of electrical power and energy. Topics include the operation of wattmeters, energy meters, and the measurement of both active and reactive power in AC circuits. It also discusses the methods for measuring power in three-phase systems.

Unit 4: Instrumentation for Frequency, Phase, and Power Factor Measurement

This unit covers instruments used for measuring frequency, phase angle, and power factor in AC circuits. It includes the working principles and applications of frequency counters, phase meters, and power factor meters, along with methods for ensuring their accuracy.

Unit 5: Electrical Instrumentation in Industrial Applications

The unit discusses advanced electrical instrumentation systems used in industrial settings, including transducers, data acquisition systems, and process control instrumentation. It explores the use of instruments for monitoring and controlling parameters such as temperature, pressure, flow, and level in industrial applications.

TRANSMISSION AND DISTRIBUTION SYSTEMS

CEEN-102 D

Unit 1: Introduction to Power Transmission and Distribution

This unit introduces the basic concepts of power transmission and distribution systems, including their importance in delivering electrical power from generation sources to consumers. It covers the basic structure of transmission and distribution networks, the components involved, and the role of substations in power systems.

Unit 2: Transmission Lines and Their Performance

This unit focuses on the design and performance of overhead transmission lines. Topics include the calculation of line parameters (resistance, inductance, and capacitance), line constants, and the effect of line length and load on voltage regulation and line losses. It also explores the types of transmission lines used and their practical considerations.

Unit 3: Power Flow and Voltage Control in Transmission Systems

The unit covers the principles of power flow in transmission networks, including the factors that affect power transfer and voltage control. Topics include the calculation of power loss in transmission lines, voltage drop, and methods of controlling voltage through tap-changing transformers and reactive power compensation.

Unit 4: Substations and Distribution Systems

This unit focuses on the role and design of substations in power systems, including the types of substations (e.g., step-up, step-down, and switching stations). It also covers the structure and operation of distribution systems, including the distribution of electrical power to residential, commercial, and industrial consumers, and discusses the types of distribution networks.

Unit 5: Protection and Maintenance of Transmission and Distribution Systems

The unit addresses the protection and maintenance of transmission and distribution systems, focusing on the need for safety and reliability in power delivery. Topics include protective relays, circuit breakers, and fault detection methods. It also covers the maintenance practices for transmission lines and substations to ensure the uninterrupted flow of power.

Technical Communication

CPCN-102

Cr. L T P 3 2 1

Unit – I

Basics of Technical Communication: Meaning, Elements, Process, Origin, Scope and Significance, Forms, Channels & Media of Communication, Barriers to Communication, Organisation and Style in Technical Communication, Non-Verbal Communication.

Technical Reports: Nature & Significance, Types, Formats of Reports, Structure of Formal Reports: Project Report, Dissertation and Thesis, Strategies for Writing.

Technical Articles: Nature & Significance, Types, Elements, Research Methods, Writing Strategies.

Technical Proposals: Nature & Significance, Types, Structure of a Formal Proposal, Tips for Writing.

Unit – II

Guidelines for Effective Writing: Requisites of Good Sentence Writing; Elements of a Paragraph, Requisites of Impeccable Paragraph Writing: Unity, Coherence and Logical Order; Development of Paragraphs.

Specific Writing: Note-Making; Summarising& Paraphrasing; Referencing; Professional Memos; e-Mails; e-Writing.

Unit – III

Professional Correspondence: Letter Writing Skills; Form & Structure; Writing Personal & Official Letters, Letters of Inquiry, Instruction Letters, Quotations, Supply Orders, Complaint and Adjustment Letters, Minutes for Meeting, Designing Resume/CV/Bio-Data, Job Application, Follow-up Letters.

Unit – IV

Basics of Phonetics: International Phonetic Alphabet, Phonemes, Allophones, Phonetic Transcription, Organs of Speech, Places and Manners of Articulation, Syllable, Stress, Rhythm, Intonation.

Reference Books :

1. Rizvi, M Ashraf. *Effective Technical Communication*. New Delhi: Tata McGraw-Hill, 2005. Print.
2. Raman, M. and S. Sharma. *Technical Communication: Principles and Practice*. New Delhi: Oxford University Press, 2004. Print.
3. Anderson, Paul V. *Technical Communication: A Reader-Centered Approach.* 6th ed. New Delhi: Cengage Learning, 2007. Print.
4. Taylor, Shirely. *Model Business Letters, E-mails and Other*

Business Documents. 6th ed. New Delhi: Pearson Education, 2004. Print.

5. Roach, Peter. *English Phonetics and Phonology: A Practical Course*. 4th ed. New Delhi: Cambridge University Press, 2009. CD-ROM, Print.

INTRODUCTION TO TECHNICAL COMMUNICATION

CPCN-102 A

Unit 1: Fundamentals of Technical Communication
Explore the principles of technical communication, its significance in various fields, and the role of the technical communicator. Understand the key characteristics of effective communication, including clarity, conciseness, and audience awareness.

Unit 2: Understanding Audiences and Contexts
Investigate different audience types and their needs. Learn to analyze contexts, including cultural and organizational factors that influence communication. Develop skills for tailoring messages to specific audiences.

Unit 3: Research and Information Gathering
Focus on effective research methodologies, including identifying credible sources, conducting interviews, and gathering data. Emphasize the importance of organizing information logically for clear communication.

Unit 4: Writing Techniques for Technical Documents
Examine various writing styles and formats used in technical documents. Cover techniques for drafting, revising, and editing, as well as the importance of incorporating visuals and design elements to enhance readability.

Unit 5: Visual Communication and Design
Learn the principles of visual communication, including the effective use of graphics, charts, and diagrams. Explore design fundamentals and tools that aid in creating visually appealing and informative documents.

TECHNICAL DOCUMENTATION

CPCN-102 B

Unit 1: Introduction to Technical Documentation
This unit covers the fundamentals of technical documentation, including its purpose and significance in various industries. It explores different types of documentation such as user manuals, system documentation, and online help. Emphasis is placed on the role of technical writers and the skills required for effective communication.

Unit 2: Documentation Planning and Management
In this unit, the focus is on the planning stages of technical documentation. Key topics include audience analysis, defining documentation goals, and creating project timelines. It also covers documentation management practices, including version control and collaboration tools.

Unit 3: Research and Information Gathering
This unit emphasizes the importance of thorough research in technical writing. It includes strategies for gathering information from subject matter experts, conducting interviews, and utilizing existing documentation. Participants learn how to validate and organize information for clarity and accuracy.

Unit 4: Writing Techniques for Technical Documentation
Here, the syllabus delves into writing techniques specific to technical documentation. Topics include clarity, conciseness, and coherence in writing. The unit also addresses the use of active voice, proper terminology, and the importance of audience-centric language.

Unit 5: Visual Elements in Technical Documentation
This unit focuses on incorporating visual elements to enhance understanding. It covers the use of diagrams, charts, screenshots, and other graphics. Participants learn best practices for visual design and how to create effective visuals that complement text.

TECHNICAL EDITING AND PROOFREADING

CPCN-102 C

Unit 1: Introduction to Technical Editing and Proofreading
Overview of technical communication, the role of editing and proofreading, and the differences between these processes.

Unit 2: Editing Fundamentals
Principles of effective editing, types of editing (substantive, copy editing, line editing), and the editing process.

Unit 3: Understanding Technical Documents
Types of technical documents, audience analysis, and the importance of context in editing.

Unit 4: Grammar and Style
Key grammar rules relevant to technical writing, style guides (APA, MLA, Chicago), and consistency in terminology.

Unit 5: Proofreading Techniques
Strategies for effective proofreading, common errors to watch for, and tools and resources for proofreading.

TECHNICAL RESEARCH AND ANALYSIS

CPCN-102 D

Unit 1: Introduction to Technical Research

This unit introduces the concept of technical research, its importance in advancing technology and innovation, and the various types of research methodologies. It covers the basics of formulating research questions, hypothesis development, and the steps involved in conducting research, including literature review and data collection techniques.

Unit 2: Research Methodology and Data Collection

This unit focuses on the methods used in technical research, including qualitative and quantitative research methodologies. Topics include sampling techniques, survey design, experimentation, and data collection tools. The unit also covers data management and the ethical considerations in research data handling.

Unit 3: Data Analysis Techniques

This unit explores various data analysis techniques used in technical research, including statistical methods, data visualization, and interpretation of results. Topics include descriptive statistics, inferential statistics, regression analysis, and the use of software tools like MATLAB, SPSS, or Python for data analysis.

Unit 4: Technical Writing and Reporting

This unit emphasizes the principles of technical writing and how to effectively communicate research findings. It covers the structure of research papers, technical reports, and academic articles, including abstract writing, literature reviews, methodology, results, discussions, and citations.

Unit 5: Presentation and Publication of Research Findings

This unit covers the techniques for presenting research findings to both technical and non-technical audiences. Topics include preparing effective research presentations, poster sessions, and oral defense of research. The unit also explores the process of publishing research in journals and conferences, including peer review, submission guidelines, and ethical issues in publication.

Engg. Physics Lab.

CPHM-152

	Cr.	L	T	P
	1	0	0	2

1. Measurement of wavelength of monochromatic light by Newton's rings
2. Measurement of the specific rotation of cane sugar solution using Biquartzpolarimeter
3. Measurement of wavelength of spectral lines using plane transmission grating
4. Measurement of the specific resistance of the material of a given wire using Carey Foster Bridge
5. Study of the variation of magnetic field along the axis of current carrying coil and then to estimate the radius of the coil
6. Calibration of the given voltmeter and ammeter with a potentiometer
7. Measurement of the resistivity and energy band gap of a semiconductor material (four probe)
8. Study of Hall effect and determination of Hall coefficient and carrier density of a given semiconductor material
9. Measurement of acceleration due to gravity by compound pendulum
10. Measurement of electro-chemical equivalent (ECE) of copper using Helmholtz galvanometer

Reference Books :

1. Jain, R.K., Darakhshan Sahar and D. Mishra. *Engineering Physics Practical Manual.*Shobhit University Publication, 2009.

INTRODUCTION TO ENGINEERING PHYSICS LAB

CPHN-152A

1. Measurement of acceleration due to gravity using a simple pendulum.
2. Determination of Young's modulus using a cantilever beam.
3. Study of motion on an inclined plane.
4. Verification of the laws of reflection and refraction.
5. Measurement of wavelength using a diffraction grating.
6. Investigation of Hooke's Law with spring constant determination.
7. Analysis of LC circuits and resonance.
8. Measurement of thermal conductivity of a metal rod.
9. Study of charge and discharge in capacitors.
10. Exploration of the photoelectric effect.
11. Determination of the focal length of a lens using the lens formula.
12. Investigation of interference patterns using a double-slit experiment.
13. Measurement of the speed of sound in air.
14. Study of magnetic fields using a current-carrying coil.
15. Analysis of the Doppler effect with sound waves.
16. Measurement of the coefficient of friction on different surfaces.
17. Determination of specific heat capacity using a calorimeter.
18. Study of the behavior of waves in a stretched string.
19. Investigation of thermoelectric effects (Seebeck and Peltier).
20. Exploration of the behavior of light through optical fibers.

ELECTROMAGNETISM LAB

CPHN-152B

1. Measurement of magnetic field strength using a Hall probe.
2. Investigation of Ampère's Law with current-carrying conductors.
3. Study of Faraday's Law of Electromagnetic Induction.
4. Determination of the resistance of a wire using Wheatstone bridge.
5. Analysis of magnetic field lines using iron filings and magnets.
6. Measurement of the inductance of coils using an LCR meter.
7. Study of the behavior of parallel plate capacitors.
8. Investigation of the force on a current-carrying conductor in a magnetic field.
9. Measurement of dielectric constants of various materials.
10. Analysis of electromagnetic waves using antennas.
11. Exploration of RLC circuit resonance and impedance.
12. Study of the magnetic hysteresis loop of materials.
13. Measurement of self-inductance using an RL circuit.
14. Investigation of the Biot-Savart Law with magnetic fields.
15. Study of capacitive reactance in AC circuits.
16. Analysis of the relationship between current and magnetic field in solenoids.
17. Measurement of electric field strength using a voltmeter.
18. Investigation of transformer operation and efficiency.
19. Study of electromagnetic interference (EMI) in circuits.
20. Exploration of magnetic shielding using different materials.

MATERIALS SCIENCE AND ENGINEERING LAB

CPHN-152C

1. A program to input stress and strain values and calculate Young's Modulus.
2. A script to calculate thermal conductivity using Fourier's law based on temperature gradient and heat flow.
3. A program that takes in component compositions and temperature to plot a simple binary phase diagram.
4. A tool to compute the diffusion coefficient using Fick’s laws based on concentration gradient.
5. A program to estimate the fatigue life of a material using S-N curves and input loading conditions.
6. A simulation of a tensile test where users can input material properties and loading rates to visualize stress-strain curves.
7. A program that suggests materials based on user-defined properties such as strength, weight, and corrosion resistance.
8. A tool to calculate the creep rate of materials at high temperatures and stresses over time.
9. A program that takes diameter of the indentation and applied load to calculate Brinell hardness number.
10. A script to calculate the corrosion rate based on weight loss and exposure time.
11. A program to calculate the effective modulus of a composite based on volume fractions and moduli of individual components.
12. A tool to compute the thermal expansion of materials based on temperature change and linear expansion coefficients.
13. A program to analyze impact test results and calculate the energy absorbed by a material during fracture.
14. A program that estimates recrystallization temperature based on grain size and deformation history.
15. A script to analyze XRD data and identify peaks corresponding to specific crystallographic planes.
16. A program to simulate the crack growth rate in materials under cyclic loading conditions.
17. A tool to calculate electrical conductivity based on resistivity and material dimensions.
18. A program that estimates the glass transition temperature of polymers based on molecular weight and structure.
19. A script that calculates thermal stresses in materials based on temperature changes and constraints.
20. A program to generate and plot load-deflection curves for beams under various loading conditions.

WAVES AND VIBRATIONS LAB

CPHN-152D

1) To study the motion of a simple pendulum and determine the acceleration due to gravity (g).
2) To determine the frequency of a tuning fork using a resonance tube.
3) To determine the speed of sound in air using the Doppler effect.
4) To study the vibration of a cantilever beam and calculate its natural frequency.
5) To observe the formation of standing waves on a string and determine the wavelength.
6) To study the longitudinal vibrations of a spring-mass system.
7) To determine the damping factor for a damped harmonic oscillator.
8) To investigate the relationship between frequency and amplitude in simple harmonic motion.
9) To study the superposition of waves using a ripple tank and observe interference patterns.
10) To determine the wave speed on a stretched string using a frequency generator.
11) To observe the phenomenon of resonance using a mechanical resonator.
12) To study the characteristics of forced oscillations and resonance in a spring-mass system.
13) To measure the time period of a simple pendulum for different lengths and plot the variation.
14) To calculate the speed of sound in a solid using the longitudinal wave method.
15) To study the vibration modes of a metal rod fixed at both ends.
16) To observe and measure the wave reflection and refraction using a slinky or spring.
17) To determine the frequency of a tuning fork by using a Helmholtz resonator.

18) To investigate the formation of beats in sound waves and calculate the beat frequency.

19) To determine the period of oscillation of a compound pendulum.

20) To study the motion of a driven damped harmonic oscillator and determine its quality factor.

COMPUTER PROGRAMMING USING C LAB.

CCSN 152

	Cr.	L	T	P
	1	0	0	2

1) Write a program to find the factorial of a given number using recursion.
2) Write a program to check whether a number is prime or not.
3) Write a program to reverse a given number using a loop.
4) Write a program to find the largest of three numbers using if-else statements.
5) Write a program to calculate the sum of digits of a given number.
6) Write a program to print the Fibonacci series up to a given term using iteration.
7) Write a program to check if a given string is a palindrome.
8) Write a program to find the greatest common divisor (GCD) of two numbers using Euclidean algorithm.
9) Write a program to perform matrix multiplication.
10) Write a program to sort an array of integers using bubble sort.
11) Write a program to implement a simple calculator that performs addition, subtraction, multiplication, and division.
12) Write a program to convert a given decimal number to binary.
13) Write a program to count the number of vowels and consonants in a string.

14) Write a program to find the length of a string without using the built-in strlen function.

15) Write a program to implement a simple linear search on an array of integers.

Reference Books :

1. Sharma, A.K. *Fundamentals of Computers and Programming with C*. Dhanpat Rai Publications, New Delhi, 2005.

2. Sharma, Divya. *Lab. Manual: Fundamentals of Computers and Programming with C*, Shobhit University Publication, Meerut.

BASIC ELECTRICAL ENGINEERING LAB

CEEN 152

	Cr.	L	T	P
	1	0	0	2

2. **Verify the KCL**
3. **Verify the KVL**
4. **Short Circuit and Open Circuit**
5. **Study of Energy meter**
6. **Verification Thevenin Theorem**
7. **Verification of Norton theorem**
8. **Verification of superposition theorem**

INTRODUCTION TO ELECTRICAL ENGINEERING LAB

CEEN-152A

1. A program to calculate the equivalent resistance of resistors in series and parallel configurations.
2. A script to analyze simple AC circuits using phasor representation and calculate voltage, current, and power.
3. A program that simulates the behavior of RC, RL, and RLC circuits under different frequency inputs.
4. A tool to perform node voltage analysis for a given electrical circuit and display results.
5. A program to calculate the power factor of an AC circuit based on voltage and current phase angles.
6. A script to design and simulate a basic operational amplifier circuit for inverting and non-inverting configurations.
7. A program that calculates the inductance of coils based on their physical dimensions and number of turns.
8. A tool to simulate a transformer and calculate turns ratio, voltage, and current on primary and secondary sides.
9. A program to determine the Thevenin equivalent circuit for a given linear circuit.
10. A script that performs load flow analysis for a simple electrical power system.
11. A program to simulate Kirchhoff's voltage and current laws in a network of resistors.
12. A tool to calculate the gain of a transistor amplifier circuit based on input and output voltages.
13. A program that analyzes a simple digital circuit and generates a truth table.
14. A script to calculate the energy consumption of electrical appliances over time based on power ratings.
15. A program that simulates the charging and discharging of a capacitor in an RC circuit.
16. A tool to design and analyze a basic filter circuit (low-pass, high-pass, band-pass).
17. A program that calculates the efficiency of a motor based on input and output power.
18. A script to visualize the waveform of a sinusoidal signal using Fourier series.

ELECTRICAL MACHINES LAB

CEEN-152B

1. Write a program to calculate the efficiency of a transformer given input and output power.
2. Simulate the no-load test of a single-phase induction motor and calculate the power factor.
3. Create a program to determine the speed-torque characteristics of a DC motor.
4. Implement a function to analyze the performance of a squirrel-cage induction motor under varying load conditions.
5. Develop a program to perform the equivalent circuit analysis of a transformer.
6. Simulate the starting current of a three-phase induction motor.
7. Write a code to perform the speed control of a DC motor using PWM (Pulse Width Modulation).
8. Create a program to calculate the losses in a three-phase transformer under different loading conditions.
9. Simulate the vector control of an induction motor using MATLAB.
10. Implement a program to determine the slip of an induction motor at various load conditions.
11. Create a function to analyze the V-curves of a synchronous motor.
12. Write a program to perform load flow analysis in a power system.
13. Simulate the fault analysis of a synchronous generator during short-circuit conditions.
14. Develop a program to model the dynamics of a brushed DC motor.
15. Create a program to calculate the power factor correction required for a given load.
16. Simulate the effect of rotor resistance on the performance of an induction motor.
17. Write a code to perform the measurement of efficiency for different types of electrical machines.

18. Implement a program to analyze the thermal performance of electrical machines under steady-state conditions.
19. Create a function to simulate the harmonic analysis in a power system.
20. Develop a program to visualize the phasor diagrams of AC circuits with different loads

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

CEEN-152C

1. Calculate resistance using Ohm's Law based on input voltage and current values.
2. Compute real, reactive, and apparent power in AC circuits given voltage and current.
3. Decode resistor color bands to determine resistance values.
4. Measure and display capacitance using a microcontroller setup.
5. Design a voltage divider calculator for output voltage based on input voltage and resistor values.
6. Implement a frequency counter to measure the frequency of an input waveform.
7. Simulate an LCR meter to measure inductance, capacitance, and resistance.
8. Create a data logger that records and stores voltage and current measurements over time.
9. Develop an oscilloscope simulation to visualize waveforms in real-time.
10. Convert temperature readings from a sensor into a corresponding voltage output.
11. Build a digital multimeter emulator to replicate basic multimeter functionalities.
12. Measure phase angle between voltage and current waveforms using timing functions.
13. Analyze a Wheatstone bridge circuit to find an unknown resistance value.
14. Generate various waveform signals (sine, square, triangular) at different frequencies.
15. Interface with transducers and display data from various sensors (e.g., temperature, pressure).

16. Calculate electric field strength based on point charge and distance from the charge.
17. Compute inductive reactance using inductance and frequency values.
18. Calculate capacitive reactance from capacitance and frequency inputs.
19. Measure and display AC voltage using a microcontroller setup.
20. Simulate the behavior of a current transformer in a circuit to analyze current ratios.

TRANSMISSION AND DISTRIBUTION SYSTEMS LAB

CEEN-152D

1. Calculate the voltage drop in a transmission line given the length, current, and resistance.
2. Simulate a three-phase load flow analysis using the Gauss-Seidel method.
3. Model a basic transformer and calculate its efficiency based on input and output parameters.
4. Implement a fault analysis program to identify the type and location of faults in a distribution system.
5. Create a program to optimize the placement of capacitors in a distribution network to reduce losses.
6. Simulate the impact of different loading conditions on the thermal rating of transmission lines.
7. Develop a program to calculate short-circuit currents in a power system using the symmetrical component method.
8. Analyze the impact of renewable energy sources on a distribution network's voltage profile.
9. Create a visualization tool for real-time monitoring of a transmission system's parameters.
10. Implement a program to evaluate the reliability of a distribution system using Monte Carlo simulation.
11. Calculate the economic dispatch of generation units in a power system to minimize cost.
12. Simulate a grid with renewable energy integration and assess its stability under varying conditions.
13. Develop a program to perform harmonic analysis of a power system with non-linear loads.
14. Model and analyze a radial distribution system using the backward/forward sweep method.
15. Implement a program to assess power factor correction requirements for industrial loads.
16. Create a tool to perform load forecasting based on historical data and weather patterns.
17. Simulate the operation of a smart grid with automated demand response features.
18. Analyze the impact of cable insulation types on transmission line performance.
19. Develop a program to assess the impact of electric vehicle charging on distribution networks.
20. Create a user interface for managing and visualizing distribution network assets and their conditions.

CCSN-201 DATA STRUCTURE USING 'C' L T P 3 1 0

Unit - I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off.Abstract Data Types (ADT), Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation and Dynamic Operations on a Linked List. Insertion, Deletion, Traversal, Generalized Linked List.

UNIT - II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C.

UNIT – III

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

UNIT – IV

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks.

UNIT - V

Searching: Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Practical consideration for Internal Sorting.

Search Trees: Binary Search Trees (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees.

Hashing Hash Function, Collision Resolution Strategies.

Storage Management: Garbage Collection and Compaction.

Text Books:

1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
2. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia, Delhi- 2002
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
4. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
5. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
6. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore)

CCSN-203 **DBMS** **L T P 3 1 0**

Unit- I Introduction:
An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and database language and interfaces, Data definitions language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model, extended ER model, relationships of higher degree.

Unit- II Relational data Model and Language:
Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

Unit- III Data Base Design & Normalization:
Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit- IV Transaction Processing Concepts:
Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Unit- V Concurrency Control Techniques:
Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

Text Books

1. Date C J, “An Introduction To Database System”, Addision Wesley
2. Korth, Silbertz, Sudarshan, “Database Concepts”, McGraw Hill
3. Elmasri, Navathe, “Fundamentals Of Database Systems”, Addision Wesley
4. Leon & Leon, “Database Management System”, Vikas Publishing House.
5. Bipin C. Desai, “An introduction to Database Systems”, Galgotia Publication
6. Majumdar & Bhattacharya, “Database Management System”, TMH
7. Ramakrishnan, Gehrke, “Database Management System”, McGraw Hill
8. Kroenke, “Database Processing: Fundamentals, Design and Implementation”, Pearson Education.
9. Maheshwari Jain, “DBMS: Complete Practical Approach”, Firewall Media, New Delhi

CCSN-205 OPERATING SYSTEMS (UNIXPROGRAMMING) L T P
3 1 0

UNIT - I:Operating System Introduction:
Operating Systems Objectives and functions, Computer SystemArchitecture, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Opening System Design and Implementation, OS Structure, Virtual machines.

UNIT - II: Process and CPU Scheduling :-
Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling, Casse studies: Linux, Windows.Process Coordination - Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

UNIT - III: Memory Management and Virtual Memory :
Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table. Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demanding Paging, Page Replacement Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT - IV: File System Interface :-
The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.
Mass Storage Structure - Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap space Management.

UNIT - V: Deadlocks -:
System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.
Protection - System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

TEXT BOOKS:

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

REFERENCES BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. Operating Systems, A. S. Godbole, 2nd Edition, TMH
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, S, Haldar and A. A. Arvind, Pearson Education.
7. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
8. Operating Systems in depth, T. W. Doeppner, Wiley.

JAVA PROGRAMMING

CCSN-207 **Cr. L T P**

4 3 1 0

Unit – I

Introduction to Java: Importance and features of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping: if..else, switch,?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

Unit – II

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Run able interface, inter thread Communication, suspending, resuming and stopping threads.

Unit - III

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. . Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming

Unit – IV

The Collection Framework: collection interfaces, collection classes(ArrayList, LinkedList, Hash set), Accessing a Collection via an Iterator, Vector, More utility class: StringTokenizer, Date.

Unit – V

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, Java Applet. Beans: Introduction to Java Beans and Swings, Servlets

Reference Books:

1. Patrick Naughton and Herbertz Schildt, "*Java-2 the Complete Reference*", TMH, 7th Edition, 2006.
2. E. Balaguruswamy, "*Programming with Java:* A Primer", TMH, First Reprint, 2007.
3. Horstmann, "*Computing Concepts with Java 2 Essentials*", John Wiley and sons inc, Third Edition, 2003.
4. Kathy Sierra, "*Head First Java*", O'Rielly, Second Edition, February 2005.

CCSN 209 A **Engineering Mathematics I**

Unit 1: Differential Calculus

Exploration of functions, limits, continuity, and differentiability, with applications of Mean Value Theorems, Taylor and Maclaurin series, partial differentiation, and optimization of multivariable functions.

Unit 2: Integral Calculus

Study of integration, including definite and indefinite integrals, and applications in calculating areas, volumes, and surfaces. Introduction to improper integrals, Beta and Gamma functions.

Unit 3: Matrices

Comprehensive study of matrices, including their types, properties, and rank. Analysis of systems of linear equations, eigenvalues, eigenvectors, and diagonalization.

Unit 4: Vector Calculus

Concepts of scalar and vector fields, with operations including gradient, divergence, and curl. Application of line, surface, and volume integrals, along with Green's, Stokes', and Gauss' theorems.

Unit 5: Differential Equations

Focus on ordinary differential equations of the first order and higher-order linear differential equations. Applications of differential equations in engineering contexts, with an introduction to partial differential equations.

CCSN 209 B **Basic Mathematics I**

Unit 1: Algebra

Covers fundamental concepts in algebra, including expressions, equations, polynomials, factorization, and quadratic equations. Introduces inequalities and basic concepts of logarithms and exponents.

Unit 2: Trigonometry

Explores trigonometric ratios, identities, and equations. Examines the properties and applications of angles, the unit circle, and trigonometric functions, including inverse functions and their graphs.

Unit 3: Coordinate Geometry

Introduction to the Cartesian coordinate system, distance formula, and the equation of a line. Covers the slope, intercepts, and different forms of line equations, with applications in solving geometric problems.

Unit 4: Calculus Basics

Foundational concepts in calculus, focusing on limits, continuity, and the basics of differentiation and integration. Includes basic applications of derivatives and integrals in solving practical problems.

Unit 5: Statistics and Probability

Introduction to data representation, measures of central tendency, and measures of dispersion. Covers basic probability concepts, including probability rules, simple events, and introduction to combinatorics.

CCSN 209 C STATISTICAL TECHNIQUES IN COMPUTER SCIENCE

Unit 1: Descriptive Statistics

Overview of data types, data collection, and summarization. Techniques for organizing and visualizing data, including frequency distributions, histograms, and scatter plots. Measures of central tendency, variability, skewness, and kurtosis.

Unit 2: Probability Theory

Basic concepts of probability, conditional probability, and Bayes' theorem. Random variables, probability distributions, and expectations. Introduction to discrete and continuous distributions, including the binomial, Poisson, and normal distributions.

Unit 3: Statistical Inference

Fundamentals of estimation and hypothesis testing. Confidence intervals for means and proportions, t-tests, chi-square tests, and ANOVA. Introduction to p-values, statistical significance, and decision-making based on hypothesis testing.

Unit 4: Regression Analysis

Simple and multiple linear regression models, least squares estimation, and interpretation of regression coefficients. Assumptions of regression, diagnostic checks, and introduction to logistic regression for binary outcomes.

Unit 5: Machine Learning and Data Mining Applications

Application of statistical techniques in supervised and unsupervised learning, including classification and clustering. Evaluation metrics for models, cross-validation, and introduction to decision trees, k-means clustering, and support vector machines.

CCSN 209 D **ELEMENT MATHEMATICS**

Unit 1: Basic Arithmetic

Focuses on fundamental arithmetic operations, including addition, subtraction, multiplication, and division. Covers concepts of fractions, decimals, percentages, ratios, and proportions.

Unit 2: Algebraic Expressions and Equations

Introduces basic algebraic expressions, simplification, and evaluation. Covers linear equations, inequalities, and problem-solving techniques using algebraic methods.

Unit 3: Geometry

Explores basic geometric shapes and properties, including points, lines, angles, triangles, circles, and polygons. Covers concepts of perimeter, area, and volume for various shapes.

Unit 4: Trigonometry Basics

Introduction to trigonometric ratios and basic identities. Covers angle measurements, right-angled triangle properties, and applications of trigonometry in simple geometric problems.

Unit 5: Statistics and Data Interpretation

Introduction to data collection, organization, and representation using tables, charts, and graphs. Covers measures of central tendency, such as mean, median, and mode.

DISCRETE MATHEMATICS

CCSN-209 **CR L-T-P**
4- 3-1-0

Unit-I

Set : Definition of sets, countable and uncountable sets, Venn Diagrams, Power set, Partition of sets, cardinality, inclusion-exclusion principles, proofs on some general identities on sets. **Relation-**Definition, types of relation, composition of relations, pictorial representation of relation, equivalence relation, partial ordering relation. **Function-**Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions. **Theorem Proving Techniques** mathematical induction, pigeonhole principle, proves by contradiction.

Unit-II

Algebraic Structures: Definition, Properties, types: Semi Group, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, cosets, factor group, permutation groups, Normal subgroup, Homomorphism and isomorphism of groups, example and standard results, rings and fields.

Unit-III

Posets, Hasse Diagram and Lattices: Introduction, ordered sets, Hasse diagram of partially ordered set, isomorphic ordered sets, well ordered set, properties of Lattces, bounded lattices and Complemented lattices. **Boolean Algebra** Basic definitions, sum of products and product of sums forms, Logic gates and Karnaugh maps.

Unit-IV

Propositional Logic: Proposition, logic operators, first order predicate logic, truth tables, tautologies,arguments,contradictions, logical implications, logical equivalence, predicates, universal and existential quantifiers.

Unit-V

Graphs & Combinatorics: Recurrence Relation, Generating function, simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, Euler graphs, Hamiltonian path and circuits, Adjacency and Incidence Matrices Graph coloring number, chromatic number, **Tree** Definiton, Rooted tree, properties of trees, binary search tree, tree traversal.

Reference Books:

1. Seymour Lipschutz & M.L. Lipson, *Discrete Mathematics*, Tata Mc Graw Hill, 2nd Edition, 1999.
2. Trembley, J.P & R. Manhor, *Discrete Mathematical Structure with Application to Computer Science*, McGraw Hill, 1997.
3. Kennth H. Rosen, *Discrete Mathematical and its applications,* McGraw Hill, 4th Edition, 2002.
4. JL Morr, A Kandal and TP Baker, *Discrete Mathematics for Computer Scientists* and Mathematics, PHI, 1999.
5. Deo, Narsingh, *Graph Theory With application to Engineering and Computer Science*, PHI, 2007

VALUE EDUCATION,HUMAN RIGHTS AND LEGISLATIVE PROCEDURES

L T P 4 0 0

CBSN-201

Unit-I: Course Introduction

Need, Basic Guidelines, Content & Process for value education, Self-Exploration, Natural Acceptance & Experimental validation, Happiness & Prosperity.

Unit-II:

Understanding harmony in the human being, Understanding the need of self & Body (Sukh&Suvidha , Sanyam&Swasthya)

Unit-III:

Understanding harmony in the faculty & society, Harmony in human relationship

Unit-IV:

Understanding harmony in the nature and Existence

Unit-V :

Natural acceptance of human values, Definitiveness of ethical human conduct, Basis of human education.

Text Books :

1. B.P. Banerjee, 2005 Foundations of ethics and management.
2. B.L. Bajpai, 2004 Indian Ethos and modern management, New royal book co. Lucknow. Reprinted 2008

CBCN-201 A **PERSONALITY DEVELOPMENT- I**

Unit 1: Introduction to Personality Development Understanding the concept and definition of personality, characteristics of a well-developed personality, factors influencing personality, and the importance of personality development in personal and professional life.

Unit 2: Self-Awareness and Self-Analysis Exploring self-awareness as a foundation for personality development, techniques for self-analysis, understanding strengths and weaknesses, and developing self-confidence and self-esteem.

Unit 3: Communication Skills Understanding effective communication, verbal and non-verbal communication, importance of active listening, barriers to communication, and building interpersonal communication skills.

Unit 4: Goal Setting and Time Management Introduction to goal setting, setting SMART goals, significance of time management in personality development, techniques to manage time effectively, and prioritization of tasks.

Unit 5: Positive Thinking and Attitude Building Understanding the power of positive thinking, building a positive attitude, overcoming negativity, strategies for developing an optimistic outlook, and how attitude impacts personal growth.

CBCN-201 B BEHAVIOUR SKILL-I

Unit 1: Introduction to Behavioural Skills and Self-Perception This unit introduces the concept of behavioural skills, the importance of developing such skills for personal and professional growth, and understanding self-perception. It explores how self-concept and perception influence behaviour and interaction with others.

Unit 2: Emotional Intelligence and Self-Regulation This unit covers the fundamentals of emotional intelligence, its components, and the role it plays in enhancing personal and social effectiveness. It includes self-regulation techniques, managing emotions in various situations, and the significance of empathy in building stronger relationships.

Unit 3: Communication and Active Listening Skills This unit focuses on developing strong communication skills, with an emphasis on active listening as a vital behavioural skill. It covers how to interpret non-verbal cues, understand communication barriers, and adapt communication styles to various social and professional settings.

Unit 4: Conflict Resolution and Problem-Solving Techniques This unit explores strategies for resolving conflicts in a constructive manner, understanding different conflict management styles, and effective problem-solving techniques. It highlights the importance of maintaining composure and logical thinking in difficult situations.

Unit 5: Adaptability, Teamwork, and Leadership Behaviour This unit emphasizes the importance of adaptability in dynamic environments, developing teamwork abilities, and understanding leadership behaviour. It covers how to foster collaboration, build trust among team members, and demonstrate leadership qualities in group settings to enhance collective performance.

CBCN-201 C **LANGUAGE PROFICIENCY AND ENGLISH I**

Unit 1: Basics of Grammar and Sentence Structure This unit covers the foundational elements of English grammar, including parts of speech, sentence formation, subject-verb agreement, tenses, and basic punctuation. It emphasizes constructing correct and coherent sentences for effective communication.

Unit 2: Vocabulary Building and Usage This unit focuses on expanding vocabulary through synonyms, antonyms, idioms, and phrases. It includes practical exercises to enhance word usage, contextual understanding, and the application of new words in speaking and writing.

Unit 3: Reading Comprehension and Analysis This unit involves developing skills for reading and understanding various types of texts, such as passages, articles, and stories. It emphasizes techniques for skimming, scanning, and critical analysis, along with answering comprehension questions effectively.

Unit 4: Writing Skills and Composition This unit covers the basics of writing clear and coherent paragraphs, essays, and short compositions. It includes practices for writing formal and informal letters, emails, and other basic written communication, focusing on structure and clarity.

Unit 5: Speaking and Listening Skills This unit emphasizes improving pronunciation, fluency, and speaking confidence. It involves listening exercises for understanding spoken English in different contexts, building conversational skills, and participating in discussions, role-plays, and presentations to enhance oral communication proficiency

CBSN-201 D PUBLIC SPEAKING AND PRESENTATION I

Unit 1: Introduction to Public Speaking

This unit covers the fundamentals of public speaking, including its importance in personal and professional contexts. Students will explore different types of speeches, such as informative, persuasive, and special occasion speeches. The unit will also introduce key elements of effective communication, including audience analysis, purpose identification, and the role of ethics in public speaking.

Unit 2: Speech Preparation

In this unit, students will learn the process of preparing a speech. This includes selecting a topic, conducting research, organizing content logically, and crafting an outline. Emphasis will be placed on the importance of developing a strong thesis statement and using evidence effectively to support arguments. Additionally, students will practice writing introductions and conclusions that engage the audience.

Unit 3: Delivery Techniques

This unit focuses on the various delivery methods for speeches, including extemporaneous, memorized, and manuscript delivery. Students will learn about body language, vocal variety, and the use of pauses. Practical exercises will help students develop their delivery skills, emphasizing the importance of confidence, eye contact, and audience engagement.

Unit 4: Use of Visual Aids

Students will explore the role of visual aids in enhancing presentations. This unit will cover different types of visual aids, such as slides, charts, graphs, and props, and best practices for their effective use. Emphasis will be placed on how to create visually appealing slides that complement the spoken message rather than distract from it.

Unit 5: Handling Questions and Feedback

This unit addresses the importance of managing audience questions and feedback during and after a presentation. Students will learn strategies for anticipating questions, handling difficult audience members, and responding to feedback constructively. Role-playing exercises will allow students to practice these skills in a supportive environment.

CCSN-251 DATA STRUCTURE USING C LAB

1. Create, display, insert, delete, and search elements in an array.
2. Implement stack operations using arrays with push, pop, and display functions.
3. Create a stack using a linked list and perform push and pop operations.
4. Convert an infix expression to postfix using a stack.
5. Evaluate a given postfix expression using stack operations.
6. Implement queue operations using arrays including enqueue, dequeue, and display.
7. Create a dynamic queue using a linked list and implement enqueue and dequeue operations.
8. Implement a circular queue with functions for enqueue and dequeue.
9. Create and traverse a singly linked list with insert and delete operations.
10. Implement a doubly linked list with functions for inserting, deleting, and traversing nodes.
11. Create a circular linked list and perform insertion and deletion operations.
12. Search for an element using the binary search algorithm on a sorted array.
13. Search for an element using the linear search method in an array.
14. Create a binary tree and perform pre-order, in-order, and post-order traversals.
15. Implement a binary search tree (BST) with node insertion, searching, and tree traversal.
16. Represent a graph using an adjacency matrix and display the matrix.
17. Traverse a graph using the breadth-first search (BFS) algorithm.
18. Implement depth-first search (DFS) for graph traversal.
19. Use a linked list to represent and add two polynomials.
20. Sort an array using the merge sort algorithm.

CCSN-253 **DBMS LAB**

1. HTML Basics
2. CSS Styling
3. JavaScript Basics
4. Responsive Web Design with Bootstrap
5. Creating a Simple Web Form
6. Validating Form Inputs with JavaScript
7. AJAX Requests with jQuery
8. Fetch API for Asynchronous Requests
9. JSON Data Handling
10. Introduction to PHP
11. Database Connectivity with MySQL
12. CRUD Operations in PHP
13. Using PHP Sessions
14. Implementing User Authentication
15. Creating RESTful APIs
16. Introduction to WordPress
17. Building a Simple Website with WordPress
18. Implementing Web Security Practices
19. Web Hosting and Deployment
20. Introduction to Content Management Systems (CMS)

CCSN-255 JAVA PROGRAMING LAB

1. Hello World Program
2. Basic Calculator
3. Swap Two Numbers
4. Check Prime Number
5. Factorial of a Number
6. Fibonacci Series
7. Palindrome Checker
8. String Reversal
9. Array Sorting (Bubble Sort)
10. Linear Search in an Array
11. Binary Search in an Array
12. Implementing a Simple Class
13. Method Overloading
14. Exception Handling
15. File Handling (Read/Write)
16. Multi-threading Example
17. Creating a Simple GUI with Swing
18. Simple Java Swing Application
19. Database Connectivity (JDBC)
20. Building a Simple Web Application with Java Servlets

CCSN- 202 Object Oriented Programming Using C++

L	T	P	Cr
3	1	0	4

UNIT I:

Introduction to C and C++: History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

UNIT II:

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

UNIT III:

Functions: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Arrays: Creating and Using One Dimensional Arrays- (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops, Use Various types of arrays (integer, float and character arrays / Strings).

Two-dimensional Arrays- (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Derived Data Types (Structures and Unions), Pointers and References in C++,

Memory Allocation in C++ - Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

UNIT IV:

File I/O, Preprocessor Directives: Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros. **Using Classes in C++:** Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

UNITV:

Overview of Function Overloading and Operator Overloading

Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators)

Inheritance, Polymorphism and Exception Handling

Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books

1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
2. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
5. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
6. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
7. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
8. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
9. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
10. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 201

CCSN- 204	Design And Analysis of Algorithm	L	T	P	Cr
		3	1	0	4

Unit- I

Introduction: Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.

Unit- II

Advanced Data Structures: Red-Black Trees, B – trees, Binomial Heaps, Fibonacci Heaps.

Unit- III

Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching.

Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Minimum Spanning trees – Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.

Unit- IV

Dynamic programming with examples such as Knapsack. All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.

Unit- V

Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

Text books:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

References:

1. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
2. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
3. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997 4. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.
5. Harsh Bhasin,"Algorithm Design and Analysis",First Edition,Oxford University Press.
6. Gilles Brassard and Paul Bratley,Algorithmics:Theory and Practice,Prentice Hall,1995

CCSN- 206	Internet and Web Technology	Cr	L	T	P
		4	3	1	0

Unit 1

Introduction web: WWW, History, Protocols, Creating website for individual and corporate, Identification of objects, Cyber Laws, Web team, Communication, Quality assurance, Search Engine, Designing strategies, Database to web applications.

Unit 2

HTML: History of HTML, Structure of html, Switching between editor and browser, Header, body, list, tables, images, Forms, Frames. Cascade Style Sheets: Introduction, Style sheets, Embedding style sheets, grouping style sheets.

Unit 3

JavaScript: Introduction, Variables, Conditional statements, Operators, Popup box, Functions, Loops, Strings, Events, JavaScript and HTML, JavaScript Object Oriented Programming, Java beans: Introduction.

Unit 4

Java Server Pages: Introduction, Features of JSP, Working with JSP Technology, JSP Processing: JSP Architecture, JSP Application design, JSP Scripting elements, JSP Syntax basics, Background of web server, Web Server, Apachi HTTP Server.

Unit 5

JSP Directives, Types of directives, JSP Actions, Component Object Model, JSP and Java Beans, JDBC, Database programming with JDBC, JDBC Drivers, JDBC Application Architecture, Steps to connect the application to database, Introduction to Struts and Swings.

Reference Books:

1. Ivan Bayross " HTML, DHTML and JavaScript", Prentice Hall Inc., 3rd Edition, 2003.

2. Uttam K. Roy, "Web Technoologies", Oxford, 1st Edition 2010.

3. Tanweer Alam, "Internet and Java Programming", Khanna Book Publication, 1st Edition, 2010.

CCSN-208 **COMPUTER NETWORKS** **L T P Cr**
3 1 0 4

UNIT I

Introduction - Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design – Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling

UNIT II

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer -Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

UNIT III

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

UNIT IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

UNIT V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Text Books:

1.Computer Networks, by Andrew S Tanenbaum, PHI. (2010)
2.Data and Computer Communications , by Walliam Stallings, PHI. (2002)

Reference Books:

1.Data Communications, Computer networking on OSI , by Fred Halsall, Addison Wesley Publishing Co.1998
2.Computer Networking -A Top-Down Approach Featuring the Internet , James F. Kurose and Keith W. Ross , Addison Wesley Publishing Co. 2004
3.Computer Networks: Protocols standards and interfaces , by Uyless Black, Prentice Hall.2002
4.Data communication & Networks , by Behrou A. Forouzan, Tata McGraw Hill. 2002

CCSN- 210 Formal Languages & Automation Theory

L	T	P	Cr
3	1	0	4

UNIT I:

Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem

UNIT II:

Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA, Pumping lemma.

UNIT III:

Context Free Languages – Leftmost and rightmost derivation, parsing and ambiguity, ambiguity in grammar and languages, normal forms

Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF.

UNIT IV:

Pushdown Automata – NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG.

UNIT V:

Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Decidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory, Chomsky Hierarchy

Textbooks:

1.An Introduction to Formal Languages and Automata, by Peter Linz, Third Edition, Narosa Publishers (1998)

2. Hopcroft, Ullman, "Introduction to Automata Theory,Languages and Computation", Pearson Education 3. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI Learning Private Limited, Delhi India.

4.Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishing house.

5. Y.N.Singh "Mathematical Foundation of Computer Science", New Age International.

6. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI Learning Private Limited, Delhi India.

7. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation, Pearson Education.

CCSN-212 **NANO SCIENCES**

Unit 1: Introduction to Nanosciences This unit introduces the fundamental concepts of nanoscience, including definitions and significance of nanomaterials. It explores the historical development of nanotechnology, key terminology, and the differences between macro, micro, and nano scales. Students will also learn about the various classes of nanomaterials and their unique properties.

Unit 2: Synthesis of Nanomaterials In this unit, students will explore various methods for synthesizing nanomaterials, including top-down and bottom-up approaches. The unit will cover techniques such as chemical vapor deposition, sol-gel processes, electrospinning, and self-assembly. Emphasis will be placed on the advantages and limitations of each method, as well as their applications in different fields.

Unit 3: Characterization Techniques This unit focuses on the techniques used to characterize nanomaterials. Students will learn about methods such as transmission electron microscopy (TEM), scanning electron microscopy (SEM), atomic force microscopy (AFM), and X-ray diffraction (XRD). The unit will also cover spectroscopic techniques like Raman spectroscopy and UV-Vis spectroscopy, and their importance in analyzing the structural, chemical, and physical properties of nanomaterials.

Unit 4: Properties of Nanomaterials In this unit, students will investigate the unique properties of nanomaterials that differentiate them from bulk materials. This includes discussions on electrical, optical, thermal, and mechanical properties at the nanoscale. Students will explore phenomena such as quantum confinement and surface effects, as well as the implications of these properties for various applications.

Unit 5: Applications of Nanotechnology This unit covers the diverse applications of nanotechnology across various fields, including medicine, electronics, energy, and materials science. Students will study topics such as drug delivery systems, nanosensors, nanocomposites, and renewable energy solutions. Case studies highlighting current advancements and future trends in nanotechnology will be included.

CBSN-202 TECHNICAL ENGLISH

Unit 1: Fundamentals of Technical English

This unit introduces the basic concepts of technical English, focusing on its significance in professional communication. It covers essential terminology, the role of technical English in various industries, and the differences between technical and general English.

Unit 2: Reading and Comprehension Skills

This unit emphasizes reading skills necessary for understanding technical documents. It includes strategies for skimming, scanning, and critical reading of technical texts, manuals, and reports. Students will practice comprehension exercises to enhance their ability to extract relevant information.

Unit 3: Writing Technical Documents

This unit focuses on the structure and format of various technical documents, such as reports, proposals, user manuals, and technical specifications. It covers the principles of clear and concise writing, the use of appropriate language, and the incorporation of visuals like charts and graphs to support written communication.

Unit 4: Presentation and Speaking Skills

This unit develops oral communication skills relevant to technical contexts. It includes techniques for effective presentations, including planning, organization, delivery, and the use of visual aids. Students will also practice public speaking and responding to questions in a professional setting.

Unit 5: Collaborative Communication and Interpersonal Skills

This unit addresses the importance of teamwork and interpersonal communication in technical fields. It covers skills for effective collaboration, including active listening, providing constructive feedback, and managing conflicts. It also explores the use of communication technologies for teamwork and project management.

TECHNICAL COMMUNICATION L T P 2 0 0

CBSN-202 A

Unit-1

Communicative Grammar: Spotting the errors pertaining to parts of speech, nouns, pronouns, adjective, adverbs, preposition,conjunction, genders, infinitives, participles, form of tenses, use of articles ; Concord - grammatical concord, notional concord and the principle of proximity between subject and verb and other exceptional usages.Lexis: Idioms and phrases; Words often confused; One-Word Substitutes; Foreign Words (A selected list may be included for all the above components); Formation of words (suffixes, prefixes and derivatives).

Unit-2

Oral Communication:

Part-A: Introduction to principal components of spoken English – Word-stress patterns, Intonation, Weak forms in English

Part-B: Developing listening and speaking skills through various activities, such as (a) role play activities, (b) Practicingshort dialogues (c) Group discussion (d) Debates (e) Speeches (f) Listening to news bulletins (g) Viewing and reviewing T.V.programs etc.

Unit-3

Written Communication:Developing reading and writing skills through such tasks/activities as developing outlines, key expressions, situations, slogan writing and theme building exercises Reading verbal and non-verbal texts-like cartoons, Graphs and tabulated data etc.

Technical Writing:

(a) Business Letters, Format of Business letters and Business letter writing-Fully-blocked layout may be used.

(b) E-mail writing

(c) Reports, Types of Reports and Format of Formal Reports

(d) Press Report Writing

Unit-4

(For Internal Evaluation Only):

Book Review – Herein the students will be required to read and submit a review of a book (Literary or non literary) of their ownchoice. This will be followed by a presentation of the same in the class

Suggested Reading:

Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press

Common Errors in English, AbulHashem, Ramesh Publishing House, new Delhi.

Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.

Spoken English for India, R.K. Bansal& J.B. Harrison, Orient Longman, Delhi.

The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.

CBSN-202 B TECHNICAL PRESENTATION SKILLS

Unit 1: Introduction to Technical Presentations

This unit provides an overview of technical presentations, emphasizing their purpose, importance, and key characteristics. It covers the components of an effective presentation and the role of technical communication in conveying complex information clearly and effectively.

Unit 2: Planning and Structuring Presentations

This unit focuses on the planning stage of presentations, including identifying the audience, defining objectives, and researching content. It addresses how to organize information logically, create outlines, and develop a clear structure that includes an introduction, body, and conclusion.

Unit 3: Designing Visual Aids

This unit explores the use of visual aids in presentations, such as slides, charts, graphs, and handouts. It discusses principles of effective design, including clarity, simplicity, and relevance. Students will learn how to create visually appealing materials that enhance understanding and retention.

Unit 4: Delivery Techniques and Strategies

This unit covers techniques for delivering technical presentations effectively. It includes vocal skills, body language, and engaging the audience. Strategies for managing anxiety and improving confidence in public speaking are also discussed, along with the importance of practice and feedback.

Unit 5: Handling Questions and Feedback

This unit focuses on interacting with the audience during and after a presentation. It addresses strategies for handling questions, managing discussions, and responding to feedback constructively. Students will learn techniques for maintaining control and fostering an interactive atmosphere during presentations.

CBSN-202 C USER MANUALS AND GUIDES

Unit 1: Introduction to User Manuals and Guides

This unit provides an overview of user manuals and guides, their purpose, and significance in technical communication. It covers the different types of user documentation, the target audience, and the role of user manuals in enhancing user experience and product usability.

Unit 2: Principles of User-Centered Design

This unit focuses on the principles of user-centered design in the creation of manuals and guides. It discusses the importance of understanding user needs, preferences, and skills. Techniques for user research, persona development, and usability testing are explored to ensure documentation meets user expectations.

Unit 3: Content Development and Organization

This unit emphasizes the process of developing content for user manuals and guides. It covers techniques for gathering information, writing clear and concise instructions, and organizing content logically. It also addresses the importance of creating effective headings, subheadings, and lists to enhance readability.

Unit 4: Visual Elements and Formatting

This unit explores the use of visual elements in user manuals, including diagrams, screenshots, and illustrations. It discusses the principles of effective formatting, layout design, and the use of typography to improve the overall presentation of the document. Techniques for integrating visuals with text to enhance understanding are also covered.

Unit 5: Review, Revision, and Maintenance

This unit focuses on the importance of reviewing and revising user manuals and guides for accuracy and clarity. It discusses the processes for editing, proofreading, and incorporating user feedback. Additionally, it addresses strategies for maintaining and updating documentation to ensure it remains relevant and effective over time.

CBSN-202 D BUSINESS COMMUNICATION

Unit 1: Introduction to Business Communication

In this unit, students will explore the significance of communication within the business environment. It will cover the various forms of communication, including verbal, non-verbal, written, and visual communication. The unit will address the barriers that can hinder effective communication and discuss strategies to overcome these obstacles. Additionally, the role of technology in facilitating business communication will be examined.

Unit 2: Written Communication

This unit focuses on the principles of written communication in a business context. Students will learn about the structure and format of essential business documents such as letters, emails, memos, and reports. The emphasis will be on techniques that promote clarity, conciseness, and coherence in writing. The importance of tone and style will also be highlighted, alongside guidelines for creating effective proposals and presentations.

Unit 3: Oral Communication

In this unit, students will gain insights into the fundamentals of effective speaking within a business setting. They will explore techniques for delivering engaging presentations and public speaking skills. The unit will address the significance of body language and voice modulation in communication, as well as strategies for conducting productive meetings and discussions.

Unit 4: Interpersonal Communication

This unit will delve into the nature of interpersonal communication and its critical role in business interactions. Students will develop skills in active listening and providing constructive feedback. The unit will also cover conflict resolution techniques and negotiation skills, emphasizing how to build and maintain professional relationships through effective communication.

Unit 5: Business Communication in a Global Context

Students will examine the challenges and strategies associated with cross-cultural communication in this unit. The importance of understanding diversity in communication styles and practices will be emphasized. The impact of globalization on business communication will also be discussed, along with ethical considerations and etiquette when communicating in an international business environment.

CCSN-252 OBJECT ORIENTED PROGRAMMING USING C++ LAB

1. Class and Object Creation
2. Constructors and Destructors
3. Inheritance
4. Method Overriding
5. Abstract Classes and Pure Virtual Functions
6. Operator Overloading
7. Function Overloading
8. Friend Function
9. Static Members
10. Template Class
11. Exception Handling
12. File Handling
13. Virtual Destructors
14. Multiple Inheritance
15. Composition
16. Dynamic Memory Allocation
17. Linked List Implementation
18. Binary Tree Implementation
19. Polymorphism with Pointers
20. Real-World Example: Banking System

CCSN-254 **DESIGN AND ANALYSIS OF SLGORITHMS LAB**

1. Bubble Sort
2. Selection Sort
3. Insertion Sort
4. Merge Sort
5. Quick Sort
6. Heap Sort
7. Counting Sort
8. Radix Sort
9. Binary Search
10. Linear Search
11. Depth-First Search (DFS)
12. Breadth-First Search (BFS)
13. Dijkstra's Algorithm
14. Prim's Algorithm
15. Kruskal's Algorithm
16. Floyd-Warshall Algorithm
17. Knapsack Problem (0/1 Knapsack)
18. Dynamic Programming - Longest Common Subsequence
19. Backtracking - N-Queens Problem
20. Greedy Algorithm - Activity Selection Problem

CCSN-256 INTERNET AND WEB TECHNOLOGY LAB

1. HTML Basics
2. CSS Styling
3. JavaScript Basics
4. Responsive Web Design with Bootstrap
5. Creating a Simple Web Form
6. Validating Form Inputs with JavaScript
7. AJAX Requests with jQuery
8. Fetch API for Asynchronous Requests
9. JSON Data Handling
10. Introduction to PHP
11. Database Connectivity with MySQL
12. CRUD Operations in PHP
13. Using PHP Sessions
14. Implementing User Authentication
15. Creating RESTful APIs
16. Introduction to WordPress
17. Building a Simple Website with WordPress
18. Implementing Web Security Practices
19. Web Hosting and Deployment
20. Introduction to Content Management Systems (CMS)

SOFTWARE ENGINEERING

CCSN-301 **Cr L-T-P**
4 3- 1-0

UNIT - I

Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT - II

Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.

Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT - III

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

UNIT - IV

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products.

Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

UNIT - V

Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

References:

1. RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.

COMPILER DESIGN

CCSN303 **Cr L-T-P**

4 3- 1- 0

Unit - I

Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications tolexical analysis, Optimization of DFA-Based Pattern Matchersimplementation of lexical analyzers, lexical-analyzer generator, LEXcompiler,Formal grammars and their application to syntax analysis,BNF notation, ambiguity, YACC. The syntactic specification ofprogramming languages: Context free grammars, derivation andparse trees, capabilities of CFG.

Unit – II

Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables.

Unit - III

Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code,postfix notation, Parse trees & syntax trees, three address code,quadruple & triples, translation of assignment statements, Booleanexpressions, statements that alter the flow of control, postfixtranslation, translation with a top down parser. More abouttranslation: Array references in arithmetic expressions,

Unit - IV

Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simplestack allocation scheme, storage allocation in block structuredlanguage. Error Detection & Recovery: Lexical Phase errors,syntactic phase errors semantic errors.

Unit - V

Code Generation: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimizationof Basic Blocks, Code Generator.Code optimization: Machine-Independent Optimizations, Loopoptimization, DAG representation of basic blocks, value numbers andalgebraic laws, Global Data-Flow analysis.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, "*Principles of Compiler Design"*, Narosa Publication, 2002
2. A.V. Aho, R. Sethi and J.D Ullman, "*Compiler: principle, Techniques and Tools"*, Addision Wesley, 2nd Edition, 2006.
3. H.C. Holub, "*Compiler Design in C"*, Prentice Hall Inc, Second Edition, Digitized Edition, 2010.
4. O.G. Kakde, "*Compiler Design"*, Laxmi Publication, Seventh Edition, 2007

OBJECT ORIENTED ANALYSIS AND DESIGN

CCSN-305 **Cr L-T-P**
4 3-1-0

Unit – I

Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract
class, multiple inheritance, meta data, candidate keys, constraints.

Unit – II

Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic,modeling concepts, a sample dynamic model.

Unit – III

Functional Modeling: Data flow diagram, specifying operations, constraints, a sample functional model.OMT
(object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons
of methodologies, SA/SD, JSD.

Unit – IV

Java Programming: Introduction, Operator, Data types, Variables, Methods & Classes, Multithread
Programming, I/O, Java Applet.
Java Library: String Handling, Input/Output exploring Java.io, Networking, Applets classes, Event
Handling, Introduction to AWT, Working with window, Graphics, AWT Controls, Layout Manager and
Menus, Images, Additional packages.

Unit – V

Software Development using Java:
Java Beans, Java Swing, Java Servlets, Migrating from C++ to java, Application of java, Dynamic
Billboard Applet, Image Menu: An image based menu, Lavatron Applets, Scrabblets, JDBC, Brief
functioning of upper layer E-mail and their applications.

Text Books:

1. James Rumbaugh etal, “Object Oriented Modeling and Design”, PHI
2. Herbert Schieldt, “The Complete Reference: Java”, TMH.
3. E. Balagurusamy, “Programming in JAVA”, TMH.

References:

1. Booch Grady, “Object Oriented Analysis & Design with application 3/e”, Pearson Education, New Delhi.
2. Bjarne Stroustrup, “C++ Programming Language”, Addison Wesley
3. E. Balagurusamy, “Object Oriented Programming with C++”, TMH

CRYPTOGRAPHY AND INFORMATION SECURITY

CCSN-307 **Cr L-T-P**
4 3-1-0

Unit - I

Introduction to the Concept of Security: Introduction to Computer Security, Network Security, Cryptology & Cryptography, Introduction to Security attacks, Services and Mechanism. **Symmetric Key Encipherment:** Conventional encryption Model, Classical encryption techniques substitution ciphers & transposition ciphers, Crytanalysis, Stereography, Stream &Block Ciphers

Unit - II

Block Ciphers: Block Cipher Principals, Shannon's Theory of Confusion and Diffusion, Fiestal structure, DES, Strength of DES, Differential & Linear Cryptanalysis of DES, Block Cipher Modes of operation, Triple DES, IDEA encryption & Decryption, Strength of IDEA, Confidentiality using Conventional Encryption, Traffic confidentiality, key distribution, random number generation

Unit - III

Mathematics of Cryptography: Introduction to Graph, Ring and Field, Prime and relative prime numbers, Modular Arithmetic**,** Fermat's & Euler's Theorem, Primality Testing, Euclid's Algorithm, Chinese remainder theorem, Discrete logarithms. **Asymmetric Key Encipherment:** Principals of public key cryptosystems, RSA Algorithms, Security of RSA, key management, Diffle- Hellman key exchange algorithm, Introductory idea if Elliptic curve Cryptography, Elganal Encryption.

Unit - IV

Integrity, Authentication & Hash Function: Authentication requirements, Authentication functions, Message Authentication Codes. Hash functions, Birthday Attacks, Security of Hash function & MAC, MD5 Message Digest Algorithm, Secure Hash Algorithm. **Digital Signatures:** Digital Signature, Authentication Protocol, DSS, Proof of Digital Signature Algorithms.

Unit - V

Network Security Applications: Authentication Applications: Kerberos & X.509, Directory Authentication Services **E-Mail Security:** PGP, S/MIME.**IP Security:** Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, key management. **Web Security:** Secure Socket Layer & Transport Layer Security , Secure electronic Transaction, **System Security:** Intruder, Intrusion Detection, Password Management. **Malicious Software:** Viruses and related threads. **Firewall:** Firewall design principles, trusted Systems

Reference Books:

1. William Stallings," *Cryptography and Network Security: Principles and Practice"*, Pearson Education, 5th edition, First impression 2011.
2. Forouzan A. Behrouz, "*Cryptography and Network Security* ", Tata McGraw Hill , 2nd Edition, 2008.

CCSN 309 INTERNET WEB PROGRAMMING

Unit 1: Introduction to Web Technologies

Overview of the internet and the World Wide Web, including the architecture of web applications. Exploration of client-server model, web servers, browsers, and the basics of web hosting.

Unit 2: HTML and CSS

Fundamentals of HTML for structuring web content, including elements, attributes, and semantic HTML. Introduction to CSS for styling web pages, covering selectors, properties, layout techniques, and responsive design principles.

Unit 3: JavaScript and DOM Manipulation

Introduction to JavaScript as a programming language for the web. Focus on syntax, data types, functions, and event handling. Exploration of the Document Object Model (DOM) for dynamic content manipulation and interaction with HTML elements.

Unit 4: Server-Side Programming

Overview of server-side scripting languages, with an emphasis on PHP or Node.js. Topics include form handling, session management, and database connectivity using SQL. Introduction to RESTful services and API integration.

Unit 5: Web Development Frameworks

Introduction to popular web development frameworks such as React, Angular, or Django. Focus on understanding framework architecture, component-based development, and best practices for building scalable web applications.

CCSN 311 **GRAPH THEORY**

Unit 1: Introduction to Graphs

Overview of graph theory, including definitions and basic terminologies such as vertices, edges, and types of graphs. Exploration of directed and undirected graphs, simple graphs, and multigraphs, as well as graph representations like adjacency matrices and adjacency lists.

Unit 2: Graph Traversal Algorithms

Study of fundamental graph traversal methods, including depth-first search (DFS) and breadth-first search (BFS). Applications of these algorithms in solving problems related to connectivity and graph exploration.

Unit 3: Connectivity and Components

Examination of connected graphs, components, and the concepts of strong and weak connectivity in directed graphs. Discussion on cut vertices, bridges, and applications in network reliability.

Unit 4: Trees and Their Properties

Introduction to trees, properties of tree structures, and applications in various fields. Exploration of binary trees, spanning trees, and the concepts of minimum spanning trees, including algorithms such as Prim's and Kruskal's.

Unit 5: Graph Coloring and Matching

Study of graph coloring concepts, including applications in scheduling and resource allocation. Examination of matchings in graphs, including perfect matchings and applications of the Hall's marriage theorem.

CUCS 341 COMPUTER VISION

Unit 1: Introduction to Computer Vision

Overview of the field of computer vision, its history, and applications. Discussion of the human visual system and the fundamentals of image formation, including image acquisition and representation.

Unit 2: Image Processing Fundamentals

Introduction to basic image processing techniques including image enhancement, filtering, and noise reduction. Exploration of color spaces, histogram equalization, and morphological operations.

Unit 3: Feature Detection and Description

Study of key concepts in feature detection, including edge detection, corner detection, and blob detection. Examination of feature descriptors such as SIFT, SURF, and ORB for image matching and recognition.

Unit 4: Image Segmentation

Overview of image segmentation techniques, including thresholding, clustering, region-based methods, and graph-based segmentation. Discussion of the challenges in segmentation and evaluation metrics.

Unit 5: Object Detection and Recognition

Exploration of object detection algorithms, including traditional methods and deep learning approaches. Discussion of techniques such as R-CNN, YOLO, and SSD, along with applications in real-world scenarios.

CUCS 343 ROBOTICS AND AUTOMATION

Unit 1: Introduction to Robotics

Overview of robotics, including definitions, history, and types of robots. Exploration of the applications of robotics in various industries and the fundamental components of robotic systems.

Unit 2: Kinematics of Robots

Study of robot kinematics, focusing on forward and inverse kinematics. Analysis of the motion of robotic arms and end effectors, including transformations and the Denavit-Hartenberg convention.

Unit 3: Dynamics of Robots

Introduction to the principles of dynamics as applied to robotic systems. Covers the concepts of forces, torques, and motion equations, including Newton's laws and Lagrangian mechanics.

Unit 4: Sensors and Actuators

Examination of various sensors used in robotics, such as proximity sensors, cameras, and IMUs. Discussion of actuators, including motors and servos, and their roles in robot movement and control.

Unit 5: Robot Control Systems

Overview of control strategies for robotic systems, including open-loop and closed-loop control. Exploration of PID control, adaptive control, and advanced techniques for motion control and trajectory planning.

CUCS-345 WEB SERVICE AND SERVICE ORIENTED ARCHITECTURE

Unit 1: Introduction to Web Services

This unit covers the fundamental concepts of web services, including their definition and purpose. It explores the evolution of web services, their significance in modern computing, and the various types of web services, such as SOAP and REST. Additionally, it examines the architecture of web services and the key components involved.

Unit 2: SOAP Web Services

In this unit, students learn about Simple Object Access Protocol (SOAP), including its structure and messaging framework. It discusses the creation and consumption of SOAP web services, including the use of WSDL (Web Services Description Language) to describe service interfaces. The unit also covers error handling in SOAP and security measures.

Unit 3: RESTful Web Services

This unit focuses on Representational State Transfer (REST) architecture and its principles. It explores how RESTful services differ from SOAP services, including the use of HTTP methods (GET, POST, PUT, DELETE) and status codes. The unit covers the design and implementation of RESTful APIs, including best practices for RESTful web service development.

Unit 4: Service-Oriented Architecture (SOA)

This unit introduces the concept of Service-Oriented Architecture, explaining its principles and benefits. It discusses the role of services in SOA, including service design, service orchestration, and service composition. The unit also covers the importance of interoperability and loose coupling in SOA.

Unit 5: Web Service Security

In this unit, students learn about the security concerns associated with web services. It covers security standards and protocols, such as WS-Security, OAuth, and OpenID. The unit also addresses authentication, authorization, and encryption methods to ensure secure communication between services.

HUMAN COMPUTER INTERACTION

CUCS-347 **Cr L-T-P**

4 3-1-0

UNIT - I Introduction : Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT - III Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT - IV Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls, Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT – V Software tools – Specification methods, interface – Building Tools,Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS : 1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.

2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

3. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.

4. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech, 3. User Interface Design, Soren Lauesen , Pearson Education

ENERGY STUDIES

CBSN-301 **Cr L-T-P**
4 3-1-0

UNIT 1: Energy Sources - Fossil fuels, Nuclear fuels, hydel, solar, wind and bio fuels in India, Energy conservation, Nuclear energy through fission and fusion processes.

UNIT 2: Energy Conversion- Energy conversion from source to utility, Solar, Nuclear, Geothermal, Tide and Wind Energies.

UNIT 3: Global Energy Scenario- Role of energy in economic development and social transformation, Overall energy demand, availability and consumption, Depletion of energy resources and its impact on economy, Non proliferation of nuclear energy. International energy policies of G-8, G-20, OPEC and European Union countries.

UNIT 4: Indian Energy Scenario- Commercial and noncommercial forms of energy, Utilization pattern in the past, present and also future prediction, Sector wise energy consumption.

UNIT 5: Energy Policy: Energy policy issues at global level, national level and state level, Energy conservation act 2001, Electricity act 2003, Energy pricing and its impact on global variations.

Text Books:

1. Jose Goldenberg, Thomas Johanson, and Reddy, A.K.N., Energy for Sustainable World, WileyEastern, 2005.

2. Charles E. Brown, World Energy Resources, Springer Publication, New York, 2002.

3. Culp, A.W., Principles of Energy Conversion, McGraw Hill New York, 2004. 80

Reference Books:

1. Bukhootsow, B., Energy Policy and Planning, Prentice Hall of India, New Delhi, 2003.

2. TEDDY Year Book, The Energy Research Institute (TERI), 2011

CCSN-351 SOFTWARE ENGINEERING LAB

Unit 1: Introduction to Software Engineering

Overview of software engineering principles and methodologies, including the software development lifecycle, software process models, and the importance of requirements analysis. Introduction to software tools and environments.

Unit 2: Requirements Analysis and Specification

Hands-on practice in gathering and analyzing software requirements. Techniques for writing clear and concise requirements specifications using tools for requirements management. Emphasis on user stories and use case diagrams.

Unit 3: Software Design

Exploration of software design principles, patterns, and best practices. Implementation of design diagrams including class diagrams, sequence diagrams, and architecture design. Use of design tools for visual representation of software architecture.

Unit 4: Software Development and Implementation

Practical experience in coding and implementation of software solutions using a chosen programming language. Focus on version control systems, collaborative development tools, and coding standards. Emphasis on modular programming and unit testing.

Unit 5: Software Testing and Quality Assurance

Introduction to software testing methodologies and strategies. Practical exercises in writing test cases, conducting different types of testing (unit, integration, system, acceptance), and using automated testing tools. Concepts of software quality assurance and metrics.

Unit 6: Project Management and Documentation

Exploration of software project management concepts including planning, scheduling, and resource management. Hands-on experience with project management tools. Emphasis on documenting the software development process and maintaining project artifacts.

CCSN-353 COMPILER DESIGN LAB

Unit 1: Introduction to Compilers

Overview of the compiler design process, components of a compiler, and the phases of compilation. Study of the role of the compiler in programming languages and the importance of syntax and semantics.

Unit 2: Lexical Analysis

Implementation of a lexical analyzer using regular expressions and finite automata. Development of tools like Lex or Flex for tokenizing input strings. Analysis of token representation and symbol tables.

Unit 3: Syntax Analysis

Construction of a syntax analyzer or parser using context-free grammars. Implementation of parsing techniques such as LL(1) and LR(1) parsers. Development of a parser generator like Yacc or Bison.

Unit 4: Semantic Analysis

Design of a semantic analyzer to check variable types, scope, and declarations. Implementation of symbol table management and type checking. Exploration of abstract syntax trees and their construction.

Unit 5: Intermediate Code Generation

Generation of intermediate code representations such as three-address code or quadruples. Techniques for code optimization and analysis of control flow and data flow within programs.

CCSN-355 OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Unit 1: Introduction to Object-Oriented Concepts

Overview of object-oriented programming principles including classes, objects, inheritance, encapsulation, and polymorphism. Discussion of the advantages of object-oriented design over procedural programming.

Unit 2: Unified Modeling Language (UML)

Introduction to UML as a standard modeling language. Study of various UML diagrams such as class diagrams, use case diagrams, sequence diagrams, and activity diagrams. Practical exercises in creating UML diagrams to represent system designs.

Unit 3: Object-Oriented Analysis

Techniques for requirements gathering and analysis using object-oriented methodologies. Focus on identifying use cases, actors, and system requirements. Development of use case diagrams and scenarios to model system functionality.

Unit 4: Object-Oriented Design

Principles of designing software systems using object-oriented techniques. Emphasis on design patterns, system architecture, and the application of SOLID principles. Hands-on experience with designing class structures and interactions.

Unit 5: Implementation and Testing

Transition from design to implementation using an object-oriented programming language. Practical coding sessions to develop, test, and debug applications. Focus on unit testing, integration testing, and validation of object-oriented systems.

CCSN 302 Computer Graphics L T P 4 0 0

Unit- I

Transformation, Projections, and Clipping Algorithm: Bresenham's Line Drawing Algorithm, Homogeneous Coordinates system for 2D AND 3D , Various 2D, 3D, Transformation matrices(Translation, Scaling, Rotation , Shear), Rotation about an arbitrary point(2D), Rotation about an arbitrary axis(3D), Computing location of V.P., Clipping algorithms, Sutherland-Cohen Clipping Algorithm, Bresenham's Circle Drawing Algorithm.

Unit - II

Curves and Surfaces Bezier Curves, 4 point and 5 point Bezier curves using BersteinPolynomials , Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors. Testing for first and second order continuities, Effect of multiple control points at same location, Geometrical Construction, Computing control points given end slopes for a specified curve segment.

Unit - III

Projection and Solid Modeling Parallel Projection, Oblique Projection on xy plane, Isometric Projection, Perspective Projection, One Vanishing Point(V.P.) projection from a point on z axis, Generation of 2 V.P. Projection , Solid Modeling, Sweeping a polygon or a surface patch along a path to form solids, Boundary Representations (B-Rep), octrees, CSG-Constructive Solid Geometry.

Unit - IV

Shading Illumination Model for diffused Reflection ,Effect of ambient lighting, distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Gourard Shading, Phong Model.

Unit-V

Hidden surface Removal Floating Horizon Method, Back Face Detection , Depth Buffer(Z-Buffer, A-Buffer) Method, Scan Line Method, Depth Sorting Method, BSP-Tree Method, Area Subdivision Method.

Reference Book:

1. Donald Hearn and M. P. Baker, *Computer Graphics*, Prentice Hall Inc., 3rd Edition, 2003.

2. Foley, Van Dam, *Computer Graphics Principles & Practice*, Pearson Education, 2nd

CCSN 304 Data Warehousing &Data Mining L T P 4 0 0

Unit – I

Introduction: Data-ware housing: Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Stars, Snow Flakes, Fact Constellations, Data marts,3 Tier Architecture of Data Warehouse, OLAP Servers: ROLAP, MOLAP, HOLAP.

Data Mining: Motivation(for Data Mining), Definition & Functionalities, knowledge discovery steps, Architecture , Statistical measures in large Databases. Measuring Central Tendency.

Unit - II

Data Processing: Requirement for preprocessing, Data Cleaning and its various techniques, Data Integration and Transformation, Data Reduction:- Data Cube Aggregation, attribute subset selection, Numerosity Reduction, Concept hierarchy generation. Attribute oriented induction Concept Description and Data Generalization, implementation of AOI, presentation of derived generalization and class description, Mining Class comparisons. Mining frequent patterns, A priori Algorithm, F P Growth, Mining various kind of Association rule: Multilevel, Multi-Dimensional, correlation analysis, constraints based mining.

Unit - III

Classification and Predictions:

Basics and issues regarding Classification & Prediction, Classification by Decision tree induction, Bayesian Classification, Rule- based Classification, Classification by Back propagation; Multilayer feed-forward Neural Network, Back-propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm, and regression based methods for prediction, accuracy and error measure.

Unit - IV

Cluster analysis: requirement of clustering in data mining, Data types in cluster analysis, Categories of clustering methods, Partitioning methods: K-mean and K- mediods. Hierarchical Clustering: agglomerative and divisive clustering, BIRCH, and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method – expectation- maximization, Outlier Analysis: statistical distribution method, distance based method.

Unit - V

Applications and Trends in data mining: Data mining applications, themes on data mining, social impact on data mining, trends in data mining. Data mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Reference Books:

1.Jiawei Han, Micheline Kamber, ”Data Mining Concepts & Techniques” Elsevier,2nd edition 2010.

2.M.H.Dunham, ”Data Mining :Introductory and Advanced Topics”, Pearson Education,1st edition ,2007.

3.Sam Anahory, Dennis Murray, “Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems “, Pearson Education, 1st edition, 2008.

4.Pieter Adriaans, Dolf Zantinge, “ Data Mining”, Pearson Education, 4th edition,2009.

MOBILE COMPUTING

CCSN-306	Cr.	L	T	P
	4	3	1	0

Unit – I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit - IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Books:

1. J. Schiller, Mobile Communications, Addison Wesley.

2. A. Mehrotra , GSM System Engineering.

3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.

4. Charles Perkins, Mobile IP, Addison Wesley. 5. Charles Perkins, Ad hoc Networks, Addison Wesley.

KNOWLEDGE MANAGEMENT& EXPERT SYSTEM

CCSN-308	Cr.	L	T	P
	4	3	1	0

Unit - I

Introduction to knowledge Management Distinction between data , information & knowledge. Concept of knowledge creation, Intellectual Capital Creation, Human Capital, Customer Capital and Organizational Capital

Unit-II

Socio-cultural aspects & organizational aspects Tacit & Explicit knowledge & Knowledge Organization . Knowledge Storage and Distribution, KM tools, Data warehouse, Data mining, knowledge management evaluation & Valuation of Knowledge.

Unit-III

K- Sharing Practices and Barriers. K – culture, KM In Indian organizations and MNC. Learning Organizations & Organizational Learning

Unit – IV

Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit-V

K-Initiative, K-Strategic issues in knowledge management, K-Commerce

Reference Books:

1. SudhirWarrier, "*Knowledge Management*", Vikas publishing House, New Delhi, First edition, 2007.
2. Thotharti Raman, "*Knowledge Management*", Excel Books ,New Delhi, First Edition,2004.
3. Stuart Barnes *"Knowledge Management Systems: Theory & Practice*", Thomson Learning Press, New Delhi, First Edition, 2002.
4. Ronald Maier, *"Knowledge Management System"*, Springer, Germany, Second Edition,2002.
5. AmritTiwana, "*Knowledge Management Tool Kit*", Pearson Education, New Delhi, First Edition, 2002.

CCSN 308 A Introduction to Knowledge Management

Unit 1: Understanding Knowledge Management

Introduction to the concepts of knowledge and knowledge management, exploring the types of knowledge, including tacit and explicit knowledge, and the importance of knowledge management in organizations.

Unit 2: Knowledge Creation and Sharing

Examination of processes involved in knowledge creation, including socialization, externalization, combination, and internalization. Discussion on knowledge sharing practices, barriers to sharing, and strategies for fostering a knowledge-sharing culture.

Unit 3: Knowledge Storage and Retrieval

Overview of methods for storing and organizing knowledge, including knowledge repositories, databases, and content management systems. Emphasis on techniques for effective knowledge retrieval and the role of technology in knowledge management.

Unit 4: Knowledge Management Systems and Tools

Exploration of various knowledge management systems and tools, including collaborative platforms, decision support systems, and enterprise social networks. Discussion on selecting appropriate tools for different organizational needs.

Unit 5: Knowledge Management Strategies and Best Practices

Analysis of knowledge management strategies and frameworks, including the role of leadership and organizational culture. Examination of best practices in implementing and sustaining knowledge management initiatives within organizations.

CCSN 308 B **Information Systems and Technology**

Unit 1: Introduction to Information Systems

Exploration of the role and importance of information systems in organizations. Examination of various types of information systems, their components, and how they support decision-making processes.

Unit 2: Information Technology Fundamentals

Overview of the fundamental concepts of information technology, including hardware, software, networking, and data management. Discussion of current technologies and trends shaping the IT landscape.

Unit 3: Database Management Systems

Introduction to database concepts, including data modeling, database design, and the relational database model. Study of SQL and database management system functionalities, including data retrieval, manipulation, and integrity.

Unit 4: System Development Life Cycle

Understanding the phases of the system development life cycle, including planning, analysis, design, implementation, and maintenance. Exploration of methodologies and tools used in system development.

Unit 5: Information Security and Ethics

Examination of information security principles, threats, and risk management strategies. Discussion of ethical considerations in information systems, including privacy, intellectual property, and regulatory compliance.

CCSN 308 C **Organizational Learning**

Unit 1: Introduction to Organizational Learning

Overview of organizational learning concepts, definitions, and the importance of learning in organizations. Exploration of theories and models of learning within an organizational context.

Unit 2: Learning Theories and Approaches

Examination of key learning theories, including behaviorism, cognitivism, and constructivism. Discussion of experiential learning and the role of social learning in organizations.

Unit 3: Knowledge Management

Introduction to knowledge management concepts, including the types of knowledge (tacit and explicit) and the processes involved in capturing, sharing, and applying knowledge within organizations.

Unit 4: Learning Culture and Environment

Analysis of the role of organizational culture in fostering learning. Exploration of how leadership, communication, and trust contribute to a supportive learning environment.

Unit 5: Learning Organizations

Study of the characteristics and attributes of learning organizations. Examination of practices and strategies for promoting continuous learning and adaptability in organizations.

CCSN 308 D **Emerging Trends in Knowledge Management**

Unit 1: Introduction to Knowledge Management

Overview of knowledge management concepts, definitions, and importance. Examination of the knowledge economy and the role of knowledge in organizational success. Introduction to key theories and models of knowledge management.

Unit 2: Knowledge Creation and Capture

Exploration of knowledge creation processes, including tacit and explicit knowledge. Strategies for knowledge capture and documentation. Discussion on the role of communities of practice and collaborative technologies in knowledge creation.

Unit 3: Knowledge Sharing and Transfer

Analysis of methods and tools for knowledge sharing within organizations. Examination of barriers to knowledge sharing and strategies to overcome them. Study of social networks and informal knowledge transfer mechanisms.

Unit 4: Technology in Knowledge Management

Evaluation of emerging technologies that facilitate knowledge management, including artificial intelligence, machine learning, and big data analytics. Discussion on knowledge management systems, their architecture, and implementation.

Unit 5: Knowledge Management Strategies and Practices

Development of knowledge management strategies aligned with organizational goals. Examination of best practices in knowledge management and case studies from various industries. Discussion on the measurement and assessment of knowledge management effectiveness.

CCSN 310 EMBEDDED COMPUTING SYSTEMS

Unit 1: Introduction to Embedded Systems

Overview of embedded systems, their characteristics, and applications. Discussion on the architecture of embedded systems, including hardware and software components, and comparison with general-purpose computing systems.

Unit 2: Microcontrollers and Microprocessors

Study of microcontrollers and microprocessors, including their architecture, operation, and programming. Exploration of popular microcontrollers and microprocessors used in embedded systems, along with their instruction sets and interfacing techniques.

Unit 3: Embedded System Design

Fundamentals of embedded system design, including design methodologies and processes. Discussion on system specification, modeling, and design tools. Consideration of hardware-software co-design and integration challenges.

Unit 4: Real-Time Operating Systems

Introduction to real-time operating systems (RTOS) and their importance in embedded systems. Exploration of task scheduling, synchronization, and inter-process communication. Discussion on different types of RTOS and their applications.

Unit 5: Embedded System Applications

Examination of various applications of embedded systems in different fields such as automotive, healthcare, industrial automation, and consumer electronics. Study of case studies showcasing the implementation of embedded systems in real-world scenarios.

CCSN 312 **SIMULATION AND MODELING**

Unit 1: Introduction to Simulation

Overview of simulation concepts, types of simulation, and the role of modeling in various applications. Discussion of the advantages and disadvantages of simulation as a problem-solving tool.

Unit 2: Modeling Techniques

Exploration of different modeling techniques, including mathematical, statistical, and graphical models. Introduction to system dynamics and discrete event simulation, along with model development processes.

Unit 3: Simulation Process

Detailed examination of the simulation process, including problem definition, model formulation, experimentation, and analysis of results. Emphasis on the validation and verification of models.

Unit 4: Statistical Analysis of Simulation Output

Introduction to statistical methods for analyzing simulation output. Topics include confidence intervals, hypothesis testing, and regression analysis. Techniques for sensitivity analysis and model calibration.

Unit 5: Applications of Simulation

Discussion of practical applications of simulation across various fields such as engineering, healthcare, finance, and manufacturing. Case studies demonstrating the use of simulation in real-world scenarios.

CCSN 314 **APPROXIMATION OF ALGORITHMS**

Unit 1: Introduction to Approximation Algorithms

Overview of algorithmic problem-solving and the necessity of approximation algorithms. Discussion on NP-hardness and the classification of problems based on their approximation characteristics.

Unit 2: Performance Analysis of Approximation Algorithms

Study of the concepts of approximation ratio and performance guarantees. Analysis of different approximation techniques and their effectiveness in various problem domains.

Unit 3: Greedy Algorithms

Exploration of greedy strategies for optimization problems. Examination of classic problems such as the Knapsack problem, Minimum Spanning Tree, and Huffman coding. Understanding when greedy algorithms yield optimal solutions.

Unit 4: Dynamic Programming and Approximation

Application of dynamic programming techniques in designing approximation algorithms. Discussion on problems such as the Traveling Salesman Problem and how dynamic programming approaches can be adapted for approximation.

Unit 5: Linear Programming and Rounding Techniques

Introduction to linear programming as a tool for approximation. Examination of rounding techniques and their application in creating approximation algorithms for various optimization problems.

SOFTWARE PROJECT MANAGEMENT

CUCS-342 | **Cr. L T P**
4 3 1 0

Unit – I

Introduction and Software Project Planning

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Unit – II

Project Organization and Scheduling

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

Unit - III

Project Monitoring and Control

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV),Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.

Unit – IV

Software Quality Assurance and Testing

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

Unit – V

Project Management and Project Management Tools

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Reference Books:

1. Software Project Management by M. Cotterell
2. Information Technology Project Management
3. Management Information and Control by
4. Software Project Managemnet by S. A. Kelkar

CUCS 342 A **Project Planning and Scheduling**

Unit 1: Introduction to Project Management

Overview of project management concepts, terminology, and frameworks. Exploration of the project life cycle, project stakeholders, and the importance of project planning and scheduling in achieving project success.

Unit 2: Project Planning Techniques

Examination of various project planning techniques, including project scope definition, work breakdown structures (WBS), and estimation of project activities. Discussion of resource allocation and budgeting in project planning.

Unit 3: Scheduling Methods

Introduction to different scheduling methods, including Gantt charts, network diagrams, and critical path method (CPM). Analysis of program evaluation and review technique (PERT) and its applications in project scheduling.

Unit 4: Resource Management

Focus on resource management in projects, including resource leveling and resource allocation strategies. Discussion of constraints, dependencies, and the impact of resource availability on project schedules.

Unit 5: Monitoring and Controlling Projects

Techniques for monitoring and controlling project progress, including earned value management (EVM) and performance measurement. Examination of project risk management and its role in project planning and scheduling.

CUCS 342 B **Risk Management in Software Projects**

Unit 1: Introduction to Risk Management

Overview of risk management principles and processes in software projects. Discussion on the importance of risk management and its impact on project success. Introduction to key terms and concepts related to risk.

Unit 2: Risk Identification

Techniques and methods for identifying risks in software projects. Exploration of tools and frameworks for risk identification, including brainstorming, checklists, and interviews. Understanding the role of stakeholders in the identification process.

Unit 3: Risk Assessment and Analysis

Methods for assessing and analyzing risks, including qualitative and quantitative approaches. Exploration of risk prioritization techniques and the use of risk matrices. Understanding the implications of risk assessment on project planning.

Unit 4: Risk Mitigation Strategies

Development of risk response strategies and planning for risk mitigation. Discussion on various approaches to manage identified risks, including avoidance, transfer, acceptance, and reduction. Strategies for creating effective risk management plans.

Unit 5: Risk Monitoring and Control

Techniques for monitoring and controlling risks throughout the software project lifecycle. Discussion on the role of continuous risk assessment, documentation, and reporting. Exploration of tools for tracking risks and measuring the effectiveness of mitigation strategies.

CUCS 342 C **Project Quality Management**

Unit 1: Introduction to Project Quality Management

Overview of project quality management principles and its significance in project management. Discussion on quality concepts, definitions, and the role of quality management in achieving project objectives.

Unit 2: Quality Planning

Exploration of quality planning processes, including defining quality standards and objectives for projects. Examination of tools and techniques used for quality planning, such as quality metrics and quality assurance plans.

Unit 3: Quality Assurance

Study of quality assurance principles and practices in project management. Focus on the processes involved in ensuring that quality standards are met, including audits, process analysis, and continuous improvement strategies.

Unit 4: Quality Control

Introduction to quality control methods and techniques used to monitor project performance and ensure quality requirements are fulfilled. Covers statistical quality control tools, inspection processes, and corrective actions.

Unit 5: Continuous Improvement and Quality Management Systems

Examination of continuous improvement methodologies such as Six Sigma and Total Quality Management (TQM). Discussion on implementing quality management systems and standards, including ISO standards and their application in project management.

CUCS 342 D **Stakeholder Management**

Unit 1: Introduction to Stakeholder Management

Overview of stakeholder management concepts, identification of stakeholders, and the importance of stakeholder engagement in project management. Exploration of the stakeholder management process and its relevance to organizational success.

Unit 2: Stakeholder Identification and Analysis

Techniques for identifying stakeholders and categorizing them based on their influence and interest. Examination of stakeholder mapping tools, analysis of stakeholder needs and expectations, and understanding their potential impact on projects.

Unit 3: Stakeholder Engagement Strategies

Development of effective engagement strategies for various stakeholder groups. Exploration of communication methods, relationship building, and negotiation techniques to ensure active stakeholder involvement and buy-in.

Unit 4: Managing Stakeholder Expectations

Understanding the dynamics of stakeholder expectations and the role of effective communication in managing them. Strategies for aligning stakeholder expectations with project objectives and handling conflicts that may arise.

Unit 5: Evaluating Stakeholder Management Success

Methods for assessing the effectiveness of stakeholder management efforts. Examination of key performance indicators, feedback mechanisms, and lessons learned to improve future stakeholder engagement processes.

CUCS 344 MICROWAVE ENGINEERING

Unit 1: Introduction to Microwave Engineering

Overview of microwave frequencies and applications. Discussion on the characteristics of microwave signals and their propagation in various media. Introduction to microwave components and systems.

Unit 2: Microwave Transmission Lines

Analysis of transmission line theory, including the concept of characteristic impedance and reflection coefficient. Examination of different types of transmission lines such as coaxial cables and microstrip lines, along with their applications in microwave circuits.

Unit 3: Microwave Devices

Study of various microwave devices such as waveguides, resonators, and filters. Exploration of solid-state devices including diodes and transistors used at microwave frequencies. Introduction to active and passive microwave components.

Unit 4: Microwave Network Analysis

Fundamentals of network parameters including S-parameters and their applications in microwave circuit design. Discussion on two-port networks, matching networks, and stability considerations in microwave circuits.

Unit 5: Microwave Measurement Techniques

Techniques and equipment used for measuring microwave signals, including power, frequency, and impedance. Introduction to microwave test equipment and methods for evaluating the performance of microwave components and systems.

CUCS 346 SUPPLY CHAIN MANAGEMENT-PLANNING

Unit 1: Introduction to Supply Chain Management

Overview of supply chain management concepts, objectives, and the importance of effective supply chain planning. Discussion of supply chain components and relationships between suppliers, manufacturers, distributors, and customers.

Unit 2: Demand Planning and Forecasting

Examination of demand planning processes and techniques, including qualitative and quantitative forecasting methods. Analysis of demand variability, forecasting accuracy, and the impact of demand planning on supply chain performance.

Unit 3: Inventory Management

Study of inventory types, functions, and costs within the supply chain. Exploration of inventory management techniques, including Economic Order Quantity (EOQ), Just-In-Time (JIT), and safety stock management.

Unit 4: Production Planning and Scheduling

Discussion of production planning methodologies, including aggregate planning and master production scheduling. Analysis of scheduling techniques, resource allocation, and the role of production planning in meeting demand.

Unit 5: Supply Chain Strategy and Network Design

Evaluation of supply chain strategies and their alignment with business goals. Examination of network design principles, including facility location, capacity planning, and transportation considerations.

CUCS-348 SOFTWARE TESTING

Unit 1: Introduction to Software Testing

Basics of software testing, importance, and objectives. Overview of testing processes, principles, and the role of testing in the software development lifecycle. Types of software testing and their classifications.

Unit 2: Test Planning and Documentation

Creating a test plan, defining test objectives, and scope. Developing test cases and test scripts. Importance of test documentation and test data preparation. Test management and tracking tools.

Unit 3: Testing Techniques and Strategies

Black-box and white-box testing techniques. Equivalence partitioning, boundary value analysis, decision table testing, and path testing. Overview of testing strategies like unit testing, integration testing, system testing, and acceptance testing.

Unit 4: Test Automation

Introduction to test automation and its benefits. Overview of test automation tools and frameworks. Criteria for selecting test tools, creating automated test scripts, and maintaining automated test suites. Challenges in test automation.

Unit 5: Debugging and Defect Management

Understanding the debugging process and identifying root causes of defects. Defect lifecycle and defect tracking systems. Tools for defect management and best practices for logging and resolving defects.

ENVIRONMENTAL STUDIES **L T P 2 0 0**

CBSN-302

Unit I

Atmosphere: The Earth's Natural Greenhouse Effect: Greenhouse Gases, Global Warming, Ozone depletion, Acid rain, El Nina and La Nina Phenomenon.

Unit-II

Pollution: Air, Water, Noise and Soil pollutions and their quality parameters

Unit-III

Waste Management: Agricultural waste, Industrial waste and Other hazardous waste, Environment Impact Assessment.

Unit-IV

Sustainable Development: Conservation of natural resources watershed management, Rain water harvesting and storage;Application of Remote Sensing and GIS

Unit-V

Environmental Management Systems: ISO certification control policies, International and National legislations and acts related to environment.

Reference:

1. Miller, T.G. Jr. *Environmental Science*. Wadsworth Publishing Co.
2. Liu, David H.F. and Béla G. Lipták. *Environmental Engineers' Handbook*. 2nd edition. Lewis

Publishers, New York, 199F.

3. Jadhav, H. and V.M. Bhosale. *Environmental Protection and Laws*. Himalaya Publishing House,

Delhi. 1995.

4. Rajagopalan, R. *Environmental Studies*: *From Crisis to Cure*. Oxford University Press, New

Delhi.

5. Joseph, B. *Environmental Studies*. Tata McGraw-Hill, New Delhi.

CCSN-352 COMPUTER GRAPHICS LAB

Unit 1: Introduction to Computer Graphics

Overview of computer graphics fundamentals, including the graphics pipeline, types of graphics, and applications. Introduction to graphics programming environments and tools.

Unit 2: Basic Drawing Algorithms

Implementation of fundamental drawing algorithms such as line drawing, circle drawing, and polygon filling. Exploration of rasterization techniques and pixel manipulation.

Unit 3: 2D Transformations

Study of geometric transformations including translation, rotation, scaling, and reflection in 2D space. Implementation of transformation matrices and their applications in graphics.

Unit 4: 3D Graphics and Transformations

Introduction to 3D graphics concepts, including 3D modeling, viewing transformations, and projection techniques. Implementation of basic 3D transformations and manipulation of 3D objects.

Unit 5: Animation Techniques

Exploration of animation principles and techniques. Implementation of basic animation methods, including keyframe animation and motion interpolation. Introduction to time-based animation and its applications.

CCSN-354 DATA MINING LAB

Unit 1: Introduction to Data Mining Tools

Overview of popular data mining tools and software, including installation and setup procedures. Introduction to the user interface and basic functionalities of tools such as Weka, RapidMiner, and Python libraries for data mining.

Unit 2: Data Preprocessing

Techniques for data cleaning, transformation, and normalization. Exploration of methods for handling missing values, outliers, and categorical data. Application of data reduction techniques to enhance efficiency in data analysis.

Unit 3: Data Exploration and Visualization

Methods for exploring datasets through descriptive statistics. Visualization techniques using tools like Matplotlib, Seaborn, or Tableau to represent data insights effectively. Emphasis on graphical representation of data patterns and trends.

Unit 4: Classification Techniques

Implementation of classification algorithms such as Decision Trees, k-Nearest Neighbors, and Support Vector Machines. Evaluation of classification models using metrics like accuracy, precision, recall, and F1-score.

Unit 5: Clustering Techniques

Exploration of clustering methods such as k-Means, Hierarchical clustering, and DBSCAN. Practical applications of clustering techniques in real-world scenarios and evaluation of clustering results through internal and external validation metrics.

CCSN-356 **MINI PROJECT**

Unit 1: Project Introduction

Overview of the mini project concept, objectives, and significance in practical learning. Exploration of the project lifecycle, including planning, execution, and evaluation.

Unit 2: Topic Selection and Proposal

Guidance on selecting relevant topics based on interest and feasibility. Development of a project proposal, including defining project scope, objectives, and expected outcomes.

Unit 3: Literature Review and Research Methodology

Conducting a literature review to gather existing knowledge related to the chosen topic. Understanding research methodologies and techniques for data collection and analysis.

Unit 4: Project Implementation

Hands-on execution of the project, including practical application of theoretical concepts. Development of the project deliverable, whether it be a report, prototype, or presentation.

Unit 5: Project Presentation and Evaluation

Preparation for presenting project findings to an audience. Techniques for effective communication and presentation skills. Evaluation of the project based on set criteria, including originality, methodology, and results.

DISTRIBUTED COMPUTING SYSTEMS

CCSN-401 **Cr. L T P**
4 3 1 0

Unit–I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models. Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks ,Lamport's& vectors logical clocks. Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

Unit-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms. Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlockprevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Unit–III

Agreement Protocols: Introduction, System models, classification of Agreement Problem,Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system. Distributed Resource Management: Issues in distributed File Systems, Mechanism for buildingdistributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

Unit–IV

Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recoveryin Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems. Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamicvotingprotocols.

Unit –V

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, OptimisticConcurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit

protocols,Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

REFERENCES:

1. Singhal&Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill

2. Ramakrishna,Gehrke,” Database Management Systems”, McGraw Hill

3. Vijay K.Garg Elements of Distributed Compuitng , Wiley

4. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design”, Pearson Education

ADVANCED COMPUTER SYSTEM ARCHITECTURE

CCSN-403 **Cr L-T-P**

4 3- 1-0

Unit - I

Parallel computer model: Evolution of computer architecture, system performance attributes, Multiprocessors and Multicomputer: shared memory multiprocessors and distributed memory multicomputer, Vector supercomputers, Program and network properties: conditions of parallelism, program partitioning and scheduling, program flow mechanism, Dynamic interconnection network.

Unit - II Principles of scalable performance: Performance metrics and measures: parallelism profile in programs, harmonic mean performance, efficiency utilization and quality, standard performance measure, scalability of parallel algorithms, Speedup performance laws: Amdahl's law for fixed workload, Gustafson's law for scaled problems, Memory bounded speedup model.

Unit - III Processor and Memory hierarchy: Advanced processor technology, superscalar and vector processor, memory hierarchy technology, virtual memory technology, Bus, cache and shared memory: Backplane bus system: bus specification, addressing and timing protocol, arbitration, transaction, and interrupt, cache memory organization: addressing model, direct and associative mapping, set associative and sector cache, shared memory organization: Interleaved memory organization.

Unit – IV Pipelining: Linear and non linear pipeline processors, Multiprocessors: Multiprocessor system interconnects, cache coherence and synchronization mechanism, Scalable and multithreaded architectures: Principles of multithreading, scalable and multithreaded architectures.

Unit - V Parallel models, languages and compilers: Parallel programming models, parallel languages and compiler, dependence analysis of data arrays, code optimization and scheduling loop parallelization and pipelining.

Reference Books:

1. Kai Hwang, "Advanced Computer Architecture", McGraw-Hill, Revised Edition, 01/Feb/2003

2. Hwang and Briggs, "Computer Architecture and Parallel Processing", McGraw Hill, International Edition, 1986.

3. Moreshwar R. Bhujade, "*Parallel Computing*", New Age International(P) Ltd, Publishers, First Edition Reprint, 2004.

4. John L. Hennessy, David A. Patterson, "*Computer Architecture: A Quantitative Approach*", Elsevier Inc., Fifth Edition, 2011

5. Sima, Terence Fountain, Péter Kacsuk, "*Advanced Computer Architecture*", Pearson Education, Seventh Impression, 2009.

6. Michael J. Quinn, "*Parallel Computing: Theory And Practice*", Tata McHill-Edition, Twelfth Reprint, Second Edition, 2008.

7. Michael Jay Quinn, "*Parallel Programming in C with MPI and Open MP*",McGraw-Hill Higher Education, 2004.

ARTIFICIAL INTELLIGENCE

CCSN-405 **Cr L-T-P**

4 3- 1-0

Unit - I

Introduction: Introduction to Artificial Intelligence, History, What is AI, Importance of AI, Issues, Simulation of sophisticated & Intelligent Behaviors in different area, problem solving in games, natural language, automated reasoning, visual perception, Search algorithms: Informed search, Uninformed search, Hill Climbing, Depth first search, Best first search, And or graph.

Unit - II

Processing and understanding Natural Languages: Understanding Natural Languages: Applications of Natural Languages, Natural Language processing, Parsing techniques: Rules of parsing, Top down parsing, Bottom up parsing, Transformational grammars, Context free grammar, Transition networks, Fillmore's grammars, Shanks Conceptual Dependency.

Unit - III

Knowledge Representation: Graphs, Frames structures and related structures, Semantic Nets and Partitioned Nets, Scripts, Introduction to PROLOG, Production Rules, Knowledge Based systems, Inference engine, Forward deductions and backward deductions, Matching production rules against working memory.

Unit - IV

Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit - V

Pattern Recognition Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception, Semantic & Model, Object Identification, Speech Recognition. **Programming Language** Introduction to programming Language, LISP, PROLOG.

Reference Books :

1. Char Nick, "*Introduction to Artificial Intelligence"*, Addision Wesley, 2007.
2. Stuart Russell and Peter Norvig, ``*Artificial Intelligence: A Modern Approach*.", Prentice Hall, Third Edition, 2010.

3. Elaine Rich, Kevin Knight and Shivashankar B.Nair, "*Artificial Intelligence*", Tata McGraw-Hill, Third edition, 2009.

CCSN-407 DIGITAL IMAGE PROCESSING

Unit 1: Introduction to Digital Image Processing

Overview of digital image processing, applications, basic concepts of image formation, and the human visual system. Understanding image sampling and quantization processes.

Unit 2: Image Enhancement Techniques

Spatial domain methods for image enhancement, histogram processing, contrast manipulation, and image smoothing and sharpening filters. Frequency domain techniques for enhancement using Fourier transforms.

Unit 3: Image Restoration and Reconstruction

Concepts of image degradation, noise models, restoration using inverse filtering, Wiener filtering, and image reconstruction methods. Techniques for dealing with motion blur and other degradation effects.

Unit 4: Color Image Processing

Color models and spaces (RGB, CMY, HSI), color transformations, and processing color images. Techniques for color enhancement and the use of pseudo-color and full-color image processing.

Unit 5: Image Segmentation

Segmentation techniques including edge detection, thresholding, region-based methods, and morphological processing. Advanced methods such as active contours, watershed, and segmentation using machine learning.

CCSN-409 MULTIMEDIA COMPUTING

Unit 1: Introduction to Multimedia Computing

Fundamentals of multimedia, components, and applications. Understanding multimedia systems, characteristics, and the importance of multimedia in different fields. Overview of multimedia hardware and software.

Unit 2: Text and Image Processing

Text representation and formats, text compression techniques, and standards. Image fundamentals, graphics, color models, and image formats. Image compression and processing techniques for effective storage and transmission.

Unit 3: Audio Processing

Basics of digital audio, audio sampling, and representation. Audio formats, compression techniques, and standards for efficient storage and streaming. Overview of audio editing and sound synthesis methods.

Unit 4: Video Processing

Fundamentals of digital video, video standards, and formats. Video compression techniques, including temporal and spatial redundancy reduction. Introduction to video streaming and real-time video transmission.

Unit 5: Animation Techniques

Principles of animation, types of animation (2D and 3D), animation tools, and software. Keyframing, tweening, and morphing. The use of animation in multimedia projects and real-world applications.

PATTERN RECOGNITION

CCSN-411 **Cr L-T-P**

4 3- 1-0

Unit – I

Introduction : Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation. Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces.

Unit – II

Normal density :Univariate and multivariate density, discriminant functions for the normal density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context. Maximum likelihood and Bayesian parameter estimation : Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case.

Unit – III Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering.

Unit - IV

Linear discriminant function based classifiers : Perceptron, Support Vector Machines. Component analyses : Principal component analysis, non-linear component analysis; Low dimensional representations and multi dimensional scaling.

Unit - V Discrete Hidden MorkovModels : Introduction, Discrete–time markov process, extensions to hidden Markov models, three basic problems for HMMs. Continuous hidden Markov models : Observation densities, training and testing with continuous HMMs, types of HMMs.

Applications: Data mining, web searching, handwriting recognition, multimedia data retrieval, speech recognition, network traffic analysis

Reference Books:

1. Earl Gose, Richard John baugh, "*Pattern Recognition and Image Analysis*", Steve JostPHI, 2004.

2. Richard O. Duda, Peter E. Hart, David G. Stroke, "*Pattern classifications*", Wiley , Second Edition, 2006.

3.C.M.Bishop, "Pattern *Recognition and Machine Learning*", Springer, Second Edition, 2009.

4.S.Theodoridis and K.Koutrombar, "*Pattern recognition*", Academic press, Fourth Edition, 2009.

CCSN-413 VLSI DESIGN & ALGORITHMS

Unit 1: Introduction to VLSI Design
Basics of Very Large Scale Integration (VLSI), the evolution of VLSI technology, and design hierarchy. Overview of VLSI design flow, design styles, and types of VLSI circuits including ASICs and FPGAs.

Unit 2: CMOS Technology and Fabrication
CMOS logic, fabrication processes, and the layout design rules. Concepts of nMOS and pMOS transistors, CMOS inverter characteristics, and design considerations for CMOS circuits. Fabrication techniques and process steps.

Unit 3: Digital VLSI Design
Designing combinational and sequential logic circuits using CMOS. Implementation of logic gates, flip-flops, and registers. Circuit characterization and performance metrics including power, area, and timing analysis.

Unit 4: VLSI Design Methodologies
Hierarchical design, full-custom, semi-custom, and programmable logic design. Introduction to hardware description languages (HDLs) like Verilog and VHDL. Techniques for design verification and simulation.

Unit 5: VLSI Algorithms
Algorithms for circuit partitioning, floorplanning, and placement. Algorithms for routing, including global and detailed routing techniques. Introduction to graph algorithms and optimization techniques for VLSI design.

CUCS-441 CLIENT-SERVER COMPUTING

Unit 1: Introduction to Client-Server Computing
Fundamentals of client-server architecture, characteristics, and evolution of client-server models. Overview of distributed systems and comparison with peer-to-peer networks. Benefits and challenges of client-server computing.

Unit 2: Client-Server Architecture and Models
Detailed study of client-server architecture including 2-tier, 3-tier, and n-tier models. Components of client-server systems and roles of clients and servers. Thin clients, thick clients, and hybrid models.

Unit 3: Networking and Communication Protocols
Overview of network protocols used in client-server systems, including TCP/IP, HTTP, and FTP. Communication mechanisms and techniques for data transfer. Concepts of sockets, ports, and connection handling.

Unit 4: Middleware and Application Servers
Introduction to middleware technologies and their role in client-server communication. Overview of application servers, database connectivity, and middleware services such as message brokers and RPC (Remote Procedure Call).

Unit 5: Database Management in Client-Server Systems
Client-server database management, database access mechanisms, and SQL query processing. Concepts of database connectivity using JDBC/ODBC, data consistency, and transaction management.

NEURAL NETWORK

CUCS-443 **Cr L-T-P**

4 3- 1-0

UNIT – I INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT – II ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT – III SINGLE LAYER FEED FORWARD NETWORKS

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, TrainingAlgorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

UNIT – IV MULTI- LAYER FEED FORWARD NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - V ASSOCIATIVE MEMORIES

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis. Neural network applications: Process identification, control, fault diagnosis.

REFERENCES

1. Laurene Fausett, "Fundamentals of Neural Networks" , Pearson Education, 2004..
2. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2003.
3. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TATA Mc Graw Hill, 2006.
4. S. Rajasekharan and G. A. Vijayalakshmi pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2004.
4. Timothy J. Ross, " Fuzzy Logic With Engineering Applications", Tata McGraw- Hill Inc. 2000

CUCS-445 ENGINEERING SYSTEM MODELING AND SIMULATION

Unit 1: Introduction to System Modeling and Simulation
Overview of system modeling and the purpose of simulation in engineering. Types of models including physical, mathematical, and computational models. Applications of modeling and simulation in various engineering fields.

Unit 2: Mathematical Modeling Techniques
Basic concepts of differential equations, state-space representation, and transfer functions. Techniques for modeling mechanical, electrical, and other dynamic systems. Linear and non-linear system modeling approaches.

Unit 3: Simulation Techniques and Tools
Classification of simulation methods, including continuous and discrete event simulation. Overview of simulation software tools and environments. Introduction to Monte Carlo simulation and its applications.

Unit 4: System Dynamics and Feedback Control
Concepts of system dynamics, feedback loops, and their role in system behavior. Analysis of open-loop and closed-loop systems. Basics of control system design and its integration with simulation models.

Unit 5: Modeling of Complex Systems
Approaches to modeling multi-domain and complex systems using modular techniques. Methods for simulating interactions within complex systems. Use of block diagrams and flowcharts for system representation.

CBSN-401 LAW FOR ENGINEERS

Unit 1: Introduction to Law and Legal Systems

This unit introduces the basic concepts of law, the sources of law, and the structure of the legal system. Students will explore different branches of law, including civil, criminal, administrative, and constitutional law. The unit will emphasize the importance of law in engineering practice and the implications of legal decisions in the engineering field.

Unit 2: Contract Law

In this unit, students will study the principles of contract law, focusing on the formation, enforcement, and breach of contracts. Topics will include elements of a valid contract, types of contracts, and remedies for breach. The unit will also cover specific contracts relevant to engineering, such as construction contracts and service agreements.

Unit 3: Intellectual Property Rights (IPR)

This unit covers the various forms of intellectual property protection, including patents, copyrights, trademarks, and trade secrets. Students will learn about the importance of IPR in engineering and innovation, the process of obtaining patents, and the implications of infringement. Case studies will illustrate the application of IPR in engineering projects.

Unit 4: Liability and Professional Ethics

This unit focuses on legal liability, including torts and negligence, as they relate to engineering practice. Students will explore the concepts of professional liability, duty of care, and the consequences of professional misconduct. Ethical considerations and professional standards will also be discussed, highlighting the role of ethics in engineering decisions.

Unit 5: Regulatory Frameworks and Compliance

In this unit, students will study the regulatory frameworks governing engineering practices, including environmental laws, safety regulations, and industry standards. The unit will emphasize the importance of compliance and the consequences of violations. Topics may include occupational safety, environmental protection, and building codes.

CBSN-401 A INTRODUCTION TO ENGINEERING LAW

Unit 1: Overview of Law and Legal Systems

This unit introduces the fundamental concepts of law, the structure of the legal system, and the role of law in society. Students will explore the different branches of law, such as civil law, criminal law, and administrative law, as well as the sources of law including statutes, regulations, and case law. The unit will emphasize the importance of understanding legal principles in the context of engineering practice.

Unit 2: Contracts in Engineering

In this unit, students will study the principles of contract law as they apply to engineering. Key topics will include the elements of a valid contract, types of contracts commonly used in engineering projects, and the processes for contract negotiation and enforcement. The unit will also cover the implications of breach of contract and available remedies.

Unit 3: Intellectual Property Rights

This unit focuses on the significance of intellectual property rights in engineering and innovation. Students will learn about the different forms of intellectual property protection, including patents, copyrights, trademarks, and trade secrets. The unit will cover the process of obtaining these protections, the importance of safeguarding innovations, and the consequences of infringement.

Unit 4: Professional Liability and Ethics

In this unit, students will explore the concepts of professional liability, negligence, and ethical standards in engineering practice. Topics will include the duty of care engineers owe to clients and the public, the implications of professional misconduct, and the importance of adhering to ethical codes and standards within the profession.

Unit 5: Regulatory Frameworks in Engineering

This unit examines the various regulatory frameworks that govern engineering practices. Students will learn about environmental regulations, safety standards, zoning laws, and building codes. The unit will highlight the importance of compliance with these regulations and the role of engineers in ensuring adherence to legal requirements.

CBSN-401 B INTELLECTUAL PROPERT LAW

Unit 1: Introduction to Intellectual Property

This unit provides an overview of intellectual property (IP), including its definition, significance, and historical development. Students will explore the different types of intellectual property, including patents, copyrights, trademarks, and trade secrets. The unit will emphasize the role of IP in innovation and economic development.

Unit 2: Patents

In this unit, students will learn about patent law, including the requirements for patentability, the types of patents (utility, design, and plant patents), and the application process. The unit will cover the rights granted by a patent, the duration of protection, and the limitations of patent rights. Case studies will illustrate the impact of patents on technology and industry.

Unit 3: Copyrights

This unit focuses on copyright law, covering the protection of original works of authorship, including literary, artistic, and musical works. Students will explore the requirements for copyright protection, the rights of copyright holders, and the duration of copyright protection. The unit will also address issues related to fair use, infringement, and the impact of digital technology on copyright.

Unit 4: Trademarks

In this unit, students will study trademark law, including the importance of trademarks in branding and consumer protection. Topics will include the types of trademarks, the process of registering a trademark, and the rights conferred by trademark registration. The unit will also cover issues related to trademark infringement, dilution, and fair use.

Unit 5: Trade Secrets and Confidentiality

This unit examines the concept of trade secrets and the legal protections available for confidential information. Students will learn about the criteria for trade secret protection, the legal remedies for misappropriation, and the importance of maintaining confidentiality in business practices. Case studies will illustrate the significance of trade secrets in various industries.

CBSN-401 C ETHICS AND PROFESSIONAL RESPONSIBILITY

Unit 1: Introduction to Ethics

This unit introduces the fundamental concepts of ethics, including definitions, the importance of ethical behavior, and the relationship between ethics and law. Students will explore different ethical theories, such as utilitarianism, deontology, and virtue ethics, and discuss the role of ethics in personal and professional decision-making.

Unit 2: Professional Ethics

In this unit, students will examine the concept of professional ethics, focusing on the specific ethical standards and codes of conduct that govern various professions. The unit will cover the importance of integrity, accountability, and transparency in professional practice, as well as the consequences of unethical behavior.

Unit 3: Ethical Decision-Making Frameworks

This unit focuses on the frameworks and models for ethical decision-making. Students will learn about systematic approaches to identify ethical dilemmas, analyze options, and make informed decisions. Case studies will be used to illustrate practical applications of these frameworks in real-world scenarios.

Unit 4: Responsibility to Stakeholders

In this unit, students will explore the concept of stakeholder theory and the responsibilities professionals have towards various stakeholders, including clients, employers, colleagues, and the community. The unit will discuss the implications of ethical conduct on stakeholder relationships and the importance of balancing competing interests.

Unit 5: Legal and Regulatory Frameworks

This unit examines the legal and regulatory context in which professionals operate. Students will learn about the laws and regulations relevant to their field, including compliance issues, risk management, and the role of regulatory bodies. The unit will emphasize the importance of understanding legal obligations as part of professional responsibility.

CBSN-401 D LEGAL ASPECTS OF INTELLECTUAL PROPERTY IN ENGINEERING

Unit 1: Introduction to Intellectual Property

This unit provides an overview of intellectual property, its significance in engineering, and its impact on innovation. Students will learn about the different types of intellectual property, including patents, copyrights, trademarks, and trade secrets. The unit will emphasize the role of IP in protecting inventions and fostering technological advancement.

Unit 2: Patent Law Fundamentals

In this unit, students will explore the fundamentals of patent law, including the requirements for patentability, types of patents, and the patent application process. Key topics will include novelty, non-obviousness, and utility, as well as the rights conferred by patents. The unit will also cover patent infringement and enforcement issues relevant to engineers.

Unit 3: Copyrights and Engineering Works

This unit focuses on copyright law as it applies to engineering-related works, such as software, designs, and technical documents. Students will learn about the scope of copyright protection, the rights of authors, and the duration of copyright. The unit will also discuss fair use, copyright infringement, and the impact of digital technology on copyright law.

Unit 4: Trademarks in Engineering

In this unit, students will study trademark law, emphasizing its importance in branding and marketing engineering products and services. Topics will include the definition and types of trademarks, the process of trademark registration, and the legal rights associated with trademarks. The unit will cover trademark infringement and the significance of protecting brand identity.

Unit 5: Trade Secrets and Confidentiality

This unit examines the concept of trade secrets and the legal protections available for confidential information in engineering contexts. Students will learn about the criteria for trade secret protection, the legal remedies for misappropriation, and strategies for maintaining confidentiality. The unit will highlight the importance of trade secrets in competitive advantage.

CCSN-451 **DISTRIBUTED SYSTEM LAB**

1. Implement a client-server model using sockets for communication between a server and multiple clients.

2. Create a distributed file system where files can be stored and retrieved from multiple nodes in a network.

3. Develop a simple chat application that allows multiple clients to communicate through a central server.

4. Implement a distributed banking system that supports transactions from multiple clients, ensuring data consistency.

5. Design a distributed mutual exclusion algorithm using token-based or voting-based methods.

6. Build a peer-to-peer file sharing application that allows users to upload and download files from each other.

7. Create a distributed sensor network that collects and aggregates data from multiple sensor nodes.

8. Implement a distributed scheduling system that manages tasks across multiple nodes.

9. Design a distributed online voting system that ensures security and integrity of votes.

10. Create a load balancer that distributes incoming requests across multiple servers to optimize resource usage.

11. Develop a replicated database system that maintains consistency among replicas across different nodes.

12. Implement a distributed hash table (DHT) for efficient data retrieval in a peer-to-peer network.

13. Build a distributed logging system that aggregates logs from multiple applications into a central repository.

14. Create a microservices architecture where different services communicate over a network using REST APIs.

15. Implement a distributed version control system that allows collaborative development of software projects.

16. Design a fault-tolerant distributed system that can handle node failures without losing data or functionality.

17. Create a real-time distributed data processing system using a stream processing framework.

18. Develop a distributed machine learning application that trains a model using data from multiple sources.

19. Implement a blockchain-based system for secure and transparent transactions across a network.

20. Build a distributed monitoring system that tracks the performance and health of multiple services and nodes.

CCSN-453 ARTIFICIAL INTELLIFENCE LAB

1. Implement a simple chatbot using rule-based techniques to respond to user queries.
2. Develop a decision tree classifier for a dataset and visualize the tree structure.
3. Create a program that uses k-nearest neighbors (KNN) to classify handwritten digits from the MNIST dataset.
4. Build a linear regression model to predict house prices based on various features.
5. Implement a basic neural network from scratch to solve a binary classification problem.
6. Develop a program that uses natural language processing (NLP) to perform sentiment analysis on movie reviews.
7. Create a program that utilizes reinforcement learning to train an agent to play a simple game like Tic-Tac-Toe.
8. Build a recommendation system using collaborative filtering techniques for movie recommendations.
9. Implement the A* search algorithm to find the shortest path in a maze.
10. Develop a program that uses support vector machines (SVM) for classifying data points.
11. Create a simple image recognition system using convolutional neural networks (CNNs) with a popular dataset.
12. Implement a program that uses genetic algorithms to solve optimization problems.
13. Build a program that performs clustering on a dataset using k-means clustering algorithm.
14. Develop a facial recognition system using OpenCV and machine learning techniques.
15. Create a program that uses the Long Short-Term Memory (LSTM) network for time series prediction.
16. Implement a text summarization tool using NLP techniques to summarize articles or documents.
17. Develop an anomaly detection system using unsupervised learning techniques.
18. Create a program that uses transfer learning to fine-tune a pre-trained model for image classification.
19. Build a program that utilizes the Monte Carlo method for simulating random processes.
20. Implement a speech recognition system using machine learning techniques to transcribe audio to text.

CCSN-482 INTERNSHIP/MAJOR PROJECT

Unit 1: Introduction and Project Planning
Understanding project objectives, scope definition, project selection criteria, and planning methodologies. Developing timelines, work breakdown structures, and resource allocation plans.

Unit 2: Literature Review and Research Methodology
Conducting a comprehensive literature review relevant to the project topic. Establishing research methodologies, data collection techniques, and analysis frameworks to guide the project.

Unit 3: Project Development and Execution
Implementing project plans, applying technical skills, and developing prototypes or project components. Ensuring adherence to quality standards and project timelines during development.

Unit 4: Data Collection and Analysis
Collecting relevant data through surveys, experiments, or fieldwork. Analyzing data using appropriate tools and methods, interpreting findings, and deriving insights that align with project objectives.

Unit 5: Progress Monitoring and Reporting
Tracking project progress, preparing status reports, identifying potential challenges, and implementing solutions. Documenting findings and maintaining clear communication with project mentors or supervisors.

CCSN-484 PRESENTATION & VIVA

Unit 1: Fundamentals of Presentations
Understanding the purpose and importance of presentations, types of presentations, analyzing the audience, and structuring a presentation effectively.

Unit 2: Presentation Design and Tools
Designing impactful presentation slides, utilizing multimedia, applying best practices for visual content, and exploring various software and tools for creating presentations.

Unit 3: Communication Skills
Developing verbal and non-verbal communication, improving speech clarity and tone, using effective body language, and engaging with the audience.

Unit 4: Delivery Techniques
Preparing for confident delivery, managing presentation anxiety, incorporating storytelling, and handling audience interactions seamlessly.

Unit 5: Evaluation and Feedback
Practicing self-evaluation, receiving constructive feedback, using peer review, and understanding key criteria for assessing presentations and vivas.

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Bachelor of Computer Application (BCA) Three Year Programme

Semester System

(w.e.f. session 2013-14)

Revised and approved in the year 2021 (17th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO1: To facilitate in development of strong basic fundamentals of Computer Applications that fit as a perfect foundation towards a beginning a professional career in industry.

PEO2: To develop programming skills in learners by using fundamental knowledge of computer Science.

PEO3: To apply new designs and solutions to complex real life problems using existing and/or novel technologies.

PEO4: To play a creative role during professional life through turning problems to opportunities and foster personal and organizational growth

PEO5: To inculcate comprehensive communication ability that is useful during professional communication and leading of teams in future

Programme Specific Objectives (PSO's)

PSO 1 Students will able to understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.

PSO 2 Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

PSO 3 Student will able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.

PSO 4 Analyze and design solutions for real-world problems using computational techniques.

PSO 5 Explore trends in AI, Machine Learning, Cloud Computing, and Big Data.

Programme Outcome Objectives (POO's)

PO1: Understand the concepts of key areas in computer science.

PO2: Analyze and apply latest technologies to solve problems in the areas of computer applications.

PO3: Analyze and synthesis computing systems through quantitative and qualitative techniques

PO4: Apply technical and professional skills to excel in business.

PO5: Communicate effectively in both verbal and written form.

PO6: Develop practical skills to provide solutions to industry, society and business.

PO7: Acquire Knowledge of mathematical foundations, computer application theory and algorithm principles in the design and modeling of computer based system.

PO8: Earn caliber to design, analyze and development principles in the construction of complex hardware and software computer systems.

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective from 2021

BCA
I Semester

Subject Code	Subject	L	P	Cr.
BCA-101	Fundamental of Computer and C Programming	4		4
BCA-102	Problem Solving using Computer	4		4
BCA-103 **BCA-103 A /** **BCA-103 B /** **BCA-103 C**	Professional Communication / English / Technical Communication / Human Values, Deaddiction and Traffic Rules	4		4
BCA-104 **BCA-104 A /** **BCA-104 B /** **BCA-104 C**	Mathematics / Basic Mathematics / Mathematics-I / Advanced Applied Mathematics	4		4
BCA-151	Fundamental of Computer and C Programming Lab		2	2
BCA-152	Software Lab using Python		2	2
BCA-153 / **BCA-153 A/** **BCA-153 B/** **BCA-153 C**	English Communication Lab / English / Technical Communication / Human Values, Deaddiction and Traffic Rules (Lab)		2	2
BCA-154	Seminar Based on Learning		2	2
	Total Credits (4 Theory + 3 Lab)	**16**	**8**	**24**

II Semester

Subject Code	Subject	L	P	Cr.
BCA-201	OOPS Using C++	4		4
BCA-202	Database Management Systems	4		4
BCA-203	Web & E-Commerce Technologies	4		4
BCA-204 / **BCA-204 A /** **BCA-204 B /** **BCA-204 C**	Discrete Structures / Set Theory / Graph Theory / Discrete Probability	4		4
BCA-205 / **BCA-205 A /** **BCA-205 B /** **BCA-205 C**	Environmental Studies / Environmental Science / Natural Resource Management / Pollution Control	4		4
BCA-251	OOPS Using C++ Lab		2	2
BCA-252	Database Management Systems Lab		2	2
BCA-253	Seminar Based on Learning		2	2
	Total Credits (5 Theory + 2 Lab)	**20**	**6**	**26**

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective from 2021

BCA
III Semester

Subject Code	Subject	L	T	P	Cr.
BCA-301	Operating Systems	4			4
BCA-302	HTML, DHTML and CSS Programming	4			4
BCA-303	Theory of Computation	4			4
BCA-304	Multimedia and Applications	4			4
BCA-305 / **BCA-305 A /** **BCA-305 B /** **BCA-305 C /** **BCA-305 D**	Optimization Techniques / Elements of Statistics / Combinatorial Optimization Multi-objective Optimization Biostatistics	4			4
BCA-351	Operating Systems Lab			2	2
BCA-352	HTML Programming Lab			2	2
BCA-353	Seminar Based on Learning			2	2
	Total Credits (5 Theory + 2 Lab)	**20**		**6**	**26**

IV Semester

Subject Code	Subject	L	T	P	Cr.
BCA-401	Data Structures	4			4
BCA-402	Java Programming	4			4
BCA-403	Computer System Architecture	4			4
BCA-404 **BCA-404 A/** **BCA-404 B/** **BCA-404 C/** **BCA-404 D**	Knowledge Management / Knowledge Transfer / Knowledge Mapping/ Knowledge Management Systems/ Information Systems for KM	4			4
BCA-451	Data Structures Lab			2	2
BCA-452	Java Programming Lab			2	2
BCA-453	Computer System Architecture Lab			2	2
BCA-454	Seminar Based on Learning			2	2
	Total Credits (4 Theory + 3 Lab)	**16**		**8**	**24**

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective from 2021

BCA
V Semester

Subject Code	Subject	L	T	P	Cr.
BCA-501	Software Engineering	4			4
BCA-502	Analysis of Algorithms & Data Structures	4			4
BCA-503	Mobile Computing	4			4
BCA-504	Big Data and Machine Learning	4			4
BCA-551	Software Engineering Lab			2	2
BCA-552	Algorithms and Data Structures with C++ Lab			2	2
BCA-558	Research Project-I			2	2
	Total Credits (5 Theory + 2 Lab)	**16**		**6**	**22**

VI Semester

Subject Code	Subject	L	T	P	Cr.
BCA-601	Data Communication and Computer Networks	4			4
BCA-602	Artificial Intelligence	4			4
BCA-603	Cyber Security & Cyber Laws	4			4
BCA-604	Software Project management	4			4
BCA-651	Computer Networks Lab			2	2
BCA-656	Seminar and Group Discussion			2	2
BCA-658	Research Project-II			2	2
	Total Credits (4 Theory + 3 Lab)	**16**		**6**	**22**

FUNDAMENTAL OF COMPUTER AND PROGRAMMING IN C

BCA-101 **L T P 3 1**

2

Unit-I

Introduction to computer System: Definition of a Computer, Characteristics and Limitations of computer, Block diagram of computer, Types of computers Types of Software: system software, Application software, Commercial, Open source, Domain and Freeware software.

Types of programming languages: Assembler, Compiler, Interpreter, Linker, Loader (Definitions only), **Number system**: Decimal, Binary Octal and Hexadecimal number ,Interconversion of decimal to binary and vice-versa, ASCII codes, Flowchart-definition, Symbols used in writing the flow-chart Writing an algorithm and flow-chart of simple problems.

Unit-II

Fundamentals of 'C': Features of C language, Structure of C program, Writing the first C Program, Comments, Header files, Data types, Constants and Variables, Operators, Expressions, Evaluation of expressions, Type conversion and Type casting, Precedence and Associativity, I/O functions, Definition of Macro and Pre-Processor Directives.

Unit-III

Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement, Goto Statement, **Array & String:** Concept of array, One and Two-dimensional arrays, declaration and initialization of arrays, String, String storage, Built-in string functions

Unit-IV

Functions: Concept of user defined functions, prototype, definition of function, parameters, parameter passing, calling a function, Macros, Pre-processing, **Recursion:** Definitions, recursive function, Examples, Applications, **Pointers:** Basics of pointers, pointer to pointer, pointer and array, pointer to array, array of pointers, function returning a pointer.

Unit-V

Structure and Union: Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers, unions, bit-fields, **File Management:** Introduction to file management, Simple file management functions for text files, Reading from and writing to files.

Reference:

1. Fundamentals of Computers, V. Rajaraman.
2. Computer Concepts and C Programming, P.B. Kotur
3. Let us C,YashwanthKanetkar
4. ANSI C, Balagurusamy

PROBLEM SOLVING USING COMPUTER

BCA-102 **L T P 3 1 2**

Unit-I

Computer Fundamentals: Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers. **Basic Computer Organization -** Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. **Planning the Computer Program:** Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Unit-II

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.**Overview of Programming:** Structure of a Python Program, Elements of Python, IDEs for python, Python Interpreter, Using Python as calculator, Python shell, Indentation.

Unit-III

Introduction to Python: Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

Creating Python Programs: Input and Output Statements, Control statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement- if...else, Difference between break, continue and pass).

Unit-IV

Structures: Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments. File handling in python.

Unit-V

Introduction to Advanced Python: Objects and Classes, Inheritance, Regular Expressions, Event Driven Programming, GUI Programming. Basic concepts of concepts of Package and modules

References:

1. P. K. Sinha & Priti Sinha, “Computer Fundamentals”, BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010
5. Allen Downey, Jeffrey Elkner, Chris Meyers, how to think like a computer scientist: learning with Python, Freely available online.2012
6. Rober Sedgewick, K Wayne -Introduction to Programming in Python: An interdisciplinary Approach" Pearson India

PROFESSIONAL COMMUNICATION

BCA-103 **L T P 31 2**

UNIT 1

Effective communication: Meaning, Barriers, Types of communication and Essentials. Interpersonal Communication skills. Effective Spoken Communication: Understanding essentials of spoken communication, Public speaking, Discussion Techniques, Presentation strategies.

UNIT 2

Effective Professional and Technical writing: Paragraph development, Forms of writing, Abstraction and Summarization of a text; Technicalities of letter writing, internal and external organizational communication. Technical reports, proposals and papers.

UNIT 3

Effective non-verbal communication: Knowledge and adoption of the right non-verbal cues of body language, interpretation of the body language in professional context. Understanding Proxemics and other forms of non-verbal communication.

UNIT 4

Communicating for Employment: Designing Effective Job Application letter and resumes; Success strategies for Group discussions and Interviews

UNIT5

Communication Networks in organizations: Types, barriers and overcoming the barriers.

Laboratory work:

- Needs-assessment of spoken and written communication and feedback.
- Training for Group Discussions through simulations and role plays.
- Training for effective presentations.
- Project based team presentations.
- Proposals and papers-review and suggestions

Text Books:

1. Lesikar V. R. and Flately M. E., Basic Business Communication Skills for the Empowering the Internet Generation, Tata Mc Graw Hill, New Delhi (2006).
2. Raman M & Sharma S., Technical Communication Principles and Practice, Oxford University Press, New Delhi (2015) 3rd ed.
3. Mukherjee S. H., Business Communication-Connecting at Work, Oxford University Press, New Delhi (2013).

ENGLISH

English BCA-103 A

Unit 1: Grammar
Expressing in Style; Words often confused; One-word substitution; Phrases; Idioms.

Unit II: Advanced Reading
Paraphrasing; Interpreting visual information: Tables, Graphs, Charts; Speed Reading. Comprehension and Analysis of the book, "Who Moved My Cheese."

Unit III: Effective Writing
Business Correspondences: Fax, Email; Taking Notes; Making Inquiries; Placing Orders; Asking
Giving Information; Registering Complaints; Handling Complaints; Drafting Notices; Job Applications; Expository Composition; Argumentative Composition; Techniques of Argument;
Logical Presentation; Descriptive Composition; Narrative Composition; Summary Writing, Proposal; Abstract, Agenda, Minutes.

Unit IV: Speaking
Business Etiquettes; Impromptu Speech; Debate; Role Play; Presentations.

Unit V: Listening
Business-related Conversation Exercises.

Reference Books:
1. Spencer Johnson; Who Moved My Cheese; Vermilion; (2009).
2. Balasubramanian, T., A Textbook of English Phonetics for Indian Students; Macmillan India,
Delhi (1998).
3. McLearn, Stephen., Writing Essays and Report: A Student's Guide; Viva Books, New Delhi
(2011).
4. Burton Roberts, N., Analysing Sentences; Longman, London (1986).
5. Wekker, H. And Haegeman, L., A Modern Course in English Syntax; Croom Helm, London
(1985).

BCA-103 B TECHNICAL COMMUNICATION

UNIT: 1

Technical Documentation Presentation :Accuracy and Conciseness in Technical English, Structure Format etc. for Technical Reports & Thesis, Comparing and Contractive other aspects of short reports and long dissertations.

UNIT: 2

Communication Skills: Communication Process: Concept & importance, System of communication: Formal & internal. Barrier to effective communication.

UNIT: 3

Principles of Business Communication: Planning and conduction conversations, interviews and Discussion. The preparation of oral statements, effective listening, telephonic communication.

UNIT: 4

Written Communication: Guides to effective writing for business correspondence including letter and job application Memorandum, Office orders, Reports.

UNIT: 5

Non-Verbal Communication: Importance and Type-Cluster and congruency. Kinetics VoalCUes. Modern Forms of Communication: Telex, Fax, Telegram & Teleconferencing & E-mail.

SUGGESTED READINGS:-

1. Lesikar " Business Communication" AITBC

2. S. M. Ray "Business Communication" HP

BCA-103 C **Human Values, De-addiction and Traffic Rules**

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education

2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations

4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority

5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

8. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha

9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of 'I' and harmony in 'I'

11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

12. Programs to ensure Sanyam and Swasthya

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

Module 3: Understanding Harmony in the Family and Society- Harmony in HumanHuman Relationship

13. Understanding harmony in the Family- the basic unit of human interaction

14. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

15. Understanding the meaning of Vishwas; Difference between intention and competence

16. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

17. Understanding the harmony in the society (society being an extension of family):

Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

18. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha)- from family to world family!

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

19. Understanding the harmony in the Nature

20. Interconnectedness and mutual fulfillment among the four orders of naturerecyclability and self-regulation in nature

21. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

22. Holistic perception of harmony at all levels of existence

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

23. Natural acceptance of human values

24. Definitiveness of Ethical Human Conduct

25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal

Text Book

R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.

Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA

2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.

3. A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.

4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

5. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

6. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) KrishiTantra Shodh, Amravati.

MATHEMATICS

BCA-104 **L T P 310**

UNIT-I

DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem (without proof).

UNIT-II

LIMITS & CONTINUITY: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities

UNIT-III

DIFFERENTIATION: Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle's Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L' Hospitals Rule, Maxima & Minima, Curve Tracing, Successive Differentiation & Leibnitz Theorem.

UNIT-IV

INTEGRATION: Integral as Limit of Sum, Fundamental Theorem of Calculus (without proof.), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions(definition).

UNIT-V

VECTOR ALGEBRA: Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product and physical interpretation of area and volume. **Matrices:** Matrix, sub matrix, types of matrices, such as symmetric, square, diagonal Matrices, singular and non -singular matrices. Addition, subtraction, multiplication of matrices. Rank of a matrix, Matrix equation, solution by Cramer's rule and Gauss elimination method.

Referential Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Comp
4. J.P. Chauhan "BCA Mathematics Volume -1", Krishna Publications.

BCA-104 A BASIC MATHEMATICS

MODULE I : SYMBOLIC LOGIC & SET THEORY :

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional
operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments. Set operations, Venn diagram, Properties of sets, number ofelements in a set, Cartesian product, relations & functions, Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets, Functions: Types of Functions, Compositionof Functions.

MODULE II : DIFFERENTIAL CALCULUS

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications ofdifferentiation, Tangent and normal, angle between two curves, Maximum and Minimum values(Second derivative test), Curvature and radius of Curvature (Cartesian coordinates), Envelopes.

MODULE III : INTEGRAL CALCULUS

Definite Integral and its application for area, length and volume. Multiple Integrals. Change of order of Integration. Transformation of integral from Cartesian to polar. Applications in Areas, volume and surfaces.

MODULE IV : TWO DIMENSIONALANALYTICAL GEOMETRY

Straight Lines .Pair Straight Lines .Circles.

MODULE V :FUNCTION AND RELATION : Injective and surjective functions, composition of function, Inverse function, Use of
function in coding theory, Relation composition of relation, Equivalence relation.

Text Books:

1. Das BC and Mukherjee, Differential Calculus, Calcutta, U.N. Dhar Publishers
2. Das BC and Mukherjee, Integral Calculus, Calcutta, U.N. Dhar Publishers
3. Grewal B.S., Higher Engineering Mathematics, Delhi Khanna Publishers.

BCA - 104 B

MATHEMATICS – 1

UNIT : 1

BASIC CONCEPTS: Definition of Sets, Number systems, Relations Functions.

LIMIT CONTINUITY: Definition of limit, Limit of a function, Right and Left hand Limits, Algebra of limits, General principle for existence of limit, limit of inequalities, Method of finding limits, Continuity of functions, Cauchy's definition, graphical meaning of continuity, Kinds of discontinuities.

DIFFERENTIAL CALCULUS: Successive differentiation, Leibnitz theorem, Partial differentiation, Euler's Theorem, change of variables, Jacobian theorem.

UNIT : 2

INTEGRAL CALCULUS: Integration of rational and Irrational functions, Reduction Formulae, Definite Integral, Rectification; Quadrature, volumes and surfaces of Revolution, Simple applications of integration & simple problems of double and triple integrals.

UNIT : 3

DIFFERENTIAL EQUATION: Differential equations of first order, Differential equations of 2nd order, Differential of 2nd order with constant coefficients.

UNIT : 4

VECTOR CALCULUS AND ALGEBRA: Vectors, Differentiation and partial differentiation of vector functions, derivative of sum, Dot product and cross product of two vectors, gradient, divergence and curl.

UNIT : 5

COORDINATE GEOMETRY: Straight lines, Circles and the system of circles; standard equations and properties of Parabola. Ellipse and Hyperbolas, General equation of second degree in two variables, tracing of simple conic section.

Suggested Readings :

1. E. Kreyzig, "Engineering Mathematics".

2. B.S. Grewal, "Higher Engineering Mathematics"

3. Shanti Narayan, "Differential Calculus"

4. K.P. Gupta. "Vector Calculus"

BCA-104C **Advanced Applied Mathematics** **L T P**

3 0 1

Unit 1: Advanced Calculus and Analysis

Multivariable calculus: gradients, divergence, and curlTheorems of Green, Stokes, and GaussMetric spaces and Convergence, Functions of several variables: continuity, differentiability ,Optimization techniques: Lagrange multipliers

Unit 2: Differential Equations

Ordinary differential equations (ODEs): existence and uniqueness **,**Systems of ODEs and stability analysis**,**Partial differential equations (PDEs): classification and methods of solution **,**Fourier series and transforms**,**Numerical methods for ODEs and PDEs

Unit 3: Linear Algebra and Matrix Theory

Vector spaces and subspaces**,**Linear transformations and their properties**,**Eigenvalues and eigenvectors, Diagonalization and spectral theorem**,**Applications to systems of equations and optimization problems

Unit 4: Numerical Methods and Computational Mathematics

Numerical analysis: error analysis and convergence**,**Root-finding algorithms (Newton's method, bisection)**,**Numerical integration and differentiation**,**Finite difference methods for PDEs**,**Introduction to MATLAB/Python for mathematical modeling

Unit 5: Probability, Statistics, and Stochastic Processes:

Probability theory: distributions, expected values, and variance**,**Statistical inference: hypothesis testing, confidence intervals**,**Regression analysis and time series forecasting**,**Markov chains and stochastic processes**,**Applications in finance, engineering, and science

BCA-151 Fundamental of Computer and C Programming Lab

S.N	PRACTICAL PROGRAMS FILE
1	Write a program to print “hello world” in C.
2	Write a program to insert a new line using \n.
3	Write a program to make a line Single-line comment.
4	Write a program to make a line multi-line comment.
5	Write a program to create a variableand assign values to variables.
6	Write a program to create a variableand assign values to variables using scanf() function.
7	Write a program toprint other types, use %c for char and %f for float.
8	Write a program to declare more than one variable of the same type.
9	Write a program to calculate the area of a rectangle.
10	Write a program to perform operations on variables and values (+ , - , *, / ,%).
11	Write a program to perform addition assignment operator (+=) adds a value to a variable
12	Write a program to find out if a person is old enough to vote using Scanf() function using if-else.
13	Write a program to check even or odd no using while loop in C.
14	Write a program to print 1 to 50 using do while loop in C.
15	Write a program to print 5 to 10 using for loop in C.
16	Write a program to print 1 to 5 using array in C.
17	Write a program to create structure in C.
18	Write a program to create union in C.
19	Write a program to using pointer in C.
20	Write a program to create user define function in C.

BCA-152 Software Lab using Python

1. Write a program to demonstrate basic data type in python.
2. Demonstrate the working of following functions in Python.
   i) id( ) ii) type( ) iii) range( )
3. Create a list and perform the following methods

(a) Insert (b) remove (c) append (d) pop (e) clear

4. Write a Python program to demonstrate various ways of accessing the string.

i) By using Indexing (Both Positive and Negative)
ii) By using Slice Operator

5. Create a tuple and perform the following methods.

(a) Add items (b) len (c) Check for item in tuple (d) Access items

6. Demonstrate the following functions/methods which operates on dictionary in Python

i) print dictionary items ii) len( ) iii) clear( ) iv) get( ) v) pop( ) vi) change values

7. Demonstrate the following Conditional statements in Python with suitable examples.

i) if statement ii) if else statement iii) if – elif – else statement

8. write a program to print a number is positive/negative using while loop.
9. Write a program to demonstrate for loop in python.
10. Write Python program to demonstrate use of nested loop statements: print the following pattern

```
*
* *
* * *
* * * *
* * * * *
```

11. Demonstrate the following control transfer statements in Python with suitable examples.
    i) Break ii) continue iii) pass
12. Write a Python program to perform read and write operations on a file.
13. Demonstrate the following kinds of Parameters used while writing functions in Python.

i) Positional Parameters ii) Default Parameters iii)Keyword Parameters iv) Variable length Parameters

14. Write a python program to demonstrate inheritance.

BCA 153 English Communication lab

1	Self-Introduction and Group Interaction
2	Role Play: Telephone Etiquette
3	Debate: Discussing Current Issues
4	Storytelling Skills Development
5	Persuasive Speech Practice
6	Listening Comprehension: News Analysis
7	Group Discussion: Analyzing Advertisements
8	Job Interview Simulation
9	Film Scene Analysis and Discussion
10	Pronunciation Practice and Phonetics
11	Formal and Informal Letter Writing
12	Creative Writing: Dialogue Creation

BCA 153 A English lab

Practicals

1. Listening Skills

• The student should be able to listen to s text read aloud in normal speed with focus on intonation.

• After listening the student can fill-in-blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.

2. Speaking Skill

• Reading aloud of dialogues, texts, poems, speeches focusing on intonation.

• Self-introduction • Role plays on any two-situations.

• Telephonic Conversations.

3. Personality Development

• Initiation

• Physical Appearance

• Audience Purpose

4. Interpersonal Skills

• Appropriate use of non-verbal skills in face to face communication [i.e. Viva –Voce, group –interviews, GDs and seminars.]

5. Presenting in GD, Seminars and Conferences.

• Leadership Quality

• Time Management

• Achieving the target

BCA 153 B Technical Communication (Lab) ` L T P 0 0 2

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A.)

LIST OF PRACTICALS

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.

2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.

3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/Kinesics.

4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.

5. Official/Public Speaking based on suitable Rhythmic Patterns.

6. Theme- Presentation/Key-Note Presentation based on correct argumentation methodologies.

7. Individual Speech Delivery/Conferencing with skills to defend Interjections/Quizzes.

8. Argumentative Skills/Role Play Presentation with Stress and Intonation.

9. Comprehension Skills based on Reading and Listening Practicals on a model AudioVisual Usage.

Reference Books

1. Bansal R.K. & Harrison: A manual of Speech & Phonetics, Orient Black Swan Pvt. Ltd. New Delhi, 2010.

2. Sethi & Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi, 2011.

3. L.U.B.Pandey: Practical Communication-Process & Practice, A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi, 2013.

4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press. 2007.

BCA 153 C Human Values, Deaddiction and Traffic Rules (Lab)

Course Objectives:

- To instill human values and ethics.
- To understand the impact of addiction and methods for deaddiction.
- To educate students on traffic rules and safe driving practices.

Module 1: Human Values

1. **Introduction to Human Values**
    - Definition and importance
    - Types of human values (e.g., honesty, respect, empathy)
2. **Ethics in Everyday Life**
    - Decision-making and moral dilemmas
    - Case studies and discussions
3. **Community Service**
    - Organizing and participating in community outreach programs
    - Reflective practices on service experiences

Module 2: Deaddiction

1. **Understanding Addiction**
    - Definition and types of addiction (substance and behavioral)
    - Psychological and social impacts of addiction
2. **Deaddiction Strategies**
    - Methods and approaches to deaddiction
    - Role of family and community support
3. **Workshops and Guest Lectures**
    - Inviting health professionals and recovering individuals
    - Interactive sessions on coping strategies

Module 3: Traffic Rules

1. **Introduction to Traffic Rules**
    - Importance of traffic regulations
    - Basic traffic signs and signals
2. **Road Safety Practices**
    - Safe driving techniques
    - Pedestrian safety and awareness
3. **Practical Lab Sessions**
    - Simulated driving scenarios (using simulators or practical demonstrations)
    - Role-playing exercises for emergency situations

Assessment and Evaluation

- Participation in discussions and activities
- Practical assessments (lab performance)
- Group projects or presentations on chosen topics

Additional Resources

- Recommended readings and online resources
- Community organizations related to deaddiction and road safety

BCA- 154 **Seminar Based on Learning**

- **Educational technology**

  A common topic at EdCamps, this includes practical examples of using modern tools in the classroom and how to solve problems that technology can cause.

- **Current events**

  Students can track current events and create a news show or podcast about them.

- **Artificial intelligence**

  Seminars can help you learn about responsible AI development and deployment, and build a professional network.

- **Case studies and debates**

  These activities can help students engage with the material and develop communication, critical analysis, and teamwork skills.

- **Classroom management**

  This includes strategies and techniques for creating a learning environment that reduces disruptions.

- **Global issues in education and research**

  This can include topics such as the impact of crisis on education, ethical issues in education, and technology in teaching and learning.

- **Psychology**

  This includes core areas such as biological, cognitive, developmental, social, and individual differences.

OBJECT ORIENTED PROGRAMMING SYSTEM USING C++

BCA-201 **L T P 3 1 2**

UNIT 1

Introduction to Object Oriented Programming: Basic concept of OOP, Comparison of Procedural Programming and OOP, Benefits of OOP,C++ compilation, Difference between C and C++, **Tokens and identifiers:** Character set and symbols, Keywords, C++ identifiers, Variables and Constants, Integer, character and symbolic constants; Dynamic initialization of variables ,Reference variables, Basic data types in C++, Streams in C++, Operators, Types of operators in C++, Precedence and associativity of operators, Manipulators.

UNIT 2

Decision and Control Structures: if statement, if-else statement, switch statement, Loop: while, do-while, for; Jump statements:break, continue, go to, Array, Pointer and StructureArrays, pointers, structures, unions;Functions**,** main() function, components of function: prototype, function call, definition, parameter;passing arguments; types of function, inline function, function overloading.**Classes and Objects:** Classes in C++, class declaration, declaring objects, Defining Member functions, Inlinemember function, Array of objects, Objects as function argument, Static data member andmember function, Friend function and friend class.

UNIT 3

Constructors and Destructors: Constructors, Instantiation of objects, Default constructor, Parameterized constructor, Copyconstructor and its use, Destructors, Constraints on constructors and destructors, Dynamicinitialization of objects.**Operator Overloading:** Overloading unary operators: Operator keyword, arguments and return value; overload in gunary and binary operators: arithmetic operators, manipulation of strings using operators; Type conversions.

UNIT 4

Inheritance and Polymorphism : Derived class and base class, Defining a derived class, Accessing the base class member, **Inheritance:** multilevel, multiple, hierarchical, hybrid; Virtual base class, Abstract class, Virtual Functions and Polymorphism, Virtual functions, pure virtual functions; **Polymorphism:** Categorization of polymorphism techniques: Compile time polymorphism, Run time polymorphism

UNIT5

File Handling: File classes, Opening and Closing a file, File modes, Manipulation of file pointers, Functionsfor I/O operations.

BOOKS SUGGESTED

1) E. Balaguruswami – Object Oriented programming with C++
2) Kris James – Success with C++
3) David Parsons – Object Oriented programming with C++

DATABASE MANAGEMENT SYSTEMS

BCA-202 **L T P 31 2**

UNIT-I

Database Concepts:

Data, Database and DBMS, Comparison between traditional file V/s DBMS, Characteristics of datain database, Components of database system environment, Functions of DBMS, Advantagesand disadvantages of the DBMS, DBMS users, Database administrator, Role of DBA, 3-schema architecture, Database development process - conceptual data modelling, logical database design, physical database design, database implementation, database maintenance.

UNIT-II

Database Analysis: Conceptual data modelling using E-R data model -entities, attributes,relationships, generalization, specialization, specifying constraints, 5-6 practical problems basedon E-R data model.

UNIT-III

Relational Database: Relational data model: Introduction to relational database theory: definitionof relation, relational model integrity rules, relational algebra and relational calculus.

Relational Database Design: Normalization- 1NF, 2NF, 3NF, BCNF, 4NF and 5NF. Concept of De-normalization and practical problems based on these forms.

UNIT-IV

Indexing of Data: Impact of indices on query performance, basic structure of an index, creating indexes with SQL, Types of Indexing and its data structures.

Transaction Management and Concurrency Control: Transaction, Concurrency control, Concurrency control with locking Methods, Concurrency control with time stamping methods, Concurrency control with optimistic methods, database recovery management.

UNIT-V

Database Implementation: Introduction to SQL, DDL aspect of SQL, DML aspect of SQL – update, insert, delete & various form of SELECT- simple, using special operators, aggregate functions, group by clause, sub query, joins, co-related sub query, union clause, exist operator. PL/SQL - cursor, stored function, stored procedure, triggers, error handling, and package.

Text Books:

1. Silverschatz A., Korth F. H. and Sudarshan S., Database System Concepts, Tata McGrawHill (2010) 6th ed.
2. Elmasri R. and Navathe B. S., Fundamentals of Database Systems, Pearson (2016) 7th ed.

Reference Books:

1. Bayross I., SQL, PL/SQL the Programming Language of Oracle, BPB Publications (2009)4th ed.
2. Hoffer J., Venkataraman, R. and Topi, H., Modern Database Management, Pearson (2016)12th ed.

WEB AND E-COMMERCE TECHNOLOGIES

BCA-203 **L T P 3 1 0**

UNIT-I

An introduction to Electronic commerce: What is E-Commerce (Introduction and Definition), Mainactivities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions ofE-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, ElectronicCommerce Applications, Electronic Commerce and Electronic Business(C2C)(2G, G2G, B2G, B2P,B2A, P2P, B2A, C2A, B2B, B2C)

UNIT-II

Building Own Website: Reasons for building own website, Benefits of Website, Cost, Time, Reach,Registering a Domain Name, Web promotion, Target email, Baner Exchange, Shopping Bots

UNIT-III

Internet Security: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Emailprivacy, Computer Crime(Laws, Types of Crimes), Threats, Attack on Computer System, SoftwarePackages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection,Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA,Authorisation and Authentication, Firewall, Digital Signature(How it Works)

UNIT-IV

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI,Disadvantages of EDI, EDI model, Electronic Payment System, Types of Electronic PaymentSystem, Payment Types, Traditional Payment, Value Exchange System, Credit Card System,Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash

UNIT-V

Planning for Electronic Commerce: Planning Electronic Commerce initiates, Linking objectives tobusiness strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies fordeveloping electronic commerce web sites, Internet Marketing, The PROS and CONS of onlineshopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques,The E-cycle of Internet marketing, Personalisation e-commerce.

E – Governance for India: Governance of India, Indian customer EDI System, Service centre, Imports, Exports.

Recommended Books :

1. E-Commerce Concepts, Models, Strategies- :- G.S.V.Murthy Himalaya Publishing House
2. E- Commerce :- Kamlesh K Bajaj and Debjani Nag
3. Electronic commerce :- Gray P. Schneider
4. E-Commerce, Fundamentals &Applications : Chand (Wiley)

DISCRETE STRUCTURES

BCA-204 **L T P 3 10**

UNIT-I

Propositional logic: Logical connectives, Truth tables, Normal forms, Proof Techniques: Notions of implication, equivalence converse, inverse, contra positive, negation, and contradiction.

UNIT-II

Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets. **Relations:** Definition, Operations on relations, Properties of relations, Composite Relations, Order ofrelations.**Functions:**Definition,Classificationoffunctions,Operations on functions, Partially Ordered Set, Totally Ordered Set, Hasse Diagram, Minimal and Maximal Elements, Upper Bound and Lower Bound, Infimum & Suprimum

UNIT-III

Graphs Theory: Representation, Type of Graphs, Paths and Circuits: Euler Graphs, Hamiltonian Paths & Circuits; Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs.

UNIT-IV

Trees: Definition, Binary tree, Binary tree traversal, Binary search tree, Cut-sets, Connectivity and Separability, Isomorphism.

UNIT-V

Lattice: Lattice as a poset, Bounded Lattice, Lattice as algebraic system, Dual of a lattice, Complete Lattice

Text Books: 1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill (2011), 7th ed. 2. Tremblay, J.P. and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill (2007), 1st ed.

Reference Books: 1. Haggard G., Schlipf J. and Whitesides, Sue, Discrete Mathematics for Computer Science, Cengage Learning, (2008), 2nd ed. 2. Johnsonbaugh R., Discrete Mathematics, Pearson Education, (2007), 7th edt

BCA-204A **Set Theory** **L T P**

3 0 1

Unit 1: Introduction to Set Theory

Definition of sets and elements**,** Notation and terminology (subsets, proper subsets)**,**Venn diagrams and visual representations of sets**,** Operations on sets (union, intersection, difference, complement)**,**Cartesian products

Unit 2: Types of Sets and Functions

Finite vs. infinite sets**,** Countable and uncountable sets**,** Power sets**,** Introduction to functions (one-to-one, onto, bisections)**,**Relationships between sets and functions

Unit 3: Relations and Cardinality

Definitions and examples of relations**,** Properties of relations (reflexivity, symmetry, transitivity)**,**Equivalence relations and partitions**,** Cardinality: comparing sizes of sets**,** Cantor's theorem and the concept of infinity

Unit 4: Axiomatic Set Theory

Introduction to axiomatic systems**,** Zermelo-Fraenkel set theory (ZF) and the Axiom of Choice (AC)**,**Basic axioms and their implications**,** Alternative set theories (e.g., Von Neumann-Bernays-Gödel set theory)**,**Paradoxes in set theory (Russell's paradox, Burali-Forti paradox)

Unit 5: Applications and Advanced Topics

Applications of set theory in mathematics and computer science**,** Fuzzy sets and their applications**,** Set theory in probability and statistics**,** Introduction to ordinal and cardinal numbers**,** Discussion of open problems and recent developments in set theory

Course Code:-BCA-204 B **L T P C**

Course Name :-Graph Theory **4 0 0 4**

UNIT-I what is graph Application of graphs, Finite and Infinite graphs, Incidence & Degree, Isolated vertex, Pendant Vertex, and Null Graph.

UNIT-II Isomorphism, Sub graphs, A puzzle with multicolored Cubes, walks, Path, and circuits connected graph, Disconnected graphs and Components, Euler graphs, Operations on graphs more on Euler Graphs, Hamiltonian paths and circles.

UNIT-III Tree, some properties of trees, pendant Vertices in a tree, Distance and centers in a tree Rooted and Binary trees, Spanning trees, fundamental circuits, Finding all spanning tree of a graph.

UNIT-IV Cut-Sete, Some Properties of Cut-Set, All Cut-Sets in a graph, Path-Sets, some properties of paths sets in a graph, fundamental Circuits & Cut-Set, Connectively and separability. Directed graph, undirected graph. Matrix representation of graph.

Text Books:

1. NarsinghDeo, “Graph Theory”, Prentice Hall of India

Discrete Probability L T P

BCA-204 C 3 1 0

UNIT 1:- PROBABILITY; Introduction to Probability, Terms Used in Probability Random Experiment Sample Space Event and Definition of Various Events, Mathematical, Statistical and Axiomatic Definitions of Probability, Addition Rule, Multiplication Rule and Sub Rules of the Probability (Without Proof), Conditional Probability, Bayes' theorem (without proof) and its application up to three events, Simple numerical examples based on the above concepts 25%

UNIT 2:- MATHEMATICAL EXPECTATION (For Discrete Random Variable), Meaning of Discrete Random variable, Meaning of Probability Distribution, Meaning of Mathematical Expectation Properties of Mathematical Expectation (Without Proof), Variance of a Discrete Random Variable Properties of Variance (without proof), Mean and Variance of Linear Combination of Two Independent Variables, Examples based on the above Concepts 25%

UNIT 3:- DISCRETE DISTRIBUTIONS -I ; Concept of Probability Mass Function , Introduction to Poisson Distribution Properties and Uses of Poisson Distribution , Introduction to Hyper geometric Distribution Properties and Uses of Hyper geometric Distribution , Examples Related to these Distributions 25%

UNIT 4 :- DISCRETE DISTRIBUTIONS -II ; Introduction to Negative Binomial Distribution Properties and Uses of Negative Binomial Distribution 25% ĦWĂŐĞ , Geometric Distribution Properties and Uses of Geometric Distribution , Examples Related to these Distributions

REFERENCE BOOKS 1. "Introduction to Probability and Mathematical Statistics" by PrasannaSahoo (published by CRC Press) 2. "Probability and Statistics" by T.K. V. Iyengar (published by S. Chand Publishing) 3. "Fundamentals of Probability, with Stochastic Processes" by Saeed Ghahramani (published by PHI Learning Private Limited) 4. "Probability and Random Processes" by S.V. Prabhu and P.G. Sankaran (published by John Wiley & Sons India Pvt. Ltd.) 5. "A First Course in Probability and Statistics" by B.L.S. Prakasa Rao (published by Universities Press)

ENVIRONMENTAL STUDIES

BCA-205 **L T P 3 10**

UNIT-I

Environment pollution, global warming and climate change: Air pollution (local, regional and global); Water pollution problems; Land pollution and food chain contaminations; Carbon cycle, greenhouse gases and global warming; Climate change – causes and consequences; Carbon footprint; Management of greenhouse gases at the source and at the sinks.

UNIT-II

Ecology, Structure and functioning of natural ecosystems: Ecology, ecosystems and their structure, functioning and dynamics; Energy flow in ecosystems; Biogeochemical cycles and climate; Population and communities.

UNIT-III

Natural resources: Human settlements and resource consumption; Biological, mineral and energy resources; Land, water and air; Natural resources vis-à-vis human resources and technological resources; Concept of sustainability; Sustainable use of natural resources.

UNIT-IV

Agricultural, industrial systems and environment: Agricultural and industrial systems visà-vis natural ecosystems; Agricultural systems, and environment and natural resources; Industrial systems and environment.

UNIT-V

Energy technologies and environment: Electrical energy and steam energy; Fossil fuels, hydropower and nuclear energy; Solar energy, wind energy and biofuels; Wave, ocean thermal, tidalenergy and ocean currents; Geothermal energy; Future energy sources; Hydrogen fuels; Sustainable energy.

Text Books: Bharucha, E., Textbook of Environmental Studies, Universities Press (2005). Chapman, J.L. and Reiss, M.J., Ecology-Principles and Application, Cambridge University Press (LPE) (1999). Joseph, B., Environmental Studies, Tata McGraw-Hill (2006).

Reference Books: Miller, G.T., Environmental Science- Working with Earth, Thomson (2006). Wright, R.T., Environmental Science-Towards a sustainable Future, Prentice Hall (2008) 9th ed.

	Environmental studies	L T P
BCA-205 A		3 1 0

UNIT-1: THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES Definition, Scope and Importance, Need for Public Awareness.

UNIT-2: NATURAL RESOURCES: - Renewable and Non-renewable Resources: Natural resources and associated problems: - a) FOREST RESOURCES: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) WATER RESOURCES: use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

UNIT-3: ECOSYSTEMS:- Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: - a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-4: BIODIVERSITY AND ITS CONSERVATION :-Introduction – Definition: genetic, species and ecosystem diversity, Bio geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, and aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation ,Hot-sports of biodiversity, Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-5: ENVIRONMENTAL POLLUTION DEFINITION: Causes, effects and control measures of: - a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear pollution, Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster Management: Floods, earthquake, cyclone and landslides.

TEXT BOOKS:-

1."Environmental Studies: From Crisis to Cure":- Author: R. Rajagopalan, Publisher: Oxford University Press
2."Environmental Studies":- Author: ErachBharucha, Publisher: University Grants Commission (UGC)
3. "Textbook of Environmental Studies for Undergraduate Courses":- Authors: Benny Joseph, Publisher: McGraw Hill Education
4. "Environmental Science: A Global Concern":- Authors: William P. Cunningham, Mary Ann Cunningham, Publisher: McGraw-Hill

BCA-205 B **L T P**

Natural Resource Management **3 0 1**

UNIT 1: Resources: Types, Renewable & non-renewable resources; resource degradation and conservation; Human impact on natural resources.
Land resources: Land degradation and desertification; Soil erosion and control; reclamation & management of waste lands with special reference to India.
Water resources: Pools of water and hydrological cycle; Surface water, ground water, Human use of freshwater. Rain water harvesting; watershed management

UNIT 2:- Energy resources: Fossil fuels, nuclear energy, solar energy, wind energy, tidal energy, geothermal energy, hydropower. Global energy consumption; Environmental impacts of various forms of energy use.
Hydrogen as a source of energy, energy from biomass, bioconversion technology, energy plantations and petro-crops. Bioenergy-Prospects in India.
Mineral resource conservation & recycling, bacterial leaching of metals from low grade ores.

UNIT 3:- Forest resources: Forests, their importance, types, global distribution; primary and secondary products, forest resources of India. Impact of deforestation; Sustainable forest Forest Management.
Range lands: Types, uses, grassland types and management in India.
Medicinal plant resources and bioprospecting-a brief account.
Fisheries and Marine resources- a general account; aquaculture

UNIT 4: Economics, environment and development: Economic categories of resources; the market, environment and natural resources; the economics theory- market, demand and supply relationships.
The limit of growth; cost benefit ratio; natural resources accounting; market based mechanisms for environmental protection.
Economically sustainable forest management designs- green certification, resource conservation, community forest management; ecotourism.
Economic efficient model of sustainable fisheries; designs for renewable energy resources.

TEXT BOOKS:-

1. "Natural Resource Management for Sustainable Development": -Author: B.D. Dhawan, Focus: Sustainable development and conservation strategies in natural resource management.
2. "Integrated Watershed Management: Principles and Practice":- Authors: Isobel W. Heathcote
3. "Natural Resource and Environmental Economics":-Authors: Roger Perman, Yue Ma, Michael Common, David Maddison, James McGilvray
4."Principles of Environmental and Resource Economics":-Authors: HenkFolmer, Landis Gabel, Shelby Gerking, Adam Rose
5. "Natural Resource Management: The Human Dimensions":- Authors: Alan W. Ewert, Deborah J. Chavez, Arthur W. Magill

Pollution Control L T P

BCA-205 C 3 1 0

Unit 1: Introduction to Pollution and Environmental Issues

Definition and Types of Pollution:-Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution
Sources and Causes of Pollution:-Natural vs. Anthropogenic sources
Impacts of Pollution on Environment and Human Health
Global Environmental Issues:-Ozone depletion, Global warming, Acid rain, Eutrophication

Unit 2: Air Pollution Control

Air Pollutants:-Types (Particulate matter, gases, etc.), Primary vs. Secondary pollutants
Sources and Health Effects of Air Pollutants
Air Quality Standards: -WHO and National Standards, Monitoring Air Quality
Air Pollution Control Technologies:-Filtration (Cyclones, bag filters), Electrostatic precipitators, Scrubbers (Wet and dry), Catalytic converters

Unit 3: Water and Wastewater Treatment

Water Pollution:-Sources (Industrial, domestic, agricultural), Types of water pollutants (Physical, chemical, biological)
Water Quality Standards and Monitoring
Water Treatment Processes:-Coagulation and flocculation, Filtration
Sedimentation, Disinfection methods (Chlorination, UV, ozone)
Wastewater Treatment Techniques:-Primary, Secondary, and Tertiary treatments, Biological processes (Activated sludge, trickling filters), Advanced treatment (Membrane filtration, adsorption)

Unit 4: Solid Waste Management and Noise Pollution Control

Solid Waste Management:-Types of Solid Waste (Municipal, Industrial, Hazardous), Collection, transportation, and disposal of solid waste, Waste reduction and recycling, Landfills and composting, Incineration and waste-to-energy technologies
Noise Pollution:- Sources of Noise Pollution, Effects on Human Health and Environment, Noise Measurement and Control Methods, Soundproofing, barriers, and zoning

Unit 5: Environmental Policies and Sustainable Development

Environmental Legislation and Policies:-National Environmental Policies, International Conventions and Protocols (Kyoto Protocol, Paris Agreement)
Environmental Impact Assessment (EIA):- Process and Importance, Case Studies
Sustainable Development:-Principles of sustainability, Role of renewable energy in pollution control, Green technologies and innovations, Circular Economy concepts (Reduce, Reuse, Recycle)

TEXT BOOKS:-

1. Air Pollution Control Engineering:-Author: Noel De Nevers,Publisher: McGraw-Hill
2. Wastewater Engineering: Treatment and Reuse:-Authors: Metcalf & Eddy, George,chobanoglous,Publisher: McGraw-Hill
3. Environmental Pollution Control Engineering:-Author: C.S. Rao, Publisher: New Age International Publishers
4. Solid Waste Management:-Authors: K. Sasikumar, SanoopGopiKrishna,Publisher: PHI Learning Pvt. Ltd.

BCA-251 **OOPS Using C++ Lab**

S.N	PRACTICAL PROGRAMS FILE
1	Write a program to print “HELLO” in C++.
2	Write a program to addition of two numbers using C++.
3	Write a program to find factorial number of 5 in C++.
4	Write a program to Find Simple Interest in C++.
5	Write a program to Check Even or Odd Integers using if and else in C++.
6	Write a program to print 1 to 10 using array in C++.
7	Write a program to create function overloading in C++.
8	Write a program to print 20 to 1 using while loop in C++.
9	Write a program to using single inheritance in ++.
10	Write a program to create private function and call using C++.
11	Write a program to create default constructor in C++.
12	Write a program to using friend function in C++.
13	Write a program to create function overriding in C++.
14	Write a program to print matrix in C++.
15	Write a program to print addition of a single dimensional array in C++
16	Write a program to check even or odd using for loop in C++.
17	Write a program to print 1 to 20 using do while loop in C++
18	Write a program to using switch case in C++;
19	Write a program to find multilevel inheritance in C++.
20	Write a program to create operator overloading in C++.

BCA-252 **DBMS Lab**

List of Experiments:

1. Introduction SQL-SQL*Plus
2. Road way travels E-R Diagrams
3. Various Data Types
4. Tables
5. My SQL Installation
6. DDL and DML Commands with Examples
7. Key Constrains-Normalization
8. Aggregate functions
9. Joins
10. Views
11. Index
12. PL/ SQL
13. Exception handling
14. Triggers
15. Cursors
16. Subprograms-procedure PL/ SQL
17. Functions of PL/ SQL

- **Educational technology**

  A common topic at EdCamps, this includes practical examples of using modern tools in the classroom and how to solve problems that technology can cause.

- **Current events**

  Students can track current events and create a news show or podcast about them.

- **Artificial intelligence**

  Seminars can help you learn about responsible AI development and deployment, and build a professional network.

- **Case studies and debates**

  These activities can help students engage with the material and develop communication, critical analysis, and teamwork skills.

- **Classroom management**

  This includes strategies and techniques for creating a learning environment that reduces disruptions.

OPERATING SYSTEMS

BCA-301 **L T P 31 2**

UNIT-I

Introduction to the Operating System (OS), Types of Operating System: Batch System, Time Sharing System, Real Time System. Multi Programming, Distributed System, Functions and Services of OS.

UNIT - II

Process Management: Process Concept, Process State, Process Control Block, ProcessScheduling, CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Pre-emptive &Non-Preemptive Scheduling.

UNIT - III

Deadlocks-System model, Characterization, Deadlock Prevention, Deadlock Avoidance andDetection, Recovery from deadlock.

UNIT - IV

Memory Management: Logical Address, Physical Address, External and Internal Fragmentation.Concept of paging, Page table structure - Hierarchical Paging, Hashed Page Tables, Inverted PageTable.

UNIT -V

Information Management: File Concept, Access Methods, Directory Structure. DeviceManagement: Disk Structure, Disk Scheduling Algorithms.

Text Books:

1. Silbershatz and Galvin," Operating System Concept", Addition We seley, 2002.
2. Nutt, G., “Operating Systems”, Addison-Wesley.
3. GodboleAhyut, "Operating System", PHI, 2003.

Reference Books:

1. Flynn, Mchoes, "Understanding Operating System", Thomson Press, Third Edition, 2003
2. Tannenbaum,"Operating System Concept", Addition Weseley, 2002.
3. Joshi, R. C. and Tapaswi, S., “Operating Systems”, Wiley Dreamtech.

HTML, DHTML AND CSS PROGRAMMING

BCA-302 **L T P 3 1 2**

UNIT-I

Introduction: Overview of HTML, need of HTML, Use of it,HTML Tags: concept of Tag, types of HTML tags, structure of HTML program, Text formatting through HTML: Paragraph breaks, line breaks, background and BGcolorattributes, Emphasizing material in a web page: Heading styles, drawing lines, text styles, Text styles and other text effects-centering, spacing, controlling font size &color, Lists: Using unordered, ordered, definition listsAdding Graphics To HTML Documents: Using Image tag, attributes of Image tag, changing width& height of image

UNIT-II

Tables, Frames and Linking Documents: Handling Tables: To define header rows & data rows, use of table tag and its attributes. Use ofcaption tagLinking Documents: Concept of hyperlink, types of hyperlinks, linking to the beginning ofdocument, linking to a particular location in a document, Images as hyperlinksFrames: Introduction To frames, using frames & frameset tags, named frames how to fix the sizeof a frame, targeting named frames.

UNIT-III

Introduction to CSS: Introducing CSS, font attributes, color and background attributes, textattributes, border attributes, margin related attributes, list attributes Using class and span tag,External Style Sheets, Creating Divs with ID style, Creating Tag& Class style, creating borders, Navigation links,creating effects with CSS.

UNIT-IV

Introduction to JavaScript: use of JavaScript in web pages. Understand JavaScript event model,use some basic event and control webpage behavior.Variable declaration, Operators, , ControlStatements, Error Handling, Understanding arrays, Function Declaration,Built In Functions,Standard Date and Time Functions,Working with Objects, Call method in JavaScript.

UNIT-V

Web hosting - what is domain? Introduction to DNS, how to register a domain ?, what is webhosting ?, how to get a web hosting ?, host your website on web server.FTP - FTP introduction, FTP commands viewing files and directories, FTP commands transferand rename files, FTP with WS FTP/ CuteFTP, Filezilla on Windows.

References:

1. HTML and CSS, Jon Duckett, John Wiely, 2012
2. Achyut S Godbole and AtulKahate, “Web Technologies”, Tata McGraw Hill
3. Gopalan N P, Akilandeswari “Web Technology: a Developer S Perspective”, PHI
4. H.M. Deitel, P.J. Deitel, a.B. Goldberg-Internet & World Wide Web How to Program,Pearson Education, 3rd Edition,
5. C. Xavier, “Web Technology &Design ”, Tata McGraw Hill.
6. Ivan Bay Ross, “HTML,DHTML,JavaScript,Perl CGI”, BPB.
7. Web Technologies, Black Book, Dreamtech Press
8. HTML 5, Black Book, Dreamtech Press
9. Joel Sklar -Web Design,, Cengage Learning

10. Harwani-Developing Web Applications in PHP and Ajax, Mcgrawhill
11. Learn HTML IN A Weekend By Steven E. Callihan, PHI

THEORY OF COMPUTATION

BCA-303 **L T P 3 1 0**

Unit-I

Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)- Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Non deterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Myhill-Nerode Theorem, Finite State Machine with output- Moore machine and Melay Machine, Properties and Limitations of Finite state machine, Conversion of Moore machine to Melay Machine & Vice-Versa, Application of Finite Automata.

Unit-II

Properties of Regular languages: Regular Expressions, Definition, Operators of regular expression and their precedence, Chomsky Hierarchy, Conversion of DFA to Regular Expression, Arden Theorem, Pumping Lemma, Decision properties of Regular Languages,

Init-III

Context Free Grammar and Push Down Automata: Context Free Grammar, Derivation tree and Ambiguity, Application of Context free Grammars, Chomsky and Greibach Normal form, Properties of context free grammar, Decidable properties of Context free Grammar, Pumping Lemma for Context free grammar, Push down Stack Machine, Design of Deterministic and Non-deterministic Push-down stack.

Unit-IV

Turing Machine: Turing machine definition and design of Turing Machine, Church-Turing Thesis, Variations of Turing Machines, combining Turing machine, Universal Turing Machine, Post Machine, Post correspondence problem.

Unit-V

Uncomputability: Halting Problem, Turing enumerability, Turing Acceptability and Turing decidabilities, unsolvable problems about Turing machines, Rice's theorem.

Textbooks:

1. Hopcroft E.J.,Ullman D.J. and Motwani R., Introduction to Automata Theory ,Languages and Computation , Pearson Education (2007)3rd ed.
2. Martin C. J., Introduction to Languages and the Theory of Computation, McGraw-Hill Higher Education (2011)4thed.
3. Lewis H.C., Elements of the Theory of Computation, Prentice Hall (1998) 2nd ed.

Reference Books:

1. Introduction to Languages and the Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Textbook on Automata Theory, P. K. Srimani, Nasir S.F.B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

NPTEL Links:

https://www.youtube.com/results?search_query=AUTOMATA+NPTEL

https://www.youtube.com/watch?v=S3cOulqSAmU&list=PLidiQIHRzpXLOB6lg8hGUKLbbyekRz7JQ

Slide-ShareLinks: https://

www.slideshare.net/marinasantini1/automata45326059

https://www.slideshare.net/jenadgeorge/automata-250139119

MULTIMEDIA AND APPLICATIONS

BCA-304 **L T P 310**

UNIT-I

Introductory Concepts: Multimedia - Definitions, Basic properties and mediumtypes(Temporal and non-temporal), Multimediaapplications, Uses of Multimedia, Introduction to making multimedia - The Stages of project, therequirements to make good multimedia, Multimedia skills and training.

UNIT-II

Multimedia-Hardware and Software: Multimedia Hardware - Macintosh and Windowsproduction Platforms, Hardware peripherals - Connections, Memory and storage devices,Media software - Basic tools, making instant multimedia, Multimedia software andAuthoring tools, Production Standards.

UNIT-III

Multimedia building blocks Creating & Editing Media elements: Text, image, Sound,animation Analog/ digital video Data Compression: Introduction, Need, Difference oflossless/lossy compression techniques. Brief overview to different compression algorithmsconcern to text, audio, video and images etc.

UNIT-IV

Multimedia and the Internet: History, Internet working, Connections, InternetServices, The World Wide Web, Tools for the WWW - Web Servers, Web Browsers, Webpage makers and editors, Plug-Ins and Delivery Vehicles, HTML, Designing for theWWW -Working on the Web, Multimedia Applications - Media Communication,Media Consumption, Media Entertainment, Media games.

UNIT-V

Multimedia-looking towards Future: Digital Communication and New Media, InteractiveTelevision, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Virtual Reality,Digital Camera. Assembling and delivering a Multimedia project-planning and costing,Designing and Producing, content and talent, Delivering, CD-ROM: The CD family,production process, CD-i – Overview – Media Types Technology.

TEXTBOOKS:

1. Tay Vaughan, “Multimedia: Making it work”, TMH, 1999.
2. Ralf Steinmetz and KlaraNaharstedt, “Multimedia: Computing, Communications Applications”,Pearson, 2001.

REFERENCES:

1. Keyes, “Multimedia Handbook”, TMH, 2000.
2. Steve Heath, “Multimedia & Communication Systems”, Focal Press, UK, 1999.
3. K.Andleigh and K. Thakkar, “Multimedia System Design”, PHI, PTR, 2000.
4. Steve Rimmer, “Advanced Multimedia Programming”, MHI, 2000

OPTIMIZATION TECHNIQUES

BCA-305 **L T P 310**

UNIT – I

Measures of Central Tendency & Dispersion: Definition, Importance & Limitation. Collection of data and formation of frequencydistribution. Graphic presentation of frequency distribution – graphics, Bars, Histogram,Diagrammatic. Measures of central tendency – mean, median and mode, partition values –quartiles, deciles and percentiles. Measures of variation – range, IQR, quartile, deciles andpercentiles.

UNIT – II

Correlation/Regression: Correlation Coefficient; Assumptions of correlation analysis; coefficients of determination andcorrelation; measurement of correlation- Karl Person's Methods; Spearman's rank correlation;concurrent deviation the correlation coefficient; Pitfalls and limitations associated withregression and correlation analysis; real world application using IT tools.

UNIT – III

Linear Programming & Queuing: Concept a assumptions usage in business decision making linear programming problem:formulation, methods of solving: graphical and simplex, problems with mixed constraints:duality; concept, significance, usage & application in business decision making.Queuing Models: Basic structure of queuing models, Birth-Death queuing models and itssteady state solution, M/M/1 and M/M/C models with infinite/finite waiting space, PERT,CPM

UNIT – IV

Transportation & Assignment Problem: General structure of transportation problem, solution procedure for transportation problem,methods for finding initial solution, test for optimality. Maximization of transportationproblem, transportation problem.

UNIT – V

Assignment Problem: Assignment problem approach of the assignment model,solution methods of assignment problem, maximization in an assignment, unbalancedassignment problem, restriction on assignment.

TEXT BOOKS

1. Sharma, J.K.; Operations Research: problems & solutions; Macmillan India
2. Gupta, S.P. and Gupta, P.K.; Quantitative Techniques and Operations Research,Sultan Chand & Sons
3. Vohra, N.D.; Quantitative Techniques in Management 2003.
4. Gupta, S.P. Statistical Methods, Sultan Chand &Sons.2004
5. A.M. Natarajan, P Balasubramani A. Tamilarasi, Operations Research, Pearson 2005

REFERENCE BOOKS

1. R.L.Rardin, Optimization in Operations Research, Prentice Hall.
2. A.Racindran, D.T.Phillips, J.S.Solberg, Second edition, John Wiley.

ELEMENTS OF STATISTICS

BCA-305 A **Cr L-T-P**

4 3-1-0

Unit - I

Introduction to Statistics:

Definition and scope of statistics, Importance of statistics in decision making, Types of data: Primary and secondary data, Methods of data collection, Classification and tabulation of data,

Frequency distribution.

Unit – II

Measures of Central Tendency and Dispersion:

Measures of Central Tendency: Mean, Median, Mode, Properties and applications of central tendency, Measures of Dispersion: Range, Variance, Standard Deviation, Quartiles, Coefficient of variation, Moments, Skewness, and Kurtosis.

Unit - III

Probability and Probability Distributions:

Introduction, Basic concepts: Sample space, Events, Probability axioms, Conditional probability, Independent events, Bayes' theorem, Random variables: Discrete and Continuous, Probability distributions: Binomial, Poisson, and Normal distributions.

Unit - IV

Sampling and Estimation

Sampling methods: Simple random sampling, Stratified sampling, Systematic sampling, Sampling and non-sampling errors, Point and Interval estimation, Properties of estimators: Unbiasedness, Efficiency, Consistency, Introduction to Hypothesis testing

Unit – V

Correlation, Regression, and Time Series Analysis: Types, Karl Pearson's correlation coefficient, Spearman's rank correlation, Simple and Multiple regression analysis, Time series analysis: Components of time series, Methods of measuring trends: Moving averages, Least squares method, Applications of correlation, regression**.**

TEXT BOOKS:

1. S.C. Gupta: **Fundamentals of Statistics**, Himalaya Publishing House
2. R.S. Bhardwaj: **Business Statistics**, Excel Books
3. Goon, A.M., Gupta, M.K. and Dasgupta, B.: **Fundamentals of Statistics**, Vol I, The World Press.

4. Richard A. Johnson: **Probability and Statistics for Engineers**, Pearson Education

Reference Books:

1. Murray R. Spiegel: **Schaum's Outline of Probability and Statistics**, McGraw-Hill
2. A.M. Mood, F.A. Graybill: **Introduction to the Theory of Statistics**, McGraw-Hill
3. Taro Yamane: **Statistics: An Introductory Analysis**, Harper and Row
4. Sheldon M. Ross: **Introduction to Probability and Statistics for Engineers and Scientists**, Academic Press

COMBINATORIAL OPTIMIZATION

BCA-305B **Cr L-T-P**

4 3-1-0

Unit – I

Introduction to Combinatorial Optimization:

Basics of combinatorial optimization, Problem-solving strategies in combinatorial optimization

Introduction to graphs and networks, Linear programming and integer programming, Applications of combinatorial optimization in real-world problems.

Unit – II

Greedy Algorithms and Dynamic Programming:

Greedy algorithm principles, Applications of greedy methods: Minimum spanning tree Huffman coding, Dynamic programming techniques, Examples: Knapsack problem, shortest paths, Comparison of greedy algorithms and dynamic programming.

Unit - III

Network Flow and Matching:

Basics of network flow problems, Maximum flow problem: Ford-Fulkerson method, Bipartite matching and assignment problems, Minimum-cost flow problem, Applications of network flow in optimization.

Unit – IV

Approximation Algorithms and Heuristics:

Concept of approximation algorithms, Polynomial-time approximation schemes (PTAS)

Heuristic methods for optimization: Genetic algorithms, Simulated annealing, Traveling salesman problem (TSP) and its approximations, Applications of heuristic methods in large-scale optimization problems.

Text Books

1. Bernhard Korte, Jens Vygen: Combinatorial Optimization: Theory and Algorithms, Springer
2. Christos H. Papadimitriou, Kenneth Steiglitz: Combinatorial Optimization: Algorithms and Complexity, Dover Publications
3. William J. Cook, William H. Cunningham: Combinatorial Optimization, Wiley-Interscience
4. Michael R. Garey, David S. Johnson: Computers and Intractability: A Guide to the Theory of NP-Completeness, W.H. Freeman

Reference Books

1. R. K. Ahuja, Thomas L. Magnanti, James B. Orlin: Network Flows: Theory, Algorithms, and Applications, Prentice Hall
2. Jon Kleinberg, ÉvaTardos: Algorithm Design, Pearson Education
3. Vangelis Th. Paschos: Concepts of Combinatorial Optimization, Wiley
4. Robert Sedgewick, Kevin Wayne: Algorithms, Addison-Wesley

MULTI-OBJECTIVE OPTIMIZATION

BCA-305C **Cr L-T-P**

4 3-1-0

Unit – I

Introduction to Multi-objective Optimization:

Basics of optimization, Single vs. multi-objective optimization, Concept of Pareto optimality

Formulation of multi-objective optimization problems, Applications of multi-objective optimization in real-world scenarios.

Unit – II

Techniques for Multi-objective Optimization:

Weighted sum method, ε-constraint method, Goal programming, Evolutionary algorithms for multi-objective optimization, Examples and case studies.

Unit - III

Decision Making in Multi-objective Optimization:

Ranking and selection of solutions, Multi-criteria decision-making (MCDM)

Methods: Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Trade-offs and decision making in multi-objective problems.

Unit – IV

Applications and Advanced Topics:

Real-world applications in engineering, finance, and logistics, Introduction to hybrid optimization techniques, Fuzzy multi-objective optimization, Case studies in multi-objective optimization.

Text Books

1. Kalyanmoy Deb: **Multi-objective Optimization Using Evolutionary Algorithms**, Wiley
2. Carlos M. Fonseca: **Evolutionary Multi-objective Optimization**, Springer
3. Matthias Ehrgott: **Multicriteria Optimization**, Springer
4. CoelloCoello, Carlos A., Lamont, Gary B.: **Applications of Multi-objective Evolutionary Algorithms**, World Scientific

Reference Books

1. Jeffrey Horn: **Multi-objective Problem Solving from Nature**, Springer
2. Masatoshi Sakawa: **Fuzzy Multi-objective and Goal Programming**, Springer
3. Paolo Vercellis: **Multi-objective Combinatorial Optimization**, Wiley
4. AndrzejJaszkiewicz: **Genetic and Evolutionary Algorithms for Multi-objective Optimization**,

BIOSTATISTICS

BCA-305 D **Cr L-T-P**

4 3-1-0

Unit - I

Introduction to Biostatistic:

Definition and scope of biostatistics, Types of data: Qualitative and quantitative

Data collection methods in biological sciences, Descriptive statistics: Mean, median, mode, standard deviation, Introduction to probability theory.

Unit - II:

Probability Distributions:

Basic probability concepts, Normal distribution, binomial distribution, Poisson distribution

Application of probability distributions in biology, Sampling methods and sample size determination, Central limit theorem and its importance.

Unit - III

Hypothesis Testing:

Null and alternative hypotheses, Types of errors (Type I and Type II), t-test, chi-square test, and ANOVA, Confidence intervals, Applications of hypothesis testing in biological research.

Unit - IV: Regression and Correlation:

Simple linear regression, Multiple regression analysis, Correlation coefficient: Pearson and Spearman, Logistic regression in biological data, Applications of regression in biological and medical research.

Text Books

1. Kalyanmoy Deb: **Multi-objective Optimization Using Evolutionary Algorithms**, Wiley
2. Carlos M. Fo Wayne W. Daniel: **Biostatistics: A Foundation for Analysis in the Health Sciences**, Wiley
3. Harvey Motulsky: **Intuitive Biostatistics**, Oxford University Pressnseca: **Evolutionary Multi-objective Optimization**, Springer
4. Matthias Ehrgott: **Multicriteria Optimization**, Springer
5. CoelloCoello, Carlos A., Lamont, Gary B.: **Applications of Multi-objective Evolutionary Algorithms**, World Scientific.

Reference Books

1. P. S. S. Sunder Rao, J. Richard: **An Introduction to Biostatistics**, PHI Learning
2. Robert R. Sokal, F. James Rohlf: **Biometry: The Principles and Practice of Statistics in Biological Research**, W.H. Freeman
3. John A. Rice: **Mathematical Statistics and Data Analysis**, Cengage Learning
4. Jerrold H. Zar: **Biostatistical Analysis**, Pearson

BCA-351 **OPERATING SYSTEMS LAB**

1. Basics of MS-Dos commands and Implementation
2. Implementation of CPU Scheduling.
    i. FCFS
    ii. SJF
    iii. Round Robin
    iv. Priority.
3. Simulate algorithm for deadlock prevention and detection
4. Simulate the algorithm for deadlock avoidance
5. Simulate algorithm for deadlock recovery
6. Simulate page replacement algorithms:
    i. FIFO
    ii. LRU
    iii. Optimal
7. Implementation of Disk Scheduling using
    i. FCFS,
    ii. SCAN
    iii. C-SCAN algorithm
8. Implementation of Disk Scheduling using
    i. LOOK
    ii. C-LOOK
    iii. SSTF algorithm

HTML, DHTML and CSS Programming

BCA 352 **L T P 0 0 2**

List of Programs

1. Program to describe various text formatting commands.
2. Program to create an unordered list.
3. Program to create an ordered list.
4. Program to create a Table.
5. Program to create a simple form.
6. Program to create a Hyperlink.
7. Program to insert an image to Web page.
8. Program to insert scrolling text using Marquee tag.
9. Program to divide a page into Frames.
10. Program to create a simple layout of Webpage.
11. Program to insert a Video element.
12. Implement the CSS functioning with any of the program.
13. Program to calculate the length of the given string.
14. Apply the User consent option with the web page.
15. Insert the current date and time in the web page.

BCA 352 Seminar Based on Learning

Course Objectives:

- To enhance critical thinking and presentation skills.
- To foster collaborative learning and peer feedback.
- To deepen understanding of selected topics through research and discussion.

Module 1: Seminar Preparation

1. **Introduction to Seminar Topics**
    - Overview of themes and subject areas.
    - Guidelines for topic selection.
2. **Research Skills**
    - Finding credible sources (books, journals, online databases).
    - Evaluating and synthesizing information.
3. **Creating Effective Presentations**
    - Designing visual aids (slides, posters).
    - Tips for effective public speaking and engagement.

Module 2: Seminar Execution

1. **Presentation Skills**
    - Delivering content clearly and confidently.
    - Engaging the audience through questions and discussions.
2. **Peer Feedback Mechanism**
    - Constructive feedback techniques.
    - Self-assessment and reflection post-presentation.
3. **Group Dynamics**
    - Working in teams to prepare collaborative seminars.
    - Assigning roles and responsibilities within groups.

Module 3: Topics for Seminars

1. **Interdisciplinary Themes**
    - Examples: Technology in Education, Environmental Sustainability, Mental Health Awareness.
    - Encouraging connections across various disciplines.
2. **Current Events and Issues**
    - Analyzing recent developments and their implications.
    - Encouraging critical discourse around current affairs.

DATA STRUCTURES

BCA-401 **L T P 3 1 2**

UNIT 1
Introduction: Data types, structures, review of data structures in C/C++, static and dynamic memory allocation, recursion, Tower of Hanoi problem.

UNIT 2
Stacks & Queues: Concept, operations and representation in C/C++, application to evaluation of post fix expressions, conversion from in fix to post fix representation. Queues-Sequential representation, operations, priority queues, and array implementation.

UNIT 3
Linked Lists & Binary Trees: Concept, operations, stacks and queues as lists, array and dynamic representation circular lists, doubly linked lists, Josephus problem. Binary treesdefinition, array and dynamic representations, operations, lists as trees. Almost complete binary trees, threaded binary trees, Games Trees.

UNIT 4
Sorting: Efficiency considerations, Onotation, Bubblesort, Quicksort, Selection sort, binary trees or Heap, heapsort, heapasapriority queue, Insertion sort, Shellsort, Mergesort, Radixsort.

UNIT5
Searching: Sequential searching, indexed Sequential searching, binary search, interpolation search, binary tree searching, insertion and deletion, Optimum search trees, height balanced trees, single and double rotations, Multiway, search trees, B-trees, B+- trees, Hashing methods of resolving clashes, methods of choosing hash functions.

Laboratory work:
Implementation of Arrays, Recursion, Stacks, Queues, Lists, Binary trees, Sorting techniques, Searching techniques. Implementation of all the algorithmic techniques.

Text Books: Kruse, R.L., Leung, B.P. and Tondo, C.L., Data Structures and Program Design in C, Dorling Kindersley (2008). • Langsam, Y. and Augenstein, M.J., Data Structures Using C and C++, Dorling Kindersley (2008) 2nd ed.

Reference Books:• Trembley, J.P., Sorenson, P.G., An introduction to data structures with applications, Tata McGraw Hill (2008) 2nd ed. • Sahni, Sartaj, Data Structures, Algorithms and Applications in C++, Universities Press (2005) 2nd ed.

JAVA PROGRAMMING

BCA-402 **L T P**
3 1 2

UNIT-I

Java Programming: Introduction, Data types, accesspecifiers, operators,control statements, arrays.Classes: Fundamentals, objects, methods,constructors.Inheritance: Super class,subclass,this and super operator ,methodoverriding, use of final, packages, abstract class, interface.Polymorphism: Method overloading, constructor overloading.

UNIT – II

Java Library: String handling (only main functions), String Buffer class.Elementary conceptsof Input/Output :byte and character streams, System .inand System .out, print and println, reading from a file and writing in a file.

UNIT – III

Exception Handling: Exception Class, built in checked and uncheckedexceptions, user defined exceptions, use of try, catch, throw, throws, finally.Multi threaded programming: Overview, comparison with multiprocessing, Thread class and runnable interface, life cycle, creation of single and multiplethreads, thread priorities, overview of Synchronization.

UNIT-IV

Software Development using Java: Applets :Introduction, Life cycle, creation and implementation,AWT controls: Button, Label,TextField, TextArea, Choice lists, list, scrollbars,check boxes, Layout managers,Elementary concepts of Event Handling :Delegation Event Model, Event classesand listeners, Adapter classes, Inner classes.Swings: Introduction and comparison with AWT controls.

UNIT-V

Networking Basics: Socket (datagram and TCP/IP based client and serversocket), factory methods, InetAddressJDBC: JDBC Architecture, JDBC Drivers, Connecting to the Database Introduction to Java Servlets: Life cycle,Interfaces and classes injavax.servlet package(only description) Creating a simple servlet

TEXT BOOKS:

1. Patrick Naughton and Herbert Schildt, “Java-2 The Complete Reference”,TMH.
2. Y. Daniel Liang, “Introduction to Java Programming, ComprehensiveVersion, 7/e” Pearson.

REFERENCE BOOKS: -

1. Krishnamoorthy R, Prabhu S ,”Internet and Java Programming”, New AgeIntl.
2. David Flanagan, Jim Farley, William Crawford and Kris Magnusson, “JavaEnterprise in a Nutshell”, O’Reilly.

COMPUTER SYSTEM ARCHITECTURE

BCA-403 **L T P 312**

UNIT-I

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Busand Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, ShiftMicrooperations, Arithmetic logic shift unit

UNIT-II

Basic Computer Organizations and Design: Instruction Codes, Computer Registers,Computer Instructions, Timing and Control, Instruction Cycle, Memory-ReferenceInstructions, Register reference instructions, Input - Output Instructions, Design ofAccumulator Logic.

UNIT-III

Design of Microprogrammed Control Unit

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes. Difference between RISC and CISC.

Pipeline and Vector Processing: Arithmetic and Instruction pipeline, Vector operations, Matrix Multiplication, memory interleaving.

UNIT-IV

Computer Arithmetic: Introduction, Multiplication Algorithms, Division Algorithms, for fixed point-members.

Input-Output Organization: Peripheral Devices, Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA)

UNIT-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, AssociativeMemory, Cache Memory, Virtual Memory, Memory Management Hardware.

TEXT BOOKS :

1. Morris Mano, Computer System Architecture, 3rd Edition, Prentice-Hall of IndiaPrivate Limited, 1999.

REFERENCE BOOKS:

1. WIliam Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hallof India Private Limited, 2001
2. Subrata Ghosal," Computer Architecture and Organization" , Pearson 2011
3. Malvino, "Digital Computer Electronics: An Introduction to Microcomputers",McGraw Hill,

KNOWLEDGE MANAGEMENT

BCA-404 **L T P 310**

UNIT I
INTRODUCTION
An Introduction to Knowledge Management - The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management : From Information Management to Knowledge Management - Key Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management.

UNIT II
CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING
Organization and Knowledge Management - Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.

UNIT III
KNOWLEDGE MANAGEMENT-THE TOOLS
Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information.

UNIT IV
KNOWLEDGEMANAGEMENT-APPLICATION
Components of a Knowledge Strategy - Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).

UNIT V
FUTURE TRENDS AND CASE STUDIES
Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

TEXT BOOK:

1. Srikantaiah.T. K., Koenig, M., “Knowledge Management for the Information Professional” Information Today, Inc., 2000.

REFERENCE:

1. Nonaka, I., Takeuchi, H., “The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation”, Oxford University Press, 1995.

KNOWLEDGE TRANSFER

BCA-404 A **Cr L-T-P**

4 3-1-0

Unit - I

Fundamentals of Knowledge Transfer

Definition and scope of knowledge transfer, Importance of knowledge sharing in organizations

Types of knowledge: Tacit and Explicit, Knowledge transfer vs. Knowledge management, Barriers to effective knowledge transfer.

Unit – II

Models and Frameworks of Knowledge Transfer

SECI model (Socialization, Externalization, Combination, Internalization), Wiig's Knowledge Management Cycle, Nonaka and Takeuchi's Knowledge Creation Model, Communities of practice (CoP), Knowledge transfer strategies in organizations.

Unit - III

Techniques for Knowledge Transfer

mentoring and coaching methods, Storytelling as a knowledge transfer tool, Use of technology: Wikis, blogs, and forums, Workshops and seminars for knowledge dissemination, Knowledge repositories and databases.

Unit - IV

Knowledge Transfer in Organizations

knowledge-sharing culture, Role of leadership & knowledge transfer, Cross-functional knowledge sharing, Measuring knowledge transfer effectiveness, Legal and ethical considerations in knowledge transfer.

Unit – V

Knowledge Transfer and Emerging Technologies

Artificial Intelligence and knowledge transfer, Data mining and knowledge discovery, Virtual teams and remote collaboration, Future trends in knowledge transfer, Case studies of knowledge transfer in modern organizations.

TEXT BOOKS:

5. IkujiroNonaka and Hirotaka Takeuchi: **The Knowledge-Creating Company**, Oxford University Press
6. Elias M. Awad and Hassan Ghaziri: **Knowledge Management**, Pearson Education
7. J. W. Cortada and J. A. Woods: **The Knowledge Management Yearbook**, Butterworth-Heinemann

8. Thomas H. Davenport and Laurence Prusak: **Working Knowledge**, Harvard Business Review Press

Reference Books:

1. AmritTiwana: **The Knowledge Management Toolkit**, Pearson Education
2. Michael Polanyi: **The Tacit Dimension**, University of Chicago Press
3. Karl M. Wiig: **Knowledge Management Foundations**, Schema Press
4. Mark W. McElroy: **The New Knowledge Management**, Butterworth-Heinemann
5. Alex Bennet and David Bennet: **Organizational Survival in the New World**, Routledge

BCA-404 B **Knowledge Mapping (Lab)**

Course Objectives:

- To develop skills in visualizing and organizing information.
- To enhance critical thinking and knowledge retention.
- To promote collaborative learning through shared knowledge maps.

Module 1: Introduction to Knowledge Mapping

1. **Understanding Knowledge Mapping**
   - Definition and purpose of knowledge mapping.
   - Types of knowledge maps (concept maps, mind maps, flowcharts).
2. **Tools and Technologies**
   - Overview of digital tools for knowledge mapping (e.g., MindMeister, XMind, Lucidchart).
   - Introduction to paper-based mapping techniques.

Module 2: Creating Knowledge Maps

1. **Basic Techniques**
   - Identifying key concepts and relationships.
   - Structuring information hierarchically.
2. **Practical Lab Sessions**
   - Hands-on workshops to create individual knowledge maps.
   - Group activities to develop collaborative knowledge maps.
3. **Applying Knowledge Mapping**
   - Mapping for different purposes (study aids, project planning, brainstorming).
   - Case studies on effective knowledge mapping.

Module 3: Analyzing and Sharing Knowledge Maps

1. **Evaluating Knowledge Maps**
   - Criteria for assessing clarity, completeness, and organization.
   - Peer review sessions for constructive feedback.
2. **Presenting Knowledge Maps**
   - Techniques for effectively presenting and explaining maps.
   - Role-playing to simulate audience engagement.
3. **Reflection and Iteration**
   - Importance of revisiting and updating knowledge maps.
   - Reflective practices on personal learning and mapping experiences.

Assessment and Evaluation

- Grading based on creativity, clarity, and effectiveness of knowledge maps.
- Participation in group activities and peer evaluations.

BCA-404 C Knowledge Management Systems (Lab)

Course Objectives:

- To understand the principles and practices of knowledge management.
- To explore various knowledge management systems and tools.
- To develop skills in designing and implementing knowledge management solutions.

Module 1: Introduction to Knowledge Management

1. **Understanding Knowledge Management (KM)**
   - Definition and importance of KM.
   - Types of knowledge (tacit vs. explicit).
2. **KM Frameworks and Models**
   - Overview of key KM theories and frameworks.
   - Case studies on successful KM implementations.

Module 2: Knowledge Management Tools and Technologies

1. **Overview of KM Systems**
   - Types of KM systems (content management systems, collaborative tools, etc.).
   - Comparison of popular KM tools (e.g., SharePoint, Confluence, Notion).
2. **Hands-On Lab Sessions**
   - Setting up a KM system using selected tools.
   - Practical exercises in content creation and management.
3. **Data Management and Organization**
   - Best practices for organizing and tagging knowledge.
   - Introduction to metadata and taxonomies.

Module 3: Designing and Implementing KM Solutions

1. **Identifying Knowledge Needs**
   - Conducting needs assessments for KM systems.
   - Engaging stakeholders in the KM process.
2. **Creating a KM Strategy**
   - Steps for developing a KM strategy.
   - Aligning KM initiatives with organizational goals.
3. **Project Work**
   - Group projects to design and propose a KM solution for a hypothetical organization.
   - Presentations of project findings and proposed implementations.

Assessment and Evaluation

- Grading based on participation, project work, and practical assignments.
- Peer feedback on group projects.

BCA-404 D Information Systems for Knowledge Management (Lab)

Course Objectives:

- To understand the role of information systems in knowledge management.
- To explore the design and implementation of information systems for KM.
- To develop practical skills in using KM information systems and tools.

Module 1: Introduction to Information Systems in KM

1. **Understanding Information Systems**
   - Definition and components of information systems.
   - The relationship between information systems and knowledge management.
2. **Types of Information Systems for KM**
   - Overview of various systems (e.g., databases, document management systems, collaborative tools).
   - The role of decision support systems in KM.

Module 2: Knowledge Management System Components

1. **Core Components of KM Systems**
   - Data management and storage.
   - Knowledge repositories and databases.
   - User interfaces and access controls.
2. **Tools and Technologies**
   - Introduction to popular KM tools (e.g., SharePoint, KnowledgeOwl, Trello).
   - Hands-on exercises with selected KM software.

Module 3: Designing KM Information Systems

1. **System Design Principles**
   - User-centered design and usability.
   - Best practices for designing intuitive interfaces.
2. **Lab Activities**
   - Group projects to create prototypes of KM systems.
   - Exercises in data modeling and knowledge mapping.
3. **Implementation Strategies**
   - Steps for deploying a KM information system.
   - Change management considerations in KM implementation.

Module 4: Evaluating KM Information Systems

1. **Assessment Criteria**
   - Evaluating the effectiveness of KM systems.
   - Metrics for measuring user satisfaction and knowledge utilization.
2. **Feedback Mechanisms**
   - Implementing feedback loops for continuous improvement.
   - Conducting user testing and gathering insights.

Assessment and Evaluation

- Grading based on participation, project quality, and practical assignments.
- Peer reviews of group projects.

DATASTRUCTUREUSINGCLAB (BCA-451)

Program 1:-To search an element in the array using Linear Search.
Program 2:-To search an element in the 2-dimensional array using Linear Search.
Program 3:-To merge two sorted array in to one sorted array.
Program 4:-To perform the following operation in Matrix 1.Addition 2.Subtraction 3.Multiplication 4.Transpose
Program 5: - To perform the swapping of two numbers using call by value and call by reference
Program 6:-To perform following operation on strings using string functions 1.Addition 2.Copying 3.Reverse 4.LengthofString
Program 7:-To search an element in the array using Iterative Binary Search.
Program 8:-To search an element in the array using Recursive Binary Search.
Program 9:-To implement Bubble Sort.
Program 10:-To implement Selection Sort.
Program 11:-To implement Insertion Sort.
Program 12:-To implement Quick Sort.
Program 13:-To implement Merge Sort.
Program 14:-To implementStack using array.
Program 15:-To implement Queue using array.

BCA-452 JAVA PROGRAMMING LAB PRACTICAL PROGRAM SYLLABUS

S.NO	PRACTICAL PROGRAMS
1.	Write a program to create class and object in java.
2.	Write a program to create user define function in a user define class in java.
3.	Write a program to find function overloading in java.
4.	Write a program to to create function overriding in java.
5.	Write a program to create single inheritance in java.
6.	Write a program to create multilevel inheritance in java.
7.	Write a program to create multiple inheritance in case of interface in java.
8.	Write a program to create abstract class and abstract function in java.
9.	Write a program to create parameterized constructor in java.
10.	Write a program to create Button using awt in java.
11.	Write a program to using JDBC in java.
12.	Write a program to crate Multithreading in java.
13.	Write a program to create Event handling in java.
14.	Write a program to print matrix in java.
15.	Write a program to print addition of two matrix in java.

BCA-453 COMPUTER SYSMTEM ARCHITECTURE LAB

Program 1:-Program to implement basic logic gates like AND, OR, NOT, NAND, NOR, XOR using HDL (Verilog/VHDL).
Program 2:- Design and simulate half adder and full adder circuits.
Program 3:- Write programs to implement multiplexer and demultiplexer circuits.
Program 4:- Design a 4-bit binary adder/subtractor using Verilog or VHDL.
Program 5:- Develop a program to implement a simple ALU that performs basic arithmetic and logical operations.
Program 6:- Implement flip-flops using HDL and simulate their behavior.
Program 7:- Design and simulate a 4-bit synchronous up/down counter.
Program 8:- Program to simulate registers and shift registers using Verilog/VHDL.
Program 9:- Simulate the working of RAM/ROM using hardware description languages (HDL).
Program 10:- Design and implement a finite state machine (FSM) for sequence detection.
Program 11:- Write and simulate Booth's algorithm for signed binary multiplication.
Program 12:- Develop a basic CPU design that can execute simple instructions like ADD, SUB, and LOAD using HDL.
Program 13:- Simulate a custom instruction set architecture (ISA) with simple operations.
Program 14:- Implement a basic instruction pipeline to simulate how pipelining works in processors.
Program 15:- Simulate cache memory using various mapping techniques (direct mapping, associative mapping).

Seminar Based on Learning(BCA-454)

- **Educational technology**

A common topic at EdCamps, this includes practical examples of using modern tools in the classroom and how to solve problems that technology can cause.

- **Current events**

Students can track current events and create a news show or podcast about them.

- **Artificial intelligence**

Seminars can help you learn about responsible AI development and deployment, and build a professional network.

- **Case studies and debates**

These activities can help students engage with the material and develop communication, critical analysis, and teamwork skills.

- **Classroom management**

This includes strategies and techniques for creating a learning environment that reduces disruptions.

- **Global issues in education and research**

This can include topics such as the impact of crisis on education, ethical issues in education, and technology in teaching and learning.

- **Psychology**

This includes core areas such as biological, cognitive, developmental, social, and individual differences.

SOFTWARE ENGINEERING

BCA-501 **L T P 3 12**

UNIT 1

Software Engineering and Processes: Introduction to Software Engineering, Software Evolution, Software Characteristics, Software Crisis: Problem and Causes, Software process models (Waterfall, Incremental, and Evolutionary process models and Agile), Software quality concepts, process improvement, software process capability maturity models, Personal Software process and Team Software Process, Overview of Agile Process.

UNIT 2

Requirements Engineering: Problem Analysis, Requirement elicitation and Validation. Requirements modelling: Scenarios, Information and analysis classes, flow and behavioralmodeling, documenting Software Requirement Specification (SRS).

UNIT 3

Software Design and construction: System design principles: levels of abstraction (architectural and detailed design), separation of concerns, information hiding, coupling and cohesion, Structured design (top-down functional decomposition), object-oriented design, event driven design, component-level design, test driven design, function oriented, service oriented, Design patterns.

UNIT 4

Software Verification and Validation: Levels of Testing, Functional Testing, Structural Testing, Test Plan, Test Case Specification, Software Testing Strategies, Verification & Validation, Unit, Integration Testing, Top Down and Bottom-Up Integration Testing, Alpha & Beta Testing, White box and black box testing techniques, System Testing and Debugging.

UNIT5

Software Project Management: (COCOMO models), Quality Management, Plan for software Quality Control and Assurance, Earned Value Analysis. Advanced Topics: Formal specification, CASE Tools, Software Business Process Reengineering, Configuration Management.

Laboratory work:

Implementation of Software Engineering concepts and exposure to CASE tools like Rational Software suit, Turbo Analyst, Silk Suite. Follow entire SDLC depending on project domain.

Text Books: 1. Pressman S. R. and Maxim R. B., Software Engineering, A Practitioner's Approach, McGraw Hill International (2015) 8th Edition. 2. Sommerville I., Software Engineering, Addison-Wesley Publishing Company (2011) 9th Edition.

Reference Book: 1. Foster C. E., Software Engineering: A Methodical Approach, Apress (2014)1st ed. 2. Booch G., Rambaugh J., Jacobson I., The Unified Modeling Language User Guide (2005) 2nd Edition.

ANALYSIS OF ALGORITHM AND DATA STRUCTURES

BCA-502 **L T P 3 1 2**

UNIT 1

Linear Data Structures: Arrays, Records, Strings and string processing, References and aliasing, Linked lists, Strategies for choosing the appropriate data structure, Abstract data types and their implementation: Stacks, Queues, Priority queues, Sets, Maps.

UNIT 2

Basic Analysis: Differences among best, expected, and worst-case behaviours of an algorithm, Asymptotic analysis of upper and expected complexity bounds, Big O notation: formal definition and use, Little o, big omega and big theta notation, Complexity classes, such as constant, logarithmic, linear, quadratic, and exponential, Time and space trade-offs in algorithms, Recurrence relations, Analysis of iterative and recursive algorithms.

UNIT 3

Algorithmic Strategies with examples and problem solving: Brute-force algorithms with examples, Greedy algorithms with examples, Divide-and-conquer algorithms with examples, Recursive backtracking, Dynamic Programming with examples, Branch-and-bound with examples, Heuristics, Reduction: transform-and-conquer with examples.

UNIT 4

Non-Linear Data Structures and Sorting Algorithms: Hash tables, including strategies for avoiding and resolving collisions, Binary search trees, Common operations on binary search trees such as select min, max, insert, delete, iterate over tree, Graphs and graph algorithms, Representations of graphs, Depth- and breadth-first traversals, Heaps, Graphs and graph algorithms, Shortest-path algorithms (Dijkstra and Floyd), Minimum spanning tree (Prim and Kruskal)

UNIT5

Problem Clauses: P, NP, NP- Hard and NP-complete, deterministic and non-deterministic polynomial time algorithm approximation and algorithm for some NP complete problems. Introduction to parallel algorithms, Genetic algorithms, intelligent algorithms.

Laboratory work:

Implementation of Arrays, Recursion, Stacks, Queues, Lists, Binary trees, Sorting techniques, Searching techniques. Implementation of all the algorithmic techniques.

Text Books: 1. Cormen H. T., Leiserson E. C., Rivest L. R., and Stein C., Introduction to Algorithms, MIT Press (2009) 3rd ed. 2. Goldberg E. D., Genetic Algorithms, Pearson education 1989 (2009) 1st ed.

Reference Books: 1. Sedgewick R. and Wayne K., Algorithms, Addison-Wesley Professional (2011), 4th ed.

MOBILE COMPUTING

BCA-503 **L T P 3 10**

UNIT 1: Introduction
Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA

UNIT 2: Mobile Telecommunication System
Introduction to Cellular Systems - Cellular systems- Frequency Management and Channel Assignment- types of handoff andtheir characteristics, dropped call rates & their evaluation, GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS – Architecture – Handover - Security

UNIT 3: Telecommunication Networks &WirlessLan
Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards–HIPERLAN – Blue Tooth.

UNIT 4: Mobile Network Layer & Transport Layer
Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security, Traditional TCP, Mobile TCP

UNIT5: Mobile Platforms and Applications
Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems, Mobile Payment System – Security Issues**,** WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP useragent profile- caching model-wireless bearers for WAP - WML – WML Scripts

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCE BOOKS:

1. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/PearsonEducation, 2003.
2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of MobileComputing”, Springer, 2003..
3. Raj Kamal, “Mobile Computing”,Oxford University Press, 2007
4. Asoke K. Talukdar, “Mobile Computing”, Tata McGraw-Hill Education,2010.
5. Mohammad Ilyas , Imad Mahgoub,” Mobile Computing Handbook” ,AUERBACH,2004.
6. Vilas S. Bagad , “Mobile Computing Introduction”, Technical Publications,2014
7. DR SANJAY Sharma, “Mobile Computing”,S.K. Kataria & Sons Publication,2014.

8. Dr. Ashish N.Jani, Dr. N.N. Jani , Neeta Kanabar ," Mobile Computing – Technologiesand Applications", 2010
9. Pattnaik, Prasant Kumar, Mall, Rajib, "Fundamentals Of Mobile Computing", SecondEdition, PHI Learning Pvt. Ltd., 2015.

BIG DATA AND MACHINE LEARNING

BCA-504 **L T P 3 10**

UNIT 1
Introduction to Business Intelligence: Business View of IT Applications, Digital Data, OLTP vs. OLAP, Why, What and How BI? , BI Framework and components, BI Project Life Cycle, Business Intelligence vs. Business Analytics.

UNIT 2
Introduction to Data Analytics: Data and Relations, Data Visualization, Correlation, Regression, Forecasting, Classification, Clustering. Big Data Technology Landscape: Fundamentals of Big Data Types, Big data Technology Components, Big Data Architecture, Big Data Warehouses, Functional vs. Procedural Programming Models for Big Data.

UNIT 3
Basic concepts, Designing a learning system, Issues in machine learning. Types of machine learning: Learning associations, Supervised learning, Unsupervised learning, Reinforcement learning, Model Evaluation Parameters, Feature Selection and Extraction. Linear Regression, Multi Regression, Gradient Descent, SVM.

UNIT 4
Clustering: K-Means, k-Medoids, Agglomerative versus Divisive Hierarchical Clustering Distance Measures in Algorithmic Methods, Mean-shift Clustering.

UNIT5
Decision Tree Learning: Decision tree representation, appropriate problems for decision tree learning, Univariate Trees (Classification and Regression), Bayesian Learning: Bayes theorem and concept learning, Bayes optimal classifier, Naive Bayes Classifier.

Text Books: . Mitchell T.M., Machine Learning, McGraw Hill (1997) 2nd ed. 2. Alpaydin E., Introduction to Machine Learning, MIT Press (2010) 2nd ed.

Reference Books: Bishop C., Pattern Recognition and Machine Learning, Springer-Verlag (2006) 2nd ed. 4. Michie D., Spiegelhalter D. J., Taylor C. C., Machine Learning, Neural and Statistical Classification. Overseas Press (2009) 1st ed.

BCA-551 Software Engineering Lab

1. To prepare problem statement for any project.
2. Create a problem statement for an online learning platform.
3. Develop an understandingandSoftware Requirements Specification(SRS).
4. To draw a sample Entity Relationship Diagram for library management system.
5. To prepareDataFlow Diagram Online shopping management system.
6. To prepare the student / university management system Use Case Diagram.
7. To draw a sample activity diagram for enterprise architectural modeling.
8. To draw a sample Class diagram for seminar.
9. To draw a Sequence Diagram for Online Shopping Checkout Process
10. To draw a Component Diagram for Library Management System.
11. To draw a Deployment Diagram for University Management System.
12. Develop a testing strategy for an online banking application.
13. Create a presentation that explains each phase of the SDLC with examples.

BCA-552 Algorithms and Data Structures with C++ Lab

Course Objectives

- Implement various data structures
- Analyze algorithm efficiency
- Develop practical problem-solving skills

1. **Introduction to C++**
   - Review of C++ syntax and fundamentals
   - Basic data types and control structures
2. **Arrays and Strings**
   - Dynamic and static arrays
   - String manipulation functions
3. **Linked Lists**
   - Singly and doubly linked lists
   - Basic operations: insert, delete, traverse
4. **Stacks and Queues**
   - Stack implementation and applications
   - Queue implementation and applications
5. **Trees**
   - Binary trees and traversal techniques
   - Binary search trees: operations and applications
6. **Heaps**
   - Heap data structure and heap sort
   - Priority queues
7. **Hashing**
   - Hash tables: creation and collision handling
   - Practical applications of hashing
8. **Graphs**
   - Graph representations (adjacency list/matrix)
   - Traversal algorithms: BFS and DFS
9. **Sorting Algorithms**
   - Overview of sorting algorithms: quicksort, mergesort, bubblesort
   - Analysis of time and space complexity
10. **Searching Algorithms**
    - Linear search vs. binary search
    - Searching techniques on various data structures
11. **Algorithm Analysis**
    - Big O notation and complexity analysis
    - Practical examples and case studies
12. **Final Project**
    - Implementation of a complex data structure or algorithm
    - Presentation and demonstration of project

BCA-553 **Research Project-I**

- **Introduction to Research Methodologies:** Overview of qualitative, quantitative, and mixed methods.
- **Research Topic Selection:** Strategies for identifying and refining research questions.
- **Literature Review:** Conducting thorough searches and summarizing relevant literature.
- **Research Methodology Design:** Choosing appropriate research methods and approaches.
- **Data Collection Techniques:** Exploring surveys, interviews, experiments, and observations.
- **Data Analysis:** Introduction to statistical and qualitative analysis techniques.
- **Research Proposal Development:** Structuring and writing an effective research proposal.
- **Ethical Considerations in Research:** Understanding ethical issues and obtaining necessary approvals.
- **Project Review and Feedback:** Presenting progress and receiving constructive feedback.
- **Final Project Submission:** Preparing and submitting the completed research project.

DATA COMMUNICATION AND COMPUTER NETWORK

BCA-601 **L T P 3 12**

UNIT 1
Introduction: Organization of the Internet, ISP, Network criteria, Categories of networks, Network performance and Transmission Impairments. Network Devices, OSI Model, TCP/IP Protocol Suite, Layering principles, Line Encoding, Switching technique and Multiplexing.

UNIT 2
Local Area Networks: LAN topologies: Bus topology, Ring topology, Token passing rings, FDDI, Star topologies, Asynchronous transfer mode, Ethernet, IEEE standards 802.3, 802.5. Wireless LANs: IEEE 802.11 and Bluetooth, introduction to Virtual circuit switching including frame relay, X.25, and ATM.

UNIT 3
Reliable Data Delivery: Error control (retransmission techniques, timers), Flow control (Acknowledgements, sliding window), Multiple Access, Performance issues (pipelining). Routing and Forwarding: Routing versus forwarding, Static and dynamic routing, Unicast and Multicast Routing. Distance-Vector, Link-State, Shortest path computation.

UNIT 4
Process-to-Process Delivery: UDP, TCP and SCTP, Multiplexing with TCP and UDP, Principles of congestion control, Approaches to Congestion control, Quality of service, Flow characteristics, Techniques to improve QoS.

UNIT5
Network Applications: Naming and address schemes (DNS, IP addresses, Uniform Resource Identifiers, etc.), Distributed applications (client/server, peer-to-peer, cloud, etc.), HTTP as an application layer protocol, Electronic mail, File transfer, Remote login.

Laboratory work: To design conceptual networks using E-Draw, Visual Studio etc. and to implement topologies BUS, RING, STAR, Mesh and configuring Router using Packet tracer or GNS3 platform

Text Books: 1. Forouzan A. B., Data communication and Networking, McGraw Hill (2012) 5thed. 2. Tanenbaum S. A. and Wetherall J. D., Computer Networks, Prentice Hall (2013) 5thed.

Reference Books: Kurose J. and Ross K., Computer Networking: A Top Down Approach, Perason (2017) 7thed. 2. Stallings W., Computer Networking with Internet Protocols and Technology, Pearson (2004)

ARTIFICIAL INTELLIGENCE

BCA-602 **L T P 310**

UNIT 1
Overview: foundations, scope, problems, and approaches of AI. Intelligent agents: reactive, deliberative, goal-driven, utility-driven, and learning agents Problem-solving through Search: forward and backward, state-space, blind, heuristic, problem reduction, A, A*, AO*.

UNIT 2
Knowledge Representation and Reasoning: ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.

UNIT 3
Planning: planning as search, partial order planning, construction and use of planning graphs Representing and Reasoning with Uncertain Knowledge: probability, connection to logic, independence, Bayes rule, Bayesian networks, probabilistic inference, sample applications

UNIT 4
Decision-Making: decision theory, sequential decision problems
Machine Learning and Knowledge Acquisition: learning from memorization, Learning nearest neighbour, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.

UNIT5
Expert Systems: Architecture of an expert system, existing expert systems like MYCIN, RI, Expert system shells.

Laboratory work:
Programming in C/C++/Java/LISP/PROLOG: Programs for Search algorithms- Depth first, Breadth first, Hill climbing, Best first, A* algorithm, Implementation of games: 8-puzzle, Tic-Tac-Toe, tower of Hanoi and water jug problem using heuristic search, Designing expert system using logic in PROLOG, Implementing an intelligent agent.

Text Books: 1. Rich E., Knight K. and Nair B. S., Artificial Intelligence, Tata McGraw Hills (2009) 3rded. 2. Luger F. G., Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education Asia (2009) 6thed.

Reference Books: 1. Patterson W. D., Introduction to Artificial Intelligence and Expert Systems, Pearson (2015) 1st ed. 2. Russel S., Norvig P., Artificial Intelligence: A Modern Approach, Prentice Hall (2014) 3rd ed.

CYBER SECURITY AND CYBER LAW

BCA-603 **L T P 3 10**

Unit-I
Information Security, Cyber Security, Information Assurance, Cyber Crime- Meaning, Types, Need, Function

Unit-II
Information Policy- Meaning, Types, Need, Function, Case Studies, Need, Convergence, Information Divide, Digital Divide, Information Literacy, Network Literacy, Digital Humanities& Sociology, Information and IT Policy as a Discipline and Degrees worldwide

Unit-III
Information Technology Act, Information Security Protocols, Non-repudiation services, related protocols, Fairness in Information Exchanges Protocols

Unit-IV
Trusted Third Party, its use as Adjudicator, message authenticator, Information Securitystandards, Information Security Infrastructure.

Unit-V
International Information Act & IT Act, Right to Information Act-2005 with Process, Features
and Functions, IT Act 2000-Role, Features, Summary, Changes, Data Privacy Rules, Real life Example of IT Act uses, Emerging Cyber Act in India

Text/References:

1. Kahin, B., & Nesson, C. (1996). Borders in cyberspace: Information policy and the global information infrastructure. MIT Press.
2. Kamisar, Y. (1980). Police interrogation and confessions: Essays in law and policy (p. 1)Ann Arbor, MI: University of Michigan Press.
3. Holtshouse, D. K. (2013). Information technology for knowledge management. U. M.Borghoff, & R. Pareschi (Eds.). Springer Science & Business Media.

SOFTWARE PROJECT MANAGEMENT

BCA-604 **L T P 310**

UNIT 1

Introduction to Project Management: The characteristics of software projects, Objectives of project management: time, cost and quality, Basics of Project Management, Stakeholders, Stages of Project, The Feasibility Study, Cost-benefit Analysis, Planning, Project Execution, Project and Product Life Cycles, Project Management Knowledge areas, Project Management Tools & Techniques, Project success factors, role of project manager

UNIT 2

Project Management and Planning: System view of project management, Understanding organizations, stakeholder's management, project phases and project's life cycles. Introduction to Agile software, why planning is necessary, Iterative steps for planning, Project Plan documentation methods, Software Requirement Specification.

UNIT 3

Project Quality Management: Quality Planning, quality Assurance, Quality control, Tool &techniques for quality control, Pareto Analysis, Six Sigma, CMM, ISO Standards, Juran Methodology.

UNIT 4

Project risk management: Risk Management planning, common sources of risk, risk identification, risk register, qualitative risk analysis, using probability impact matrixes, expert judgement, qualitative risk analysis, decision trees & expected monetary value, simulation, sensitivity analysis, risk response planning, risk monitoring & control.

UNIT5

Software Configuration Management: Why versions exist, why retain versions, SCI, Releases vs. version. Change Control and Management

Laboratory work:

Laboratory work: Using Function Point calculation tools for estimation, comparing with COCOMO estimates, Implementation of various exercises using PERT, CPM methods, Preparing schedule, resource allocation etc. using MS Project or Fissure. sim or VENSIM can also be used, Preparing an RMMM Plan for a case study, Preparing Project Plan for a Software Project for Lab Project or case study. Exploring about PMBOK (Project Management Body of Knowledge) and SWEBOK(Software Engineering Body of Knowledge) from related website, Implementation of software project management concepts using related tools and technologies.

Text Books: 1. Hughes B. and Cotterell M. and Mall R., Software Project Management, Tata McGraw Hill (2011) 5th Ed. 2. Pressman R., A practitioner's Guide to Software Engineering, Tata McGraw Hill (2014) 7th Ed.

Reference Books: 1. Stellman A., Greene J., Applied Software Project Management, O'Reilly Media, Inc. (2008). 2. Futrell T. R., Shafer F. D. and Shafer I. L., Quality Software Project Management, Prentice Hall (2002).

BCA-651 COMPUTER NETWORK

1. Programs using TCP Sockets (like date and time server & client, echo server & client, etc.)

2. Programs using UDP Sockets (like simple DNS)

3. Programs using Raw sockets (like packet capturing and filtering)

4. Programs using RPC

5. Simulation of sliding window protocols

BCA-656 Seminar and Group Discussion

- **Introduction to Seminar Presentations:** Overview of effective presentation techniques and styles.

- **Topic Selection:** Guidance on choosing relevant and engaging topics for seminars.

- **Research Skills:** Techniques for researching and organizing information for presentations.

- **Presentation Skills:** Training on voice modulation, body language, and visual aids.

- **Group Discussion Dynamics:** Understanding roles in discussions, including facilitators, note-takers, and speakers.

- **Critical Thinking:** Techniques for analyzing arguments and providing constructive feedback.

- **Peer Evaluation:** Learning how to give and receive feedback on presentation skills and content.

- **Technology in Presentations:** Utilizing tools such as PowerPoint, Prezi, and video aids effectively.

- **Special Topics:** Guest lectures or workshops on specific communication skills (e.g., negotiation, conflict resolution).

- **Final Group Discussion:** A culminating group discussion where students will apply skills learned throughout the course.

BCA-658 **Research Project-II**

- **Project Implementation:** Execution of the research plan, including data collection and analysis.

- **Data Analysis Techniques:** Application of statistical tools and software for data interpretation.

- **Research Documentation:** Structuring and writing a detailed research report.

- **Presentation Preparation:** Techniques for effectively communicating research findings.

- **Peer Review Process:** Engaging in constructive feedback sessions with peers on research presentations and reports.

- **Ethical Considerations:** Addressing ethical issues encountered during the research process.

- **Final Presentation:** Preparing and delivering a presentation summarizing the research project and findings.

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School of School of Engineering and Technology

Ordinances, Regulations & Syllabus

For

Bachelor of Computer Application (BCA) Three Year Programme

Semester System

(w.e.f. session 2013-14)

Approved and adopted in the year 2016 (7th Meeting, Board of Studies)

Programme Educational Objectives (PEOs)

PEO1: To facilitate in development of strong basic fundamentals of Computer Applications that fit as a perfect foundation towards a beginning a professional career in industry.

PEO2: To develop programming skills in learners by using fundamental knowledge of computer Science.

PEO3: To apply new designs and solutions to complex real life problems using existing and/or novel technologies.

PEO4: To play a creative role during professional life through turning problems to opportunities and foster personal and organizational growth

PEO5: To inculcate comprehensive communication ability that is useful during professional communication and leading of teams in future

Programme Specific Objectives (PSO's)

PSO 1 Students will able to understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.

PSO 2 Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

PSO 3 Student will able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.

PSO 4 Analyze and design solutions for real-world problems using computational techniques.

PSO 5 Explore trends in AI, Machine Learning, Cloud Computing, and Big Data.

Programme Outcome Objectives (POO's)

PO1: Understand the concepts of key areas in computer science.

PO2: Analyze and apply latest technologies to solve problems in the areas of computer applications.

PO3: Analyze and synthesis computing systems through quantitative and qualitative techniques

PO4: Apply technical and professional skills to excel in business.

PO5: Communicate effectively in both verbal and written form.

PO6: Develop practical skills to provide solutions to industry, society and business.

PO7: Acquire Knowledge of mathematical foundations, computer application theory and algorithm principles in the design and modeling of computer based system.

PO8: Earn caliber to design, analyze and development principles in the construction of complex hardware and software computer systems.

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective form 2016
BCA
I Semester

Course Types	Subject Code and Title	L	P	Total	Cr.
Core Course	CCAC-101 :C Programming Fundamentals	4			4
	CCAC-103:Computer System Architecture	4			4
Ability Enhancement Compulsory Course	AECC-101:Professional Communication AECC-101A: Personality Development- I AECC-101B: Behaviour Skill- I AECC-101C: language Proficiency and English I AECC-101D:Public Speaking and Presentation I	4			2
Generic Elective	GCAC-101Mathematics GCAC- 101 A- Engineering Mathematics I GCAC- 101 B – Discrete Mathematics I GCAC- 101 C- Basic Mathematics I GCAC- 101 D- Mathematical Foundation of Computer Science I GCAC- 101 E- Elementary Mathematics I	4			4
	GCAC-103: Computer Fundamentals				
Practical	CCAC-151: C Programming Fundamentals		2		1
	CCAC-153: Computer System Architecture Lab		2		1
	AECC-151: Professional Communication LAB AECC -151A: Personality Development- I AECC -151 B: Behaviour Skill- I AECC -151 C: language Proficiency and English I AECC -151 D:Public Speaking and Presentation I		2		1
	Total Credits (4 Theory +3 Lab)	16	6	22	17

II Semester

Course Types	Subject Code and Title	L	P	Total	Cr.
Core Course	CCAC-102:Java Programming	4			4
	CCAC 104: Data Structures	4			4
Ability Enhancement Compulsory Course	AECC-104 Environmental Science AECC-104 A- Life Skills AECC-104 B- Moral values and Ethics AECC-104 C – Leadership and managerial Skills AECC-104 D - Enterpreneurships	4			2
Generic Elective	GCAC 106: Digital Electronics	4			4
	GCAC:108:Business Communication II GCAC:108A: Personality Development- II GCAC:108 B: Behaviour Skill- II GCAC:108 C: language Proficiency and English II GCAC:108 D:Public Speaking and Presentation II				
Practical	CCAC 152:Java Programming Lab		2		1
	CCAC 154: Data Structures Lab		2		1
	CCAC 156: Digital Electronics Lab		2		1
	CCAC 158: Business Communication Lab CCAC 158 A: Personality Development- II CCAC 158 B: Behaviour Skill- II CCAC 158 C: language Proficiency and English II CCAC 158 D:Public Speaking and Presentation II				
	Total Credits (4 Theory +3 Lab)	16	6	22	17

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective form 2016
BCA
III Semester

Course Types	Subject Code and Title	L	P	Total	Cr.
Core Course	CCAC-201: Database Management Systems	4			4
	CCAC-203: Operating Systems	4			4
	CCAC-205: Computer Networks	4			4
Skill Enhancement Courses	SCAC-201: HTML Programming	4			4
	SCAC-203: PHP Programming				
Generic Elective	GCAC-201 Multimedia Technology	4			4
	GCAC-203 Introduction to Programming				
Practical	CCA-251: Database Management Systems lab		2		1
	CCA-253Operating Systems Lab		2		1
	CCA-255: Computer Networks Lab		2		1
	SCAC-251: HTML Programming		2		1
	SCAC-253: PHP Programming Lab				
	Total Credits (5 Theory +4 Lab)	20	8		24

IV Semester

Course Types	Subject Code and Title	L	P	Total	Cr.
Core Course	CCAC202: Software Engineering	4			4
	CCAC 204: Design and Analysis of Algorithms	4			4
	CCAC 206: OOPS Using C++	4			4
Skill Enhancement Courses	SCAC-202: UNIX/LINUX Programming	4			4
	SCAC-204:: Programming in Visual Basic				
Generic Elective	GCAC-202: Discrete Structure GCAC- 202 A- Engineering Mathematics II GCAC- 202 B – Discrete Mathematics II GCAC- 202 C- Basic Mathematics II	4			4
	GCAC-204 :Information Security and Cyber Laws				
Practical	CCAC-252: Software Engineering Lab		2		1
	CCAC-254:Design and Analysis of Algorithms Lab		2		1
	CCAC-256: OOPS Using C++ Lab		2		1
	SCAC-202:UNIX/LINUX Programming Lab		2		1
	SCAC-204:: Programming in Visual Basic				
	Total Credits (5 Theory +4 Lab)	20	8		24

Shobhit University, Gangoh (Saharanpur)
Teaching Scheme
Effective form 2016
BCA
V Semester

Course Types	Subject Code and Title	L	P	Total	Cr.
Core Course	CCAC-301: Internet Technologies	4			4
	CCAC-303:Software Project Management	4			4
Discipline Specific Elective-1 (Choose any one)	DCAC-301: Knowledge Management DCAC-301 A: Knowledge Management Strategies DCAC-301 B: Information Systems and Technology DCAC-301 C: Organizational Learning DCAC-301 D: Emerging Trends in Knowledge Management	4			4
	DCAC-303: Data Mining				
Discipline Specific Elective-2 (Choose any one)	DCAC-305System Programming	4			4
	DCAC-307 Digital Image Processing				
Practical (Choose any four)	CCAC-351: Internet Technologies Lab		2		1
	CCAC-353:Software Project Management Lab		2		1
	CCAC-355: Minor Project		2		1
	DCAC-355: System Programming Lab		2		1
	DCAC-357Digital Image Processing Lab				
	Total Credits (4 Theory +4 Lab)	16	8		20

VI Semester

Course Types	Subject Code and Title	L	P	Total	Cr.
Core Course	CCAC-302: Artificial Intelligence	4			4
	CCAC-304: Computer Graphics	4			4
Discipline Specific Elective-3 (Choose any one)	SCAC-302: Management Information system SCAC-302 A: Business Intelligence and Analytics SCAC-302 B: Information Systems Strategy SCAC-302 C: Enterprise Resource Planning SCAC-302 D: Information Security Management	4			4
	SCAC-304 : Software Testing				
Discipline Specific Elective-4 (Choose any one)	SCAC-306 Soft Computing	4			4
	SCAC-308 Mobile Computing				
Practical (Choose any four)	CCAC-352:Artificial Intelligence Lab		2		1
	CCAC-354: Computer Graphics Lab		2		1
	CCAC-356: Seminar &Group Discussion		2		1
	CCAC-358: Project Work		2		1
	Total Credits (4 Theory +4 Lab)	16	8		20

CCAC 101 C Programming Fundamentals L T P Cr3 1 0 4

UNIT I

Introduction to C : History of C , Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C.**Data Types, Variables, Constants, Operators and Basic I/O:** Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

UNIT II: Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

UNIT III: Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional array.

UNIT IV Pointers and References in C: Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems withPointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values **Memory Allocation in C:** Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation

UNIT V: File I/O, Preprocessor Directives: Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

Reference Books

1. HerbtzSchildt, "C : The Complete Reference", Fourth Edition, McGraw Hill.20032. BjarneStroustrup, "The C Programming Language", 4th Edition, Addison-Wesley , 2013.
2. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition,Addison-Wesley 2014.
3. E Balaguruswamy, "Fundamental Programming with C", Tata McGraw-Hill Education, 2008.

CCAC 103 Computer System Architecture L T P 3 1 0 4

Unit- I : Basic organization of computers, Block level description of the functional units asrelated to the execution of a program; Fetch, decode and execute cycle.

Unit- II: Machine instructions, Instruction set architectures, Assembly languageprogramming, addressing modes, instruction cycles, registers and storage, addressing modes; discussions about RISC versus CISC architectures; Inside a CPU:

Unit- III : Information representation, Floating point representation (IEEE 754), computerarithmetic and their implementation; Fixed-Point Arithmetic: Addition, Subtraction, Multiplication and Division, Arithmetic Logic Units control and data path, data path components, design of ALU and data path, controller design; Hardwired and Micro programmed Control.

Unit- IV: Memory Technology, static and dynamic memory, Random Access and SerialAccess Memories, Cache memory and Memory Hierarchy, Address Mapping, Cache pupation schemes, Virtual memory and memory management unit.

Unit- V: I/O subsystems: Input-Output devices such as Disk, CD-ROM, Printer etc.;Interfacing with IO devices, keyboard and display interfaces; Basic concepts Bus Control, Read Write operations, Programmed IO, Concept of handshaking, Polled and Interrupt-driven I/O, DMA data transfer;. Pipeline Processing, Instruction and Arithmetic Pipeline, Pipeline hazards andtheir resolution, Parallel Processing

Text Book:

1. Computer Organization by V. Carl Hamacher, Safwat G. Zaky and Zvonko G. Vranesic , McGraw-Hill series (2002)

Reference Books:

1. Computer Organization and Design, by David Patterson and John Hennessey, ” Elsevier. 2008.

2.Computer System Architecture by Mano, M.M.,, Prentice Hall of India, New Delhi, 1992

*3.*Computer Systems Design and Architecture (2nd Edition) by Vincent P. Heuring and Harry F. Jordan (Dec 6,2003)

*4.*Computer Architecture and Organization, by Hayes, J.P.1998,McGraw-Hill

AECC -101	Professional Communication	L	T	P	Cr
		3	1	0	4

UNIT I:

Introduction: Theory of Communication, Types and modes of Communication.

UNIT II:

Language of Communication: Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication

UNIT III:

Speaking Skills: Monologue Dialogue Group Discussion Effective Communication/ Mis-Communication Interview Public Speech

UNIT IV:

Reading and Understanding Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation Translation(from Indian language to English and vice-versa) Literary/Knowledge Texts

UNIT V:

Writing Skills Documenting Report Writing Making notes Letter writing

Text Books:

1. Fluency in English - Part II, Oxford University Press, 2006.

2. Business English, Pearson, 2008.

3. Language, Literature and Creativity, Orient Blackswan, 2013.

AECC-101B **Behaviour Skill-I**

UNIT:1 Introduction to Behavioural Skills

Understanding personality traits and types, Self-assessment tools for identifying strengths and areas for improvement, Importance of self-awareness and how it impacts relationships and career.

UNIT :2 Self-Motivation and Personal Development

Goal-setting techniques (SMART goals), Building self-discipline and resilience, Techniques to stay motivated, even during challenging times.

UNIT:3 Interpersonal Skills

Developing empathy and active listening, Conflict resolution strategies, Building strong relationships through trust and effective communication.

UNIT:4 Time Management & Prioritization

Time-blocking, scheduling, and the Eisenhower Matrix, Techniques to reduce procrastination, Setting realistic goals and evaluating progress.

UNIT:5 Stress and Anger Management

Identifying personal triggers and stressors, Techniques for stress relief, like deep breathing, meditation, and exercise, Anger management strategies and learning to communicate effectively when angry.

AECC-101C Language Proficiency and English I

UNIT:1 Fundamentals of English Grammar

Parts of speech, sentence structure, types of sentences, Tenses, subject-verb agreement, and common grammatical errors, Usage of prepositions, articles, and conjunctions.

UNIT:2 Vocabulary Building

Expanding vocabulary with synonyms, antonyms, idioms, and phrases, Techniques to retain and use new vocabulary, Importance of context in vocabulary usage.

UNIT:3 Listening and Speaking Skills

Improving pronunciation and intonation, Active listening techniques for better comprehension, Developing fluency through speaking exercises and dialogue practice.

UNIT:4 Reading and Writing Skills

Developing reading strategies (skimming, scanning, and detailed reading), Practice exercises for comprehension and critical analysis of texts, Basics of writing formats: formal and informal letters, essays, and reports.

UNIT:5 Communication Skills in English

Difference between verbal and non-verbal communication, Engaging in effective communication, both spoken and written, Role of English in professional and academic settings.

GCAC 101 **Mathematics-1** **L T P Cr**

3 1 0 4

Unit-I

Differential Calculus: Limits and continuity, Differentiation of algebraic, polynomial, trigonometric, logarithmic, exponential functions, Simple applications of derivatives, Increasing and decreasing functions, Maxima and minima of functions of one variable;

Unit-II

Vectors : Vector, vector algebra Addition, subtraction, scalar multiplication, magnitude, vector multiplication. Simple applications of vectors.

Matrices: Matrix, sub matrix, types of matrices, such as symmetric, square, diagonal Matrices, singular and nonsingular matrices. Addition, subtraction, multiplication of matrices. Rank of a matrix, Matrix equation, solution by Cramer's rule and Gauss elimination method.

Unit-III

Matrix Algebra: Types of matrices, Rank of a matrix, Inverse of a matrix by elementary operations, Eigenvalues and Eigenvectors of matrices, Cayley-Hamilton theorem and its use in finding inverse of a matrix, Complex matrices and their elementary properties, Application of matrices to a system of linear (homogeneous and non-homogeneous) equations.

Unit-IV **Functions:** Interval and sub-intervals. Definition of function and examples, polynomial, rational, exponential, logarithmic and trigonometric functions. Graph of some simple functions like polynomial (upto 3rd deg), rational trigometric functions, modulus, function, step functions, rational functions, composite functions.

Unit-V : Probability and Statistics: Masure of central tendency (Mean, Weighted mean, Median, Mode), Dispersion (Range, Deviation from the mean, Variance, Standard deviation, Coefficient of variation), Symmetry and Kurtosis in data. Quartiles and Percentiles.Probability and axioms of probability.Probability and probability distribution (Binomial, Poisson and Normal).Correlation and Regression.

Reference Books

1. Engineering Mathematics : E. Kreyzig

2. Higher Engineering Mathematics : B. S. Grewal

3. Advanced Engineering Mathematics : H. K. Das

4. Differential Calculus : Shanti Narayan

GCAC-101A	Engineering Mathematics I	L	T	P	Cr
		3	1	0	4

1. **Calculus**

Limits, continuity, and differentiability, Derivatives, applications of derivatives in real-world problems, Integration techniques and applications of definite integrals in engineering.

2. **Linear Algebra**

Matrices: types, operations, determinants, and inverse, System of linear equations and methods (Gaussian elimination, Cramer's rule), Eigenvalues, eigenvectors, and applications.

3. **Differential Equations**

First-order differential equations and applications, Higher-order differential equations, Laplace transforms and their application in solving differential equations.

4. **Vector Calculus**

Vector functions, gradient, divergence, and curl, Line, surface, and volume integrals, Green's, Stokes', and Gauss' theorems.

GCAC-101B:	Discrete Mathematics I	L	T	P	Cr
		3	1	0	4

UNIT:1 Fundamentals of Logic and Proof

Propositional and predicate logic, Methods of proof, including direct, indirect, contradiction, and contraposition, Mathematical induction and recursive definitions.

UNIT:2 Set Theory

Sets, relations, and functions, Set operations, Cartesian product, and power sets, Countable and uncountable sets.

UNIT:3 Combinatorics

Basic counting principles (addition and multiplication), Permutations and combinations, Introduction to recurrence relations and generating functions.

UNIT:4 Graph Theory

Basics of graphs, types of graphs, and graph terminology, Paths, cycles, connectivity, and graph traversal (BFS and DFS), Applications in computer science, such as networking and shortest path problems.

GCAC-101C	Basic Mathematics I	L	T	P	Cr
		3	1	0	4

UNIT:1 Basic Algebra

Algebraic expressions, equations, and inequalities, Linear and quadratic equations and their solutions, Introduction to complex numbers and polynomials.

UNIT:2 Coordinate Geometry

Cartesian coordinate system and distance formula, Straight lines, slope, and equations of lines, Circles and conic sections: parabolas, ellipses, and hyperbolas.

UNIT:3 Trigonometry

Basic trigonometric ratios and identities, Solving trigonometric equations, Applications o trigonometry in real-world problems.

UNIT:4 Elementary Calculus

Basic concepts of limits and continuity, Introduction to differentiation and integration, Applications of differentiation and integration in simple scenarios.

GCAC-101D	Mathematical Foundation of Computer Science I	L	T	P	Cr
		3	1	0	4

UNIT:1 Propositional Logic and Predicate Logic

Logic statements, connectives, truth tables, Quantifiers, predicates, and proofs in predicate logic, Applications in digital circuit design and algorithm logic.

UNIT:2 Set Theory and Relations

Sets, subsets, power sets, and set operations, Relations, properties of relations, equivalence relations, and partial orderings, Functions: one-to-one, onto, and bijective functions.

UNIT:3 Algorithms and Complexity

Introduction to algorithm design and efficiency, Time complexity and Big O notation, Recursive functions and basic recurrence relations.

UNIT:4 Graph Theory for Computer Science

Graphs, trees, and basic graph algorithms, Applications of graphs in computer science (e.g., networks, pathfinding), Introduction to Boolean algebra and its application in computer logic.

GCAC-103	Computer Fundamentals	L	T	P	Cr
		3	1	0	4

UNIT – I

Computer Fundamentals

Brief history of development of computers, Computer system concepts and characteristics, Types of computers, Generations of computers, Capabilities and limitations, Basic components of a computer system - CU, ALU, Input/Outputfunctions and characteristics, memory - RAM, ROM, EPROM, PROM and other types of memory.

UNIT – II

Input/Output units, Keyboard, Mouse, Trackball, Joystick, Scanners Printers - Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card and Speakers,

UNIT – III

Storage devices

Primary vs Secondary Data Storage and Retrieval methods, Sequential and Direct, Various Storage Devices, Magnetic Tape, Magnetic Disks, Cartridge Tape, Hard Disk Drives, Floppy Disks (Winchester Disk), Optical Disks, CD, VCD, CD-R, CD-RW, Zip Drive, flash drives Video Disk , Blue Ray Disc, SD/MMC Memory cards, Physical structure of floppy & hard disk, drive naming conventions.

UNIT – IV

Software and its Need, Types of Software, System & Application software, System Software-Operating System, Utility Program, Programming languages, Assemblers, Compilers and Interpreter, Introduction to MSDOS, Windows, booting process details of DOS and Windows, DOS system files. Application Software and its types - Word-processing, Spreadsheet, Presentation Graphics, Data Base Management Software, characteristics, Uses principles, Types of viruses, virus detection and prevention, viruses on network.

UNIT – V Information Technology

Use of communication and IT , Communication Process, Communication types- Simplex, Half Duplex, Full Duplex, Communication Protocols, Communication Channels - Twisted, Coaxial, Fiber Optic, Serial and Parallel Communication, Modem - Working and characteristics, Types of Network - LAN, WAN, MAN ,Internet, VPN etc., Topologies of LAN - Ring, Bus, Star, Mesh and Tree topologies, World Wide Web Internet Services, Convergence of technologies.

TEXT & REFERENCE BOOKS:

1. Using Information Technology, 5th Edi, Brian K Williams & Stacey C. Sawyer, 2003, TMH
2. Fundamentals of computers and programming with C, A. K. Sharma, DhanpatRai Publications, Daryaganj New Delhi
3. Information technology, Dennis P. Curtin, Kim Foley, KunalSen, Cathleen Morin, 1998, TMH

AECC-151 **Professional Communication Lab**

1. Write a program to calculate the sum of two integers entered by the user.
2. Write a program to check whether a given number is prime or not.
3. Write a program to reverse a given string without using built-in functions.
4. Write a program to find the largest element in an array of integers.
5. Write a program to compute the factorial of a given number using recursion.
6. Write a program to check if a string entered by the user is a palindrome.
7. Write a program to count the number of vowels in a given string.
8. Write a program to calculate the length of a string without using any library functions.
9. Write a program to calculate the power of a number raised to an exponent.
10. Write a program to print the Fibonacci sequence up to the nth term.
11. Write a program to determine if a given number is even or odd.
12. Write a program to swap two numbers without using a third variable.
13. Write a program to merge two arrays into one and display the result.
14. Write a program to print the multiplication table of a number from 1 to 10.
15. Write a program to find the greatest common divisor (GCD) of two numbers using Euclid's algorithm.

Textbooks:

1. *Effective Technical Communication* by M. Ashraf Rizvi
2. *Business Communication* by Meenakshi Raman and Prakash Singh

Reference Books:

1. *Professional Communication* by Aruna Koneru
2. *The Art of Public Speaking* by Stephen E. Lucas

AECC-151A **Personality Development - I**

Unit I:

- Introduction to Personality Development: Definition, importance, and goals.
- Self-awareness and Self-assessment.

Unit II:

- Positive Attitude: Developing a positive mindset and self-confidence.
- Motivation and Goal Setting.

Unit III:

- Time Management: Techniques and tips for effective time management.
- Stress Management and Resilience Building.

Unit IV:

- Emotional Intelligence: Understanding and managing emotions.
- Communication in Relationships and Interpersonal Skills.

Unit V:

- Leadership Skills: Types of leadership and leadership qualities.
- Teamwork and Conflict Resolution.

Textbooks:

1. *Personality Development and Soft Skills* by Barun Mitra
2. *The 7 Habits of Highly Effective People* by Stephen R. Covey

Reference Books:

1. *How to Win Friends and Influence People* by Dale Carnegie
2. *Emotional Intelligence* by Daniel Goleman

AECC-151B **Behaviour Skill - I**

Unit I:

- Basics of Behavioral Skills: Definition, importance, and categories.
- Self-esteem and Self-confidence.

Unit II:

- Adaptability and Flexibility in Workplace: Coping with changes.
- Empathy and Compassion.

Unit III:

- Developing a Positive Work Ethic.
- Problem Solving and Decision Making.

Unit IV:

- Conflict Management and Handling Criticism.
- Respect and Ethics in Professional Conduct.

Unit V:

- Building Effective Interpersonal Relationships.
- Collaboration and Building a Team.

Textbooks:

1. *Behavioral Skills for Managers and Supervisors* by Edward J. Willett
2. *The Essential Workplace Conflict Handbook* by Barbara Mitchell and Cornelia Gamlem

Reference Books:

1. *Emotional Intelligence for Project Managers* by Anthony Mersino
2. *People Skills* by Robert Bolton

AECC-151C Language Proficiency and English I

Unit I:

- Basics of Grammar: Parts of speech, tenses, and sentence structure.
- Vocabulary Building.

Unit II:

- Writing Skills: Paragraph and essay writing.
- Reading Comprehension Techniques.

Unit III:

- Pronunciation and Accent Neutralization.
- Listening Skills: Techniques for effective listening.

Unit IV:

- Conversational Skills: Dialogues, debates, and discussions.
- Formal and Informal Communication.

Unit V:

- Business Communication: Report writing, emails, and proposals.
- Presentation and Public Speaking Skills.

Textbooks:

1. *High School English Grammar & Composition* by Wren and Martin
2. *English Grammar in Use* by Raymond Murphy

Reference Books:

1. *The Elements of Style* by William Strunk Jr. and E.B. White
2. *Word Power Made Easy* by Norman Lewis

CCAC 102 Java Programming L T P Cr 3 1 0 4

UNIT I: Introduction to Java: Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods),

UNIT II: Arrays, Strings and I/O: Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods.

UNIT III: Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT IV: Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT V : Applets and Event Handling: Java Applets:Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms,Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels,

CCAC 104 **Data Structures** **L T P Cr 3 1 0 4**

UNIT I: Introduction: to Notions of data type, abstract data type, and data structures. Importance of algorithms and data structures in programming. Examples of simple algorithms and illustration of their complexity. **Array** Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)

UNIT II: Stack Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack **Queue** Array and Linked representation of Queue, De-queue, Priority Queues

UNIT III: Linked Lists Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circularrepresentation of Stack in Lists; Self Organizing Lists; Skip Lists.Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion;

ssssssUNIT IV:

Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion Iterative Traversals on Binary Search Trees); Algebraic Expressions, Height-Balanced Trees (Various operations on AVL Trees).

UNIT V: Searching: Linear Search, Binary Search, Comparison of Linear and Binary Search, Sort: Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques

Text Books:

1. Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft , Addison-Wesley Series (1983)
2. Data Structures and Algorithm Analysis in Java (3rd Edition) by Mark Allen Weiss, Addison Wesley, (2011).

Reference Books:

1. T.H. Cormen, C.E. Leiserson, and R.L. Rivest. *Introduction to Algorithms.* The MIT Press and McGraw-Hill Book Company, Cambridge, Massacusetts, 1990 (Available in Indian Edition).
2. Steven S. Skiena. *The Algorithm Design Manual*. Springer, Second Edition

DATA STRUCTURES & USING 'C' Lab.

CCAC-154

1. Programs based on Arrays (Insertion and Deletion of elements).
2. Programs based on Sorting in Arrays.
3. Programs based on Searching in Arrays.
4. Programs based on Linked Lists
5. Programs based on Stacks.
6. Programs based on Evaluating expressions in Stacks.
7. Programs based on Queues.
8. Programs based on Trees.
9. Programs based on Graphs.

Reference Books:

R. P. Agarwal, Ankita Singh, *"Laboratory Manual on Data Structures using C"*, 1st Edition, 2010, Shobhit University Publications.

AECC-104 **Environmental Science**

Unit I: Introduction to Environmental Science

- Definition, Scope, and Importance: Understanding the interdisciplinary nature of environmental science and its relevance in today's world.
- Concept of Ecosystems: Structure, function, and types of ecosystems (forest, grassland, desert, and aquatic).
- Biodiversity: Importance of biodiversity, threats to biodiversity, conservation methods, and types of biodiversity (genetic, species, and ecosystem).

Unit II: Natural Resources

- Forest Resources: Importance, deforestation causes and effects, and sustainable forest management.
- Water Resources: Importance, over-utilization, water scarcity, and conservation of water resources.
- Mineral Resources: Environmental effects of extracting and using mineral resources.
- Energy Resources: Renewable and non-renewable energy sources, energy conservation, and sustainable energy practices.

Unit III: Environmental Pollution

- Air Pollution: Sources, effects on health and the environment, and control measures.
- Water Pollution: Sources, effects on aquatic ecosystems, and methods of control.
- Soil Pollution: Causes, effects, and soil conservation techniques.
- Noise Pollution: Sources, effects on health, and noise pollution control.
- Waste Management: Types of waste (solid, liquid, e-waste), waste management techniques, and the concept of "Reduce, Reuse, Recycle."

Unit IV: Environmental Policies and Practices

- Environmental Policies in India: Major environmental laws and regulations, such as the Environment Protection Act, Wildlife Protection Act, and Forest Conservation Act.
- Environmental Impact Assessment (EIA): Purpose, process, and importance in developmental projects.
- Role of Individuals and Communities: How individuals and communities can contribute to environmental conservation and sustainable practices.
- Climate Change and Global Warming: Causes, effects, and measures to combat climate change.

Unit V: Human Population and the Environment

- Population Growth and Environment: Effects of population growth on natural resources and urbanization.
- Human Health and Environment: Impact of environmental factors on health, including waterborne diseases, air pollution, and sanitation.
- Sustainable Development: Principles, importance, and practices for achieving sustainable development.
- Environmental Ethics and Awareness: Importance of ethics in environmental conservation and the role of environmental education.

Textbooks:

1. *Textbook of Environmental Studies for Undergraduate Courses* by Erach Bharucha
2. *Environmental Science: Principles and Practices* by R.C. Sharma and Gurbir Singh

Reference Books:

1. *Environmental Studies* by Benny Joseph
2. *Environmental Science: Earth as a Living Planet* by Daniel B. Botkin and Edward A. Keller

AECC-104 A **Life Skills**

Unit I: Self-Awareness and Personal Development

Understanding self-awareness and its importance, Personal values, goals, and identity, Building self-confidence and self-esteem, Techniques for personal growth and development.

Unit II: Emotional Intelligence and Stress Management

Introduction to emotional intelligence (EI), Components of EI: self-awareness, self-regulation, motivation, empathy, and social skills, Stress sources, types of stress, and coping mechanisms, Techniques for managing stress and promoting mental well-being.

Unit III: Effective Communication and Interpersonal Skills

Types of communication: verbal, non-verbal, and written, Active listening, empathy, and assertive communication, Building healthy interpersonal relationships, Conflict resolution and negotiation skills.

Unit IV: Decision Making and Problem Solving

Steps and techniques in decision-making, Problem-solving models and creative thinking, Critical thinking and evaluating outcomes, Ethical decision-making and responsibility.

Unit V: Time Management and Goal Setting

Importance of time management for personal and professional life, Prioritization, scheduling, and delegation techniques, Setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals, Overcoming procrastination and developing discipline

Suggested Books:

- **Textbooks:**
    1. "Life Skills: Managing Your Future Success" by Evan Davis
    2. "Developing Life Skills" by John Smith and Martha Rogers
- **Reference Books:**
    1. "Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman
    2. "How to Win Friends and Influence People" by Dale Carnegie

AECC-104 B **Moral Values and Ethics**

Unit I: Introduction to Ethics and Moral Values

Concept of ethics, morality, and values**,** Relationship between ethics and moral values**,** Importance of moral values in personal, social, and professional contexts

Unit II: Ethical Theories and Principles

Overview of ethical theories: Utilitarianism, Deontology, Virtue Ethics, Applications of ethical principles in decision-making, Personal vs. societal ethics

Unit III: Moral Development and Ethical Behavior

Stages of moral development (Kohlberg, Piaget), Factors influencing ethical behavior, Case studies on moral dilemmas in various professions

Unit IV: Contemporary Ethical Issues

Ethics in technology, environment, and business, Workplace ethics and corporate social responsibility (CSR), Resolving ethical conflicts and dilemmas

Suggested Books:

- **Textbooks:**
    1. "Ethics: Theory and Contemporary Issues" by Barbara MacKinnon
    2. "Moral Values and Ethics: Theory and Practice" by K.K. Sharma
- **Reference Books:**
    1. "Ethics in the Real World: 82 Brief Essays on Things That Matter" by Peter Singer
    2. "Applied Ethics: A Multicultural Approach" by Larry May

AECC-104 C **Leadership and Managerial Skills**

Unit I: Fundamentals of Leadership and Management

Definitions, characteristics, and roles of leaders and managers, Differences between leadership and management, Importance of leadership and managerial skills in organizations

Unit II: Leadership Theories and Styles

Overview of leadership theories: Transformational, Transactional, Situational, Leadership styles: autocratic, democratic, laissez-faire, Matching leadership style with organizational needs

Unit III: Key Managerial Skills

Skills for effective management: decision-making, problem-solving, strategic planning, Importance of interpersonal and communication skills, Managing time and resources efficiently

Unit IV: Challenges in Modern Leadership

Managing diversity and inclusion in teams, Ethical leadership and social responsibility, Case studies on contemporary leadership challenges

Unit V: Contemporary Challenges in Leadership

Managing diversity, inclusion, and ethical leadership**,** Coping with global business challenges and crises**,** Case studies on ethical leadership and contemporary leadership issues

Suggested Books:

- **Textbooks:**
    1. "Leadership: Theory and Practice" by Peter G. Northouse
    2. "Management and Leadership in Organizations" by Alan Murray
- **Reference Books:**
    1. "Developing Management Skills" by David A. Whetten and Kim S. Cameron
    2. "The Art of Leadership" by George Manning and Kent Curtis

AECC-104 **Environmental Sciences** **L T P 4 0 0**

Unit I

Atmosphere: The Earth's Natural Greenhouse Effect: Greenhouse Gases, Global Warming, Ozone depletion, Acid rain, El Nina and La Nina Phenomenon.

Unit-II

Pollution: Air, Water, Noise and Soil pollutions and their quality parameters

Unit-III

Waste Management: Agricultural waste, Industrial waste and Other hazardous waste, Environment Impact Assessment.

Unit-IV

Sustainable Development: Conservation of natural resources watershed management, Rain water harvesting and storage;Application of Remote Sensing and GIS

Unit-V

Environmental Management Systems: ISO certification control policies, International and National legislations and acts related to environment.

Reference:

1. Miller, T.G. Jr. *Environmental Science*. Wadsworth Publishing Co.
2. Liu, David H.F. and Béla G. Lipták. *Environmental Engineers' Handbook*. 2nd edition. Lewis

Publishers, New York, 1997.

3. Jadhav, H. and V.M. Bhosale. *Environmental Protection and Laws*. Himalaya Publishing House,

Delhi. 1995.

4. Rajagopalan, R. *Environmental Studies*: *From Crisis to Cure*. Oxford University Press, New

Delhi.

5. Joseph, B. *Environmental Studies*. Tata McGraw-Hill, New Delhi.

GCAC 106 **Digital Electronics** **L T P Cr**
3 1 0 4

Unit-I: Logic gates & Boolean algebra

Basic laws of Boolean algebra, Conversion between bases (Binary, Octal, Hexadecimal & Decimal); Logic gates: Inverters, OR, AND, NAND, NOR, XOR & X-NOR gates.

Simplification of Boolean equations using Boolean algebra, universal gates & K-maps (up to 6 variables). Code Conversion: BCD, Gray and Excess-3 codes.

Unit-II: Combinational Circuits

Half adder, Full sadder, Binary adder, Signed binary numbers, 1's& 2's complements adder – subtractor. Binary multiplier and divider.

Multiplexers/Demultiplexers, encoder / decoders, decimaladders& amplitude comparators.

Unit-III: Sequential Logic Circuits (I) – Flip-flops

SR, D, JK, T, & JK master-slave flip –flops and their conversions, excitation table, state table & state diagram. Shift registers: SISO, SIPO. PISO & PIPO. By directional shift registers.

Unit-IV: Sequential Logic Circuits (II) – Counters

Design procedure, Synchronous and Asynchronous counters, Ripple counters, modulo counters, twisted ring & Johnson counters.

Unit-V : Memories

ROMs, PROMs, EPROMs, EEPROMs, RAMs, Hard Disk, Floppy Disk and CD- ROM.

PAL & PLA.

Text Books :

1. Digital Design by M Moris Mano, 2nd Edn.PHI
2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH

Reference Books :

1. Switching Circuit & Logic Design by Hill & Peterson, Wiley
2. Digital Circuit & Logic Design, by Holsworth.

GCAC-108 Business Communication II

Unit I: Advanced Business Writing

- **Professional Emails**: Effective email formatting, clarity, and tone.
- **Reports and Proposals**: Structure and essentials of writing concise business reports and proposals.

Unit II: Oral Communication in Business

- **Presentation Skills**: Organizing and delivering impactful presentations.
- **Meetings and Negotiations**: Basics of running or participating in meetings and negotiation techniques.

Unit III: Interpersonal Skills for Business

- **Team Communication**: Building trust and clear communication in team settings.
- **Networking**: Basics of professional networking and relationship building.

Unit IV: Public Speaking and Listening Skills

- **Public Speaking Techniques**: Confidence-building strategies and engaging audiences.
- **Active Listening**: Techniques to improve listening and respond effectively.

Unit V: Digital Communication

- **Digital and Social Media Communication**: Basics of professional communication on platforms like LinkedIn.
- **Etiquette for Online Communication**: Tone, clarity, and professionalism in virtual interactions.

Textbooks:

1. *Business Communication* by Asha Kaul
2. *Effective Business Communication* by Herta A. Murphy

CCAC-158 Business Communication Lab

Unit I: Basics of Communication

- **Introduction to Communication**: Types, channels, and barriers in communication.
- **Role Play Exercises**: Practicing communication in real-life scenarios.

Unit II: Business Writing Skills

- **Email Writing**: Structure and tone for professional emails.
- **Memo and Report Writing**: Simple formats for internal and external communication.

Unit III: Presentation Skills

- **Developing Presentations**: Organizing content and visuals.
- **Public Speaking Practice**: Techniques to build confidence and engage audiences.

Unit IV: Listening and Feedback

- **Active Listening Skills**: Exercises to improve listening comprehension.
- **Constructive Feedback**: Learning how to give and receive feedback effectively.

Unit V: Interview Skills

- **Mock Interviews**: Practicing answering common interview questions.
- **Resume Building**: Basics of creating a professional resume.

Textbooks:

1. *Essentials of Business Communication* by Rajendra Pal and J.S. Korlahalli
2. *Business Communication Today* by Courtland Bovee and John Thill

CCAC-158A **Personality Development II**

Unit I: Self-Awareness and Growth

- **Personal Strengths and Weaknesses**: Identifying areas of improvement.
- **Goal Setting and Motivation**: Techniques for personal and professional goal setting.

Unit II: Communication and Social Skills

- **Verbal Communication**: Basics of clear and effective verbal interactions.
- **Non-Verbal Communication**: Understanding body language and eye contact.

Unit III: Building Confidence

- **Self-Confidence**: Exercises to improve self-belief and assertiveness.
- **Overcoming Fear and Anxiety**: Simple relaxation techniques.

Unit IV: Time and Stress Management

- **Prioritizing Tasks**: Techniques to organize and manage time effectively.
- **Managing Stress**: Identifying stress triggers and coping strategies.

Unit V: Personal Grooming and Etiquette

- **Professional Appearance**: Basics of personal grooming.
- **Social and Workplace Etiquette**: Simple rules of professional and social etiquette.

Textbooks:

1. *Personality Development and Soft Skills* by Barun Mitra
2. *The Power of Positive Thinking* by Norman Vincent Peale

CCAC-158B Behaviour Skill II

Unit I: Interpersonal Skills Development

- **Emotional Intelligence**: Basics of recognizing and managing emotions.
- **Empathy and Understanding**: Exercises to improve empathy.

Unit II: Conflict Resolution

- **Types of Conflict**: Basics of personal and professional conflict.
- **Conflict Management Techniques**: Practical approaches to resolve disagreements.

Unit III: Decision Making and Problem Solving

- **Steps in Decision Making**: Basics of identifying and evaluating options.
- **Problem-Solving Skills**: Structured approach to solving problems.

Unit IV: Adaptability and Flexibility

- **Adaptation to Change**: Exercises for improving flexibility in various situations.
- **Overcoming Resistance**: Techniques to embrace new challenges.

Unit V: Teamwork and Cooperation

- **Roles in a Team**: Understanding roles and responsibilities.
- **Collaboration Skills**: Basics of effective teamwork and collaboration.

Textbooks:

1. *Behavioral Skills in Management* by R.K. Sahu
2. *Emotional Intelligence* by Daniel Goleman

CCAC-158C Language Proficiency and English II

Unit I: Advanced Grammar and Vocabulary

- **Grammar Skills**: Complex sentence structures and advanced usage.
- **Vocabulary Development**: Synonyms, antonyms, and usage in context.

Unit II: Writing Skills

- **Essay Writing**: Structuring ideas clearly and concisely.
- **Summarizing and Paraphrasing**: Techniques for effective summarization.

Unit III: Reading and Comprehension

- **Reading for Information**: Strategies for quick comprehension.
- **Analyzing Texts**: Understanding context and main ideas.

Unit IV: Speaking and Listening

- **Pronunciation and Accent Neutralization**: Basic techniques.
- **Conversational English**: Engaging in meaningful conversations.

Unit V: Presentation and Public Speaking

- **Short Presentations**: Basics of organizing and delivering presentations.
- **Audience Interaction**: Techniques for engaging with listeners.

Textbooks:

1. *High School English Grammar & Composition* by Wren and Martin
2. *Word Power Made Easy* by Norman Lewis

GCAC-108 BUSINESS COMMUNICATION L T P Cr

4 0 1 5

Unit I:

Nature of Communication: Process of Communication, Types of Communication (verbal & Non Verbal), Importance of Communication, Different forms of Communication Barriers to Communication Causes, Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers

Unit II:

Business Correspondence: Letter Writing, presentation, Inviting quotations, Placing order, Memorandum, Memo, Notices, Job application letter, Resume:FormulatingCareerPlans,PlanningyourResumeStructuringtheResume,Contentofthe Resume, ElectronicResumes

Unit III:

Report Writing: Business reports, Types, Characteristics, Importance, Elements of structure, Process of writing, Order of writing, the final draft and check lists for reports.

Unit IV:

Vocabulary: Words often confused Words often misspelt, common errors in English.

Unit V:

Oral Presentation: Importance, Characteristics, Presentation Plan, Power point presentation, Visual aids.

Suggested Readings:

1. Bovee, and Thill, Business Communication Today, Pearson Education

2. Lesikar, R.V. &Flatley, M.E. Kathryn Rentz; Business Communication Making Connections in Digital World, 11th ed., McGraw Hill Education.

3. Shirley Taylor, Communication for Business, Pearson Education

4. Locker and Kaczmarek, Business Communication: Building Critical Skills, TMH

CCAC 201 DATABASE MANAGEMENT SYSTEM Cr L T P 4 4 0

Unit-1

Database Systems: Introducing the database and DBMS, Files and File Systems, Problems withFile System and advantages of Database Management systems. Data Models: The importance of Data models, Data Model Basic Building Blocks, BusinessRules, The evaluation of Data Models, Degree of Data Abstraction.

Unit-II

The Relational Database Model: A logical view of Data, Keys, Integrity Rules, Relational SetOperators, The Data Dictionary and the system catalog, Relationships with in the Relational Database, Data Redundancy revisited, Indexes, Codd's relational database rules.Entity Relationship Model: The ER Model, Developing ER Diagram.

Unit-III

Normalization of database tables: Database Tables and Normalization, The need for Normalization, The Normal forms and High level Normal Forms, denormalization.

Unit-IV

Introduction to SQL: Data Definition Commands, Data Manipulation Commands, Select queries, Advanced Data Definition Commands, Advanced Select queries, Virtual Tables, Joining Database Tables. Advanced SQL: Relational Set Operators, SQL Join Operators, Subqueries and correlated queries, SQL Functions, Oracle Sequences, and Procedural SQL.

Unit-V

Transaction Management and Concurrency Control: What is transaction, Concurrency control, Concurrency control with locking Methods, Concurrency control with time stamping methods, concurrency control with optimistic methods, database recovery management.

Reference Books:

1. Peter Rob, Carlos Coronel, Database Systems Design, Implementation and Management, Seventh Edition, Thomson (2007)

2. Elimasri / Navathe, Fundamentals of Database Systems, Fifth Edition, Pearson Addison Wesley (2007).

3. Raman A Mata – Toledo/Panline K Cushman, Database Management Systems,

CCA-251 DATABASE MANAGEMENT SYSTEM LAB

Perform the following operations in SQL

1. Creating and managing tables.
2. Manipulating data.
3. Defining constraints
4. Functions
5. Joins
6. Aggregate Functions
7. Sub-queries
8. Views
9. Set operators
10. Procedures

References

1. NidhiTyagi, MridulVaish, “Oracle 9i-Laboratory Manual”, ShobhitUniversity Publications,2010.
2. Ivan Bayross, “SQL, PL/SQL: The programming language with oracle”BPB,2007.

CCAC203 OPERATING SYSTEM L T P 4 0 0

I –Unit

operating Introduction: Definition of operating systems, Operating System Design Issues, types of time -sharing parallel, distributed and real–systems, Batch Systems, multi programming, time .systems, Operating system structure, Operating system components and services

ses, Interprocess Process Management: Process concept, Process scheduling, Cooperating proces processor scheduling, -communication, CPU scheduling criteria, Scheduling algorithms, Multiple .time scheduling and Algorithm evaluation-Real

II -Unit

ardware, Section problem, synchronization h-Process Synchronization and Deadlocks: The Critical System model, -Semaphores, Classical problems of synchronization, Critical regions, Deadlocks Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, .Combined approach to deadlock handling

III -Unit

Logical and Physical Address Space, Swapping, -ment: Memory ManagementStorage manage Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, .rasing, Page Size and other considerations, Demand segmentationTh

IV –Unit

File systems, secondary Storage Structure, File concept, access methods, directory ,implementation, Efficiency and performance, recovery

Disk management, Recovery, Disk structure, disk ,Disk structure, Disk scheduling methods .Space management, Disk reliability-scheduling methods, Disk management, Swap

V –Unit

Goals of protection, Domain of protection, Access -Security & Case Study: Protection and Security f access Matrix, Revocation of Access Rights, language based protection, matrix, Implementation o The Security problem, Authentication, One Time passwords, Program threats, System threats, .Threat Monitoring, Encryption. Case Study: Linux

Books:

1. Abraham Siberschatz and Peter Baer Galvin, "*Operating System Concepts",* Addision-Wesley,8th edition,2009.
2. Milan Milenkovie, "*Operating Systems, Concepts and Design*", McGraw-Hill Fifth Edition,2000.
3. Richard Peterson, "*Linux: The Complete Reference*", McGraw-Hill, sixth edition, 2007.
4. Harvey M Deital ,"O*perating Systems*", Addison-Wesley Pub. Co., Second Edition, 2007.

CCA-253 OPERATING SYSTEM-LAB

List of experiments:

1. Simulate the following CPU scheduling algorithms

a) Round Robin b) SJF c) FCFS d) Priority

2. Simulate all file allocation strategies

a) Sequential b) Indexed c) Linked

3. Simulate MVT and MFT

4. Simulate all File Organization Techniques

a) Single level directory b) Two level c) Hierarchical d) DAG

5. Simulate Bankers Algorithm for Dead Lock Avoidance

6. Write a C program to create a child process and allow the parent to display

"Hello"and the child to display "Welcome" on the screen.

7. Simulate all page replacement algorithms

a) FIFO b) LRU c) LFU Etc…

8. Simulate Paging Technique of memory management.

9. Write C programs that make a copy of a file using i)standard I/O and ii) system calls.

10. Write C programs that count the number of blanks in a text file using i) standard

I/O and ii) system calls.

CCAC 205 COMPUTER NETWORKS L T P 4 0 0

Unit-I Introductory Concepts Goals and Applications of Networks, the OSI reference model and Network Architecture, TCP/IP Architecture, Networks topology, Types of Networks, Physical Layer Transmission Media, Switching methods, ISDN.

Unit-II Connecting Devices Repeaters, Active & Passive Hubs, Head End, Bridges, Switches, Routers, Gateway. Medium access sub layer Channel allocations, Random Access overview, LAN protocols, Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI.

Unit-III Data Link Layer Elementary data link protocols, sliding windows protocols, error handling, Parity Bit Check, CRC, Checksum, Hamming Code, Hamming Distance. High Level Data Link Control (HDLC), Overview of Ethernet. Network Layer Point-to-Point networks, X.25, Layers of X.25, Routing algorithms, Congestion control algorithms, internetworking, TCP/IP packet, IP addresses, Ipv6.Internet Control Protocol ICMP, ARP, RARP, Interior Gateway routing Protocol OSPF, Exterior Gateway Protocols BGP.

Unit-IV Transport Layer: Design issues, connection management, User Datagram Protocol: UDP protocol & Header, Transmission Control Protocol: TCP protocol, TCP segment Header Format, TCP window Management, TCP Timer Management), Data Compression techniques.

Unit-V Application Layer WWW, Hyper Text Transfer Protocol, Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, TFTP, RTP, RTCP, Telnet Virtual Terminal and terminal handling, Internet and Public networks.

Reference Books:

1. A. S. Tanenbaum, Computer Networks, Prentice Hall Inc., 3rd Edition, 2000.

2. Forouzan, A. Behrouz, Data Communication and Networking, Tata Mc-Graw Hall, Special Indian Edition, 2006.

3.Comer, Computer Networks & Internet, Prentice Hall Inc., 3rd Edition, 2002.

CCA 255 COMPUTER NETWORK LAB

LIST OF PRACTICALS

1. Implementation of the Data Link layer framing method such as character stuffing and bit stuffing in C.
2. Implementation of CRC algorithm in c.
3. Implementation of hamming code in C.
4. Implementation of LZW compression algorithm in C.
5. Implementation of Checksum in C.
6. Implementation of Client –Server.
7. Performance analysis of following over LAN Trainer Kit

    i) Token bus

    ii) Token ring

    iii) Ethernet

    iv) Flow Control

a. Stop-and-wait

b. Go-back-n

    v) File transfer Protocol

SCAC 201 HTML Programming L T P 4 0 0

Unit-I: Introduction: Internet Basics communicating on the internet, internet domains, establishing connection on the internet, TCP/IP and its services, transmission control protocol, WWW, intranet, extranet.

Unit-II: The Basics: Commonly used HTML commands, text formatting, text styles, The Head, the Body, Colors, Attributes, Lists, ordered and unordered

Unit-III: Links: Introduction of links, Hyperlinks, Internal document references, External document references

Images: Putting an Image on a Page, Using Images as Links, Putting an Image in the Background

Unit IV: – Tables: Introduction, Creating a Table, Table Headers, Captions, Spanning Multiple Columns, Styling Table

Unit V – Forms: Basic Input and Attributes, Other Kinds of Inputs, Styling forms with CSS, Where to Go from Here

Book Recommended:

1. Virginia DeBolt , Integrated HTML and CSS A Smarter, Faster Way to Learn

Wiley / Sybex , 2006

2. Cassidy Williams, Camryn Williams Introduction to HTML and CSS, O'Reilly, 2015

3. Ivan Bayross, “HTML, DHTML, Java Script, Perl cgi”, BPB publication,

SCAC 251 Software Lab Based on HTML:

Q.1 Create an HTML document with the following formatting options:

I. Bold, II. Italics, III. Underline, IV. Headings (Using H1 to H6 heading styles), V. Font (Type, Size and Color), VI. Background (Colored background/Image in background), VII. Paragraph, VIII. Line Break, IX. Horizontal Rule, X. Pre tag

Q.2 Create an HTML document which consists of:

I. Ordered List, II. Unordered List III.

Q.3 Create an HTML document which implements Internal linking as well as external linking.

Q.4 Create a table using HTML which consists of columns for Roll No., Student‘s name and grade.

Q.5 Create a table using colspan and rowspan.

Q.6 Create a form using HTML which has the following types of controls:

I. Text Box, II. Option/radio buttons, III. Check boxes, IV. Reset and Submit buttons

Q.7 Create HTML documents having multiple frames.

SCAC 203 **PHP Programming** **L T P 4 0 0**

UNIT I : Introduction to PHP -Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression.**Decisions and loop** Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.

UNIT II Function: What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function. **Array** Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function.

UNIT III: Handling Html Form with Php: Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission. **Working with file and Directories:** Understanding file& directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.

UNIT IV: Session and Cookie -Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.

UNIT V: Database Connectivity with MySql: Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.) **Exception Handling** Understanding Exception and error, Try, catch, throw. Error tracking and debugging.

GCAC 201 **Multimedia Technology** **L T P Cr**
3 1 0 4

Unit I

Introduction to Multimedia Evolution of Multimedia and its objects, Scope of multimedia in business & work, Production and planning of Multimedia applications. Multimedia Application.

Unit-II

Multimedia Hardware & Software Macromedia products, Basic drawing techniques,
Basic tools , painting and drawing tools , OCR software, sound editing programs, animation devices Multimedia requirements-Hardware, software, and training Macintosh verses PC, the Macintosh platform, PC platform connections, memory and storage devices, input devices output hardware communication devices.

Unit-III

Production Building blocks Text using text in multimedia , computer and text font editing and design tools , hyper media and hyper text , sound multimedia system sounds MIDI verses Digital audio, audio file formats , working with sound in windows, notation interchange file format , adding sound

Unit-IV: Production tips

Image creation , making stiff images, images color, image file format, animation-principles of animation, making workable animation video using video, Broad cast video, standard integrating computers and TVS shooting and editing video using recording formats , video tips , video compression

Unit-V : Multimedia project development and case studies

Planning Costing, Proposal preparation Project planning estimating, RPFs and bid proposals designing, producing acquiring and CD-ROM technology and standards
Designing for the World Wide Web working on the web, Text for the web, images for the web, sound for the web, animation for the web.

References

1. 1.Multimedia Making it work TMH by Tay Vaughan
2. 2.Andreas Haizinger "Multimedia Basics",Vol-1 to Vol-III Firewall Media , New Delhi
3. 3.Sleinreitz, Multimedia Systems", Addison Wesley

GCAC 203	Introduction to Programming	L	T	P	Cr
		3	1	0	4

Unit-I

Computer System: Basics of computer systems, Generations and history, Classification of computers, capability and limitations of computer systems

Hardware Organization: Anatomy of a digital computer, CPU, Accumulator and instruction characteristics.

Memory Units: Hierarchy, primary memory-RAM, ROM, cache; Auxiliary storage devices: magnetic tapes and disks, hard disks, floppy disks, CD-ROM.

Unit-II

Input and Output Devices: Input devices: Keyboard, MICR, OCR, OMR, Digitizer, mouse, light pen, and offline input devices; Output Devices: Printers-impact printers: line-character printers, Non impact printers -ink-jet, laser printers; Display devices.

Number System: Decimal , binary, octal, hexadecimal numbers and their inter-conversions; Representation of information inside the computers, Integer representation- Signed 1's and signed 2's complement representation, Floating point representation, Codes: BCD, ASCII, ISCII.

Unit-III

Basics of Programming Languages and Operating Systems: Low level programming languages: Machine and Assembly languages, High level languages-procedure oriented languages, Translation process- Assembler, Complier, Interpreter.

Graphical User Interface and Windows- Working with windows operating systems, Introduction to system software systems, Operating System Principles. Memory Management, Types of Operating Systems.

Unit-IV

Introduction to 'C' : History, Characters used in C, Structure of a C program, Data types, C tokens, Basic input output through printf( ) and scanf( ), Comments, Escape sequence, Use of Editor, Compiling and Linking.

Operations and Expressions: Operators- arithmetic, relational and logical, Order of evaluation of expression, Special Operators: assignment, bitwise shift Operators.

Problem Solving and Programming Methodology: Algorithms, Programming methodology, Debugging,

Flow of Control and I/O Functions: Compound statement, Selective execution, Repetitive execution,Single character functions, String-based Functions, More discussion on scanf( ) &printf( ) functions.

Unit-V

Loop Constructs: For loop, While loop, go to break, switch statement, Arrays and Structures: One dimensional array, Strings, Array initialization; Structure, User defined data types.
Introduction of functions and library functions.

References:

1. Sharma, A.K. *Fundamentals of Computers and Programming with C*. DhanpatRai Publications, New Delhi, 2005.
2. Williams, Brian K. and Stacy C. Sawyer. *Using Information Technology*. TMH, New Delhi, 2003.
3. Curtin, Dennis P., Kim Foley, KunalSen, and Cathleen Morin. *Information Technology* TMH,1998.
4. King, K.N. *C Programming – A Modern Approach*. WW Norton & Co., 1996.

5. Ritchie, Dennis M. and Brian W. Kernigham. *The C Programming Language*. PHI, New Delhi, 1988.

CCAC 202 SOFTWARE ENGINEERING L T P 4 0 0

UNIT – I

Introduction: Software engineering definition and paradigms, Program Vs Software ,Software Crisis, Software Characteristics, Software life cycle models: Why use a Life Cycle Model, Waterfall Model; Iterative Model; Prototyping Model; Evolutionary Model; Spiral Model;

UNIT – II

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like Interview & Brainstorming, requirements analysis using DFD, Data dictionaries & ER Diagrams.

UNIT-III

Software Project Planning: Size Estimation: LOC & Function Count, Risk Management.

Software Design: Modularity**:** Cohesion & Coupling, Function Oriented Design, Object Oriented Design.

UNIT-IV

Software Testing: Definition, Types of Testing, Verification vs Validation testing , Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing.

UNIT –V

Software Quality: **Software Quality, CMM and ISO 9000;**

Software Maintenance: Types of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management.

References

1. Software Engineering Pressman
2. System Analysis and Design Jalote.
3. Software Engineering Sommerville
4. System Analysis & Design Elias Awad
5. Object Oriented Modeling & Design James Rumbaugh
6. Analysis & Design of Information System James Senn
7. Analysis & Design of Information System V. Rajaraman
8. Software Engineering Concepts Richard Fairley

CCAC-252 SOFTWARE ENGINEERINGLAB

The student has to select one of the project listed below:

1. Health Care Insurance
2. Attendance Management System
3. Paylogs
4. Air Ticketing System
5. E-Banking
6. Online Recruitment System
7. Online Trading System
8. Resource Manager
9. Warehouse Management System
10. Grievance Handling System.

Perform the different phases of software development life cycle on the selected project.

a. Feasibility study and requirement analysis
b. Design (students are advised to use object oriented approach)
c. Coding
d. Testing
e. Installation and Maintenance (optional).

CCAC 204 DESIGN & ANALYSIS OF ALGORITHMS L T P 4 0 0

Unit-I

Introduction to Algorithms Analysis of algorithm, Design of algorithm, complexity of algorithm, asymptotic notations, Recurrences. Sorting in polynomial time: Insertion sort, Merge sort, Quick sort, heap sort. Sorting in linear time: counting sort, bucket sort, radix sort. Medians and order statics.

Unit-II

Elementary data structure binary search tree. **Advanced data structure** Red Black tree, Augmenting data structure, binomial heaps, B-tree, Fibonacci heap and data structure for disjoint sets.

Unit-III

Advanced design and analysis techniques Dynamic programming, Greedy algorithm, Backtracking, Amortized analysis.

Unit-IV

Graph algorithm Breadth first search, Depth first search, Minimum spanning tree, Kruskal's algorithms, Prim's algorithms, Single source shortest path, All pair shortest path, Maximum flow and Traveling salesman problem.

Unit-V

String matching: The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm.

Randomized algorithms, string matching, NP-hard and NP-completeness, Approximation algorithms.

References Books :

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein,*Introduction to Algorithm,* Tata Mc-Graw Hill, 2nd Edition, 2003.
2. Horowitz Sahani, *Fundamentals of Computers Algorithm*, Golgotia Publications, 1998.
3. Parag H. Dave, Himanshu B. Dave, *Design and Analysis of Algorithms*, Pearson

CCAC-254 DESIGN &ANALYSIS OF ALGORITHMS LAB

1. Write a program showing the implementation of selection sort algorithm using recursively problem solving approach.
2. Write a program showing the implementation of insertion sort algorithm using recursively problem solving approach.
3. Write a program showing the implementation of merge sort algorithm using divide-conquer-combine problem solving approach.
4. For a given array A= {234,233,455,423,567,656}, arrange the elements of the array A in increasing order using radix sort algorithm.
5. Write the implementation of the searching algorithm as described below-

   First of all arrange the elements of the given array in increasing order, then find the median element, if the key element is smaller then the median element then perform the searching on the left of the median element else perform the searching on the right of the median element as described above.

6. Create a linked list and show all the operations on the linked list such as – insertion, deletion and traversing.
7. Create a doubly linked list and show all the operations on the doubly linked list such as – insertion, deletion and traversing.
8. Create a binary search tree and perform the searching operation on binary search tree.
9. Consider the string s=”abcdabcerfabcderabc”, write a program using naïve string matching to find out how many times the pattern p=”abc” found in the string s.
10. Given a text string t and a pattern string p, find all occurrences of p in t using rabin-krap algorithm.

CCAC 206 OBJECT ORIENTED PROGRAMMING USING C++ L T P Cr
3 1 0 4

Unit I

Introduction to OOPs and C++Introduction to OOPs, Features & Advantages of OOPs, Different element of C++ (Tokens, Keywords, Identifiers, Variable, Constant, Operators, Expression, String).

Unit II

Program Control Statements –Sequential Constructs, Decision Making Construct, Iteration / Loop Construct, Arrays, Functions (User defined Function, Inline Function, Function Overloading), User Defined Data Types (Structure, Union and Enumeration).

Unit III

Class, Object, Constructor &Destructor Class, Modifiers (Private, Public & Protected), Data Member, Member Function, Static Data Member, Static Member Function, Friend Function, Object, Constructor (Default Constructor, Parameterized Constructor and Copy Constructor), Destructor.

Unit IV

Pointer, Polymorphism & Inheritance Pointer (Pointer to Object, this Pointer, Pointer to Derive Class), Introduction to Polymorphism (Runtime Polymorphism, Compiletime Polymorphism), Operator Overloading, Virtual Function, Inheritance (Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance), Virtual Base Class, Abstract Class.

Unit V - File Handling, Exception Handling - 10 Hrs (15 Marks)

Files I/O, Exception Handling (Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Re-throwing an Exception).

BOOKS SUGGESTED

1. E. Balaguruswami – Object Oriented programming with C++
2. Kris James – Success with C++
3. David Parsons – Object Oriented programming with C++

SCAC-202 **Linux/Unix Programming** **Cr L T P**
4 3 1 0

UNIT I:
Introduction to Unix/Linux Operating System, Difference between Linux, Unix and other operating System. Functions of OS

UNIT II:
Featuters and Architecture of Unix/Linux Operating System, Various Distribution available in market, Installation, Booting and Shut down process.

UNIT III:
System Process, External and Internal Command, Creation Of Partition in Operating System, Process and its creation phases for fork(),exec(),wait().

UNIT IV:
User Management and File System, Types of users, creating users, Granting rights , user management commands, files quota and various file system available, File system management and layout, file permissions ,login process ,managing disk quota, Links(rad links, symbolic inks)

UNIT V:
Shell introduction and Scripting , What is Shell and various types of Shells, Various Editors present in Linux, Different modes of Vi editor , What is Shell Script, Writing and Executing Shell Scripting, shell variable, system calls , Using System calls, pipes and filters, Decision making in shell script, loops I shell. Functions utility program,(cut,copy,paste,join),Pattern Matching Utility

Text Books:
1. Deitel&Deitel, JAVA : How to Program, Pearson education , 7e (2008)

2. Deitel&Deitel, Internet and World Wide Web How to Program, Pearson education, 3e ,(2005)

Reference Books:
1. Ivan BayRoss, Web Enabled Commercial Application using Java 2, bpb publication (1998)

2. David Flanagan , Java Script The Definitive Guide, O‟relly, 5e (2006)

SCAC 204 **Programming in Visual Basic** **L T PCr**

3 1 0 4

UNIT – I

Visual Basic: Introduction, Variable Names, Data Types, constants, Assignment, statements, Object oriented concept , Object and classes, If-then, If-then-else, if then-else if else, expression, print statement, arrays, variable declaration, built-in & User defined types, Subroutine and functions, Boolean Operators, Arithmetic Operator, For- .next, do loop, while-wend, procedure/Public, Private and Static & Dim Statement.

UNIT – II

Structure of VB program, Forms & built in controls, Properties and events, Code Module, Scale Modes, Printer Object (Printing text, setting Fonts, graphics), Common dialog Boxes, picture controls, image-controls, send keys, MS-Common Controls, Error Handling, Classes, Control Arrays, MDI, SDI. **File Handling** – Text and Binary Files, Files System Orbit Object.

UNIT – III

Database Interface: Review of ANSI SQL, ODBC, Pass through ODBC, DAO, MS-Jet Engine, DB-Engine, Workspaces, Databases, record sets, Data bound controls, ActiveX controls, ADO, Active X Data controls, RDO Data view Window, Data Environment Designer, Crystal Report and Data Report Utility Using Visual Basic (VB) for Transaction Management, Concurrency Control, Interfacing with RDBMS, Backend Stored procedure Usage.

UNIT – IV

Help Writing: Building a help, System, Building & Topics File, Labeling the topics, Creating a help project, primary & secondary help window, linking to internet, Adding Multimedia, Using HTML help workshop, content sensitive help, help file. Overview of COM/DCOM using Windows API Functions, MAPI interface, Microsoft Transaction Server, Visual source safe, VB Script.

UNIT – V :Introduction to .NET framework Introduction , Common language runtime, Common Type System, Common Language Specification, The Base class Library, The .NET class library intermediate language, Just in –time compilation, garbage collection , Application installation & Assemblies , WEB Services , Unified classes

References

1. .1998 ,BPB Publications ,"6.0Mastering Visual Basic "E. Petroutsos,
2. .Techmedia, 1998 ,"Teach Yourself Visual Basic 6 in 21 Days"Perry, Greg,
3. (Microsoft),"Applied .Net framework programming"Jeffrey Richter,

4. ,”6Mastering Database Programming with Visual Basic “E. Petroutsos, BPBPublications, 2000
5. .Techmedia, 1998 ,”6s Guide to Visual Basic ’er NortonPet“Norton Peter,

GCAC 202 **DISCRETE STRUCTURES** **Cr L-T-P**

4 3 1 0

Unit-I

Set : Definition of sets, countable and uncountable sets, Venn Diagrams, Power set, Partition of sets, cardinality, inclusion-exclusion principles, proofs on some general identities on sets. **Relation-**Definition, types of relation, composition of relations, pictorial representation of relation, equivalence relation, partial ordering relation. **Function-**Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions. **Theorem Proving Techniques** mathematical induction, pigeonhole principle, proves by contradiction.

Unit-II

Algebraic Structures: Definition, Properties, types: Semi Group, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, cosets, factor group, permutation groups, Normal subgroup, Homomorphism and isomorphism of groups, example and standard results, rings and fields.

Unit-III

Posets, Hasse Diagram and Lattices: Introduction, ordered sets, Hasse diagram of partially ordered set, isomorphic ordered sets, well ordered set, properties of Lattces, bounded lattices and Complemented lattices. **Boolean Algebra** Basic definitions, sum of products and product of sums forms, Logic gates and Karnaugh maps.

Unit-IV: Propositional Logic: Proposition, logic operators, first order predicate logic, truth tables, tautologies,arguments,contradictions, logical implications, logical equivalence, predicates, universal and existential quantifiers.

Unit-V : Graphs &Combinatorics: Recurrence Relation, Generating function, simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, Euler graphs, Hamiltonian path and circuits,Adjacency and Incidence Matrices Graph coloring number, chromatic number, **Tree**Definiton, Rooted tree, properties of trees, binary search tree, tree traversal.

Reference Books:

1. SeymourLipschutz& M.L. Lipson, *Discrete Mathematics*, Tata McGraw Hill, 2nd Edition, 1999.
2. Trembley, J.P & R. Manhor, *Discrete Mathematical Structure with Application to Computer Science*, McGraw Hill, 1997.

3. Kennth H. Rosen, *Discrete Mathematical and its applications,* McGraw Hill, 4th Edition, 2002.
4. JL Morr, A Kandal and TP Baker, *Discrete Mathematics for Computer Scientists* and Mathematics, PHI, 1999.
5. Deo, Narsingh, *Graph Theory With application to Engineering and Computer Science*, PHI, 2007

GCAC-101A **Engineering Mathematics II**

Unit 1: Differential Equations

- **Ordinary Differential Equations (ODEs)**: Basic concepts and solutions.
- **Applications**: Real-world problems modeled with ODEs.

Unit 2: Partial Differential Equations (PDEs)

- **Introduction**: What PDEs are and their classifications.
- **Solution Methods**: Basic techniques like separation of variables.

Unit 3: Vector Calculus

- **Vector Functions**: Understanding vector fields.
- **Integrals**: Line and surface integrals, including Green's and Stokes' Theorems.

Unit 4: Complex Variables

- **Complex Functions**: Introduction and properties of complex numbers.
- **Integration**: Basic techniques for integrating complex functions.

Unit 5: Numerical Methods

- **Root Finding**: Simple methods like Bisection and Newton-Raphson.
- **Numerical Integration**: Basic methods such as the Trapezoidal and Simpson's rule.

Unit 6: Laplace Transforms

- **Definition**: Understanding the Laplace transform.
- **Applications**: How to use Laplace transforms in solving differential equations.

Textbooks:

1. *Advanced Engineering Mathematics* by Erwin Kreyszig
2. *Engineering Mathematics* by B.S. Grewal

Reference Books:

1. *Higher Engineering Mathematics* by B.V. Ramana
2. *Engineering Mathematics* by John Bird

GCAC-101B Discrete Mathematics II

Unit 1: Graph Theory

- **Basic Concepts**: Definitions of graphs, vertices, edges, and types of graphs (simple, directed, weighted).
- **Graph Traversal**: Depth-First Search (DFS) and Breadth-First Search (BFS).

Unit 2: Trees

- **Tree Basics**: Definitions and properties of trees.
- **Binary Trees**: Types (full, complete, binary search trees) and traversal methods (in-order, pre-order, post-order).

Unit 3: Combinatorics

- **Counting Principles**: Basic counting techniques, permutations, and combinations.
- **Binomial Theorem**: Understanding the binomial coefficients.

Unit 4: Boolean Algebra

- **Basics of Boolean Algebra**: Definitions and operations (AND, OR, NOT).
- **Applications**: Use of Boolean algebra in logic circuits and simplifying expressions.

Unit 5: Relations and Functions

- **Relations**: Types (reflexive, symmetric, transitive) and properties.
- **Functions**: Definitions, types (injective, surjective, bijective), and compositions.

Unit 6: Recurrence Relations

- **Definition**: Understanding recurrence relations and their solutions.
- **Applications**: Use in algorithm analysis and computer science.

Textbooks:

1. *Discrete Mathematics and Its Applications* by Kenneth H. Rosen
2. *Discrete Mathematics* by Richard Johnsonbaugh

Reference Books:

1. *Discrete Mathematics* by D. S. Malik and J. M. Mordechai
2. *Mathematics for Computer Science* by Eric Lehman, F. Thomson Leighton, and Albert R. Meyer

GCAC-101C **Basic Mathematics II**

Unit 1: Algebra

- **Basic Algebraic Operations**: Simplifying expressions, solving linear equations, and inequalities.
- **Polynomials**: Operations on polynomials, factoring, and solving quadratic equations.

Unit 2: Trigonometry

- **Trigonometric Ratios**: Understanding sine, cosine, tangent, and their applications.
- **Trigonometric Identities**: Fundamental identities and solving basic trigonometric equations.

Unit 3: Calculus

- **Differentiation**: Basic rules of differentiation, application of derivatives to find slopes and rates of change.
- **Integration**: Understanding definite and indefinite integrals and their applications.

Unit 4: Matrices and Determinants

- **Matrices**: Definitions, types of matrices, and basic operations (addition, subtraction, multiplication).
- **Determinants**: Calculation of determinants and their properties, and applications in solving linear equations.

Unit 5: Statistics and Probability

- **Basic Statistics**: Measures of central tendency (mean, median, mode) and measures of dispersion (range, variance, standard deviation).
- **Probability**: Basic concepts of probability, counting principles, and conditional probability.

Textbooks:

1. *Basic Mathematics* by Serge Lang
2. *Elementary Algebra* by Harold R. Jacobs

Reference Books:

1. *College Mathematics* by Robert H. Bartle

2. *Mathematics for Class XI & XII* by R.D. Sharma

GCAC 204 Information Security and Cyber Law L T P 4 0 0

Unit I INTRODUCTION 1. Basic concept of Technology and Law : Understanding the Technology, Scope of Cyber Laws, Cyber Jurisprudence 2. Understanding Electronic Contracts : The Indian Law of Contract, Types of Electronic Contracts, Construction of Electronic Contracts

Unit II IPR IN CYBER SPACE 1. Copyright in Information Technology: Copyright in internet, Software Piracy, Multimedia and copyright issues. 2. Patents : Indian position on computer related patents, International context of patents. 3. Trademarks : Trade mark Law in India, Infringement and passing off.

Unit III INFORMATION TECHNOLOGY ACT 2000 : Digital Signature, E-Governance, Regulation of Certifying Authorities, Duties of Subscribers, Penalties and Adjudication, Offences under the Act, Making of Rules and Regulation.

Unit IV CYBER CRIMES 1. Understanding Cyber Crimes : Crime in context of Internet, Types of Crime in Internet 2. Indian Penal Law & Cyber Crimes : Fraud, Hacking, Mischief, Tresspass, Defamation, Stalking, Spam

Unit V Issues of Internet Governance : Freedom of Expression in Internet, Issues of Censorship, Hate Speech, Sedition, Libel, Subversion, Privacy Issues, International position on Free Speech in Internet BOOKS

REFERENCES

1. Gerold R.Ferresc, Cyber Law(Text & Cases)
2. Prof. S.R. Bhansali, Information Technology Act Rodney
3. D.Ryder, Guide to Cyber Law
4. Vakul Sharma , Cyber Crime.

CCAC 301 INTERNET TECHNOLOGY L T P 3 1 0

Unit-I

Internet Basics communicating on the internet, internet domains, establishing connection on the internet, client IP address, TCP/IP and its services, transmission control protocol, WWW, intranet, extranet.

Unit-II

Introduction to HTML commonly used HTML commands, text formatting, text styles, Lists – types of lists, adding graphics to HTML documents, tables, links – external document references, internal document references, frames.

Unit-III

Javascriptjavascript in web pages, the advantages of javascript, building javascript syntax – data types, type casting, creating variables, javascript array, operators and expressions, conditional checking, fuctions – build in functions, user defined functions, dialog boxes – alert dialog box, prompt dialog box, confirm dialog box, javascript document object model – understanding objects, forms object methods.

Unit-IV

JSPjsp execution model, components of jsp, using java beans in jsp, directives in jsp-page directive, include directive, taglib directive, standard action tags-<jsp:include>,<jsp:forward>,<jsp:init>, implicit objects in jsp-application, session, pagecontext, out, request, response, error handling in jsp, database connectivity using jsp.

Unit-V

Active Server Pages: Basics, Integrating Script, ASP Objects and Components, configuring and troubleshooting,: Request and response objects, Retrieving the contents of a an HTML form, Retrieving a Query String, Cookies, Creating and Reading Cookies. Using application Objects and Events.

References

1. Ivan Bayross, “HTML, DHTML, Java Script, Perl cgi”, BPB publication,
2. James Godwill, “Pure JSP”, Sams publications, edition-2000
3. Bryan Basham, “Head First in Servlets and Jsp”, O’Riellypublications,March 2008.

INTERNET TECHNOLOGY LAB

CCAC-351

1. Create a registration form in html containing student name, student roll no, branch, session, email id, phone no., address etc.
2. Create a document with two links to an external document. The first link should lead to the beginning of the external document. The second link should lead to a particular section in the external document.
3. Create a specimen of corporate web page. Divide the browser screen into two frames, The frame on the left will be a menu consisting of hyper links. Clicking on one of these links will lead to a new page, which must open in the target frame, which is on the right hand side.
4. Using scripting language validate a registration form whether the user enter character in the username textfield, in the password filed the no. of characters not more than 6.
5. Create a web page using two image files, which between one another as the mouse pointer moves over the images.
6. Crate a web page which accepts user information and user comments on the web site. Design the web page using form elements and check if all the text fields have begin entered with data else display an alert.
7. Create a JSP for inserting a employee information in a database.
8. Create an application which displays how many times a JSP is visited.
9. Create a JSP showing the use of application implicit object.
10. Create a jsp showing the use of jsp error handling.

CCAC 303	Software Project Management	L T P Cr
		3 1 0 4

Unit - I

Introduction and Software Project Planning

Fundamentals of Software Project Management (SPM), Need Identification, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework,

Unit – II

Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation models.

Work Breakdown Structure (WBS), Scheduling techniques, Network Diagrams: PERT, CPM and Gantt Charts.

Unit - III

Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators.

Unit - IV

Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM) and SQA Activities.

Unit - V

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control.

Reference Books:

1.Bob Hughes and Mike Cotterell, "*Software Project Management"*, Tata McGraw-Hill, Fifth Edition, 2008.

2.Roger S. Pressman, "*Software Engineering – A Practitioner's approach*", McGraw-Hill, Seventh Edition, 2009.
3.Walker Royce, "*Software Project Management*", Addison Wesley, Seventh Edition, 2003.
4.M. Cotterell, **"***Software Project Management"*, Tata McGraw-Hill, Fourth Edition, 2005.
5.S. A. Kelkar, "*Software Project Management",* Prentice-hall Of India, Fourth Edition ,2007.

KNOWLEDGE MANAGEMENT& EXPERT SYSTEM

DCAC 301 **Cr. L T P**

4 3 1 0

Unit - I

Introduction to knowledge Management Distinction between data , information & knowledge. Concept of knowledge creation, Intellectual Capital Creation, Human Capital, Customer Capital and Organizational Capital

Unit-II

Socio-cultural aspects & organizational aspects Tacit & Explicit knowledge & Knowledge Organization . Knowledge Storage and Distribution, KM tools, Data warehouse, Data mining, knowledge management evaluation & Valuation of Knowledge.

Unit-III

K- Sharing Practices and Barriers. K – culture, KM In Indian organizations and MNC. Learning Organizations & Organizational Learning

Unit – IV

Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit-V

K-Initiative, K-Strategic issues in knowledge management, K-Commerce

Reference Books:

1. SudhirWarrier, "*Knowledge Management*", Vikas publishing House, New Delhi, First edition, 2007.

2. Thotharti Raman, "*Knowledge Management*", Excel Books ,New Delhi, First Edition,2004.

3. Stuart Barnes *"Knowledge Management Systems: Theory & Practice*", Thomson Learning Press, New Delhi, First Edition, 2002.

4. Ronald Maier, *"Knowledge Management System"*, Springer, Germany, Second Edition,2002.

DCAC-301 A **Knowledge Management Strategies**

Unit 1: Foundations of Knowledge Management

- Definition and Importance of Knowledge Management
- Types of Knowledge: Explicit and Tacit
- Key Concepts and Principles of KM

Unit 2: Knowledge Management Processes

- Knowledge Creation
- Knowledge Sharing
- Knowledge Application

Unit 3: Tools and Technologies for KM

- Information Systems in KM
- Technology Support: Databases, Intranets
- Collaborative Tools and Social Media

Unit 4: Organizational Culture and Knowledge Management

- Role of Organizational Culture in KM
- Knowledge Management Strategies
- Building a Learning Organization

Unit 5: Challenges and Future of KM

- Barriers to Effective KM
- Trends in KM: AI, Big Data, and Emerging Technologies
- Future Directions in Knowledge Management

Textbooks:

1. *Knowledge Management: An Evolutionary View* by David J. Skyrme
2. *The New Knowledge Management* by Chris C. C. Wong

Reference Books:

1. *Knowledge Management in Organizations* by Michael A. J. Cowan
2. *The Knowledge-Creating Company* by Ikujiro Nonaka and Hirotaka Takeuchi

DCAC-301 B Information Systems and Technology

Unit 1: Introduction to Information Systems

- Definition and Types of Information Systems
- Components of Information Systems
- Role of Information Systems in Organizations

Unit 2: Data Management

- Data Collection, Storage, and Retrieval
- Database Management Systems (DBMS)
- Data Warehousing and Data Mining

Unit 3: Information Technology Infrastructure

- IT Components: Hardware, Software, Networks
- Network Architecture and Security
- Cloud Computing and Virtualization

Unit 4: Systems Development and Implementation

- System Development Life Cycle (SDLC)
- Agile and Waterfall Methodologies
- Testing, Deployment, and Maintenance

Unit 5: Emerging Technologies in Information Systems

- Impact of Artificial Intelligence and Machine Learning
- Internet of Things (IoT) and Big Data
- Future Trends in Information Systems

Textbooks:

1. *Management Information Systems* by Kenneth C. Laudon and Jane P. Laudon
2. *Information Systems for Managers* by Gabe Piccoli

Reference Books:

1. *Information Technology for Management* by Efraim Turban
2. *Systems Analysis and Design* by Alan Dennis and Barbara Wixom

DCAC-301 C **Organizational Learning**

Unit 1: Understanding Organizational Learning

- Definition and Importance of Organizational Learning
- Theories of Learning in Organizations
- Learning Organizations vs. Traditional Organizations

Unit 2: Knowledge Creation and Sharing

- Knowledge Management Frameworks
- Knowledge Creation Processes: SECI Model
- Sharing Knowledge: Best Practices and Tools

Unit 3: Learning Culture and Leadership

- Role of Leadership in Fostering Learning
- Creating a Learning Culture
- Assessing Organizational Learning

Unit 4: Training and Development

- Employee Development Strategies
- Learning and Development Programs
- Evaluating Training Effectiveness

Unit 5: Measuring and Managing Organizational Learning

- Metrics for Assessing Learning Outcomes
- Tools and Techniques for Evaluation
- Continuous Improvement in Learning Processes

Textbooks:

1. *The Fifth Discipline: The Art and Practice of the Learning Organization* by Peter M. Senge
2. *Organizational Learning: Creating, Retaining, and Transferring Knowledge* by William H. Starbuck

Reference Books:

1. *The Learning Organization: A Cultural Change Agenda* by David A. Garvin
2. *The Knowledge-Creating Company* by Ikujiro Nonaka and Hirotaka Takeuchi

DCAC-301 D **Emerging Trends in Knowledge Management**

Unit 1: Current Trends in Knowledge Management

- Overview of Emerging Trends
- Impact of Technology on KM Practices
- AI and Machine Learning in KM

Unit 2: Social Media and Knowledge Sharing

- Role of Social Media in Knowledge Management
- Building Communities of Practice
- Collaboration Tools and Platforms

Unit 3: Big Data and Knowledge Management

- Understanding Big Data in the Context of KM
- Data Analytics for Knowledge Management
- Case Studies on Big Data Applications

Unit 4: Knowledge Management Frameworks and Models

- Popular KM Models and Frameworks
- Implementing a KM Framework
- Best Practices in KM Implementation

Unit 5: Future Directions and Challenges

- Ethical Considerations in KM
- Challenges in Implementing KM Systems
- The Future of Knowledge Management

Textbooks:

1. *Knowledge Management: A New Challenge for Tomorrow's Managers* by Michael J. Stankosky
2. *Emerging Trends in Knowledge Management* by Klaus North

Reference Books:

1. *The New Knowledge Management: The Challenge of Change* by David J. Skyrme
2. *Knowledge Management: Systems and Processes* by David J. Pauleen

DCAC 303 **Data Mining** **L T P Cr**
3 1 0 4

Unit - I

Data Warehousing: Data-ware housing: Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Stars, Snow Flakes, Fact Constellations, Data marts, 3 Tier Architecture of Data Warehouse, Introduction to OLAP servers.

Unit - II

Data Mining: Motivation(for Data Mining), Definition & Functionalities, knowledge discovery steps,Architecture , Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description.

Data Processing: Requirement for pre processing, Data Cleaning and its various techniques, Data Integration and Transformation,Data Reduction:- Data Cube Aggregation, attribute subset selection, Numerosity Reduction, Concept hierarchy generation.

Unit - III

Data Generalization and Frequent Patterns: Attribute oriented induction Concept Description and Data Generalization, implementation of AOI, presentation of derived generalization and class description, Mining Class comparisons. Mining frequent patterns, A priori Algorithm, F P Growth, Mining various kind of Association rule.

Unit - IV

Classification and Predictions:

Introduction, Classification by Decision tree induction, Bayesian Classification, Rule- based Classification, Classification methods K-nearest neighbor classifiers. **Cluster analysis:** requirement of clustering in data mining, Data types in cluster analysis, Categories of clustering methods, Partitioning methods: K-mean and K- mediods. Hierarchical Clustering: agglomerative and divisive clustering, brief introduction to different clustering techniques.

Unit - V

Applications and Trends in data mining: Benefits of data mining, Data Mining Applications: in retail industry banking and finance, and telecommunication industry Social impact on data mining, trends in data mining. Data mining interface,

Reference Books:

1. Jiawei Han, MichelineKamber, "*Data Mining Concepts & Techniques*" Elsevier,2nd edition 2010.
2. M.H.Dunham, "*Data Mining :Introductory and Advanced Topics*", Pearson Education,1st edition ,2007.

3. Sam Anahory, Dennis Murray, "*Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems* ", Pearson Education, 1st edition, 2008

SYSTEM PROGRAMMING

DCAC 305 **Cr L-T-P**

4 3-1-0

Unit - I

Introduction To PC Architecture (Intel Pentium, PC Hardware, segments and addressing, Registers, Assembly Language Basics, Machine Addressing, special DEBUG features, Data Definition Directives, Addressing Formats, COM Programs.

Unit – II: Program Logic And Control Jmp, Loop and conditional jump Instructions, Boolean operations, Shifting, Rotating, Keyboard And Screen Processing, String Operations, Arithmetic Operations and Table Processing, Searching, sorting.

Unit - III

Macro Working and Linking, Macro Definition, The LOCAL Directive, Reception Directives, Conditional Directives, Intra-segment and Inter-segment calls, passing parameters, Advanced Screen and Keyboard Processing, BIOS Interrupt 16H for Keyboard input, Extended Function Keys.

Unit – IV: Disk Processing Disk Organization, File allocation Table, File Control Block, Sequential Reading of a Disk File, Random Processing, Miscellaneous disk Processing Features, File Handlers and Extended DOS functions, BIOS Disk Operations, Dos Memory Management, Program Segment Prefix, DOS Memory Control, Program loader, program overlays, Resident programs.

Unit – V : Assemblers And Macroprocessor, Design of Assembler, Data Structure, format of Databases, Algorithm, Macro instructions, Features of a macro facility, Atwopass algorithm and a single pass algorithm. LOADERS, Compile-and-go Loaders, General Loader Schemes, Absolute Relocating and Direct-Linking loaders.

Reference Books:

1. Peter Abel, "*IBM PC Assembly Language and Programming"*, Pearson Education, 5th Edition, 2009.

2. John J. Donovan," *Systems Programming"*, Tata McGraw-Hill, Fourth Edition,6th reprint, 2009.

3. Leland L.Beck, D. Manjula, "*System Software - An Introduction to System Programming"*, Pearson Education, 3rd Edition, 2009.

4. D. M. Dhamdhere, *"System Programming and Operating Systems"*, Tata McGraw-Hill, 2nd Edition, 2008.

DCAC 307 DIGITAL IMAGE PROCESSING L T P Cr
3 1 0 4

Unit - I

Introduction and Fundamentals, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.. Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering;Smoothing - Mean filter, Ordered Statistic
Filter; Sharpening – The Laplacian.

Unit - II

Image Enhancement in Frequency DomainFourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters –Gaussian Highpass Filters; Homomorphic Filtering.

Unit - III

Image Restoration: A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering– Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

Unit - IV

Color Image Processing: Color Fundamentals, Color Models, and Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.
Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Unit - V

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting
Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector performance, Line Detection, Corner Detection. Feature Extraction: Representation, Topological , Geometrical attributes.

Reference Books:

1. Rafael C. Gonzalvez and Richard E. Woods," Digital Image Processing", Pearson Education 2nd edition,Pearson Education2009.
2. R.J. Schalkoff, "Digital Image Processing and Computer Vision", John Wiley and Sons NY,2nd edition, reprint 2009.

3. A.K. Jain,"Fundamentals of Digital Image Processing", Prentice Hall, Upper Saddle River, NJ, 2nd edition 2002.

CCAC-351 **Internet Technologies Lab**

1. Create a simple web page using HTML.
2. Design a web page using CSS for layout and styling.
3. Implement basic JavaScript functions to manipulate HTML elements.
4. Create a responsive webpage using media queries.
5. Design a form using HTML and validate it using JavaScript.
6. Implement an AJAX request to fetch data from an API and display it on the webpage.
7. Create a simple PHP script that displays "Hello, World!"
8. Connect to a MySQL database and retrieve/display data using PHP.
9. Develop a simple RESTful API using PHP.
10. Host a simple website on a cloud server (like Heroku or AWS).
11. Create a responsive webpage using the Bootstrap framework.
12. Integrate a third-party API (like Google Maps or Weather API) into a webpage.
13. Install and set up a basic CMS (like WordPress).
14. Implement basic security measures in a web application (input validation, sanitization).
15. Deploy a simple web application on a cloud server.

CCAC-353 **Software Project Management Lab**

1. Create a project charter and define project goals.
2. Develop a WBS for a sample project.
3. Use software tools to create a Gantt chart for project scheduling.
4. Identify and assess risks for a project.
5. Prepare a budget for a project using estimation techniques.
6. Simulate an Agile sprint planning session.
7. Create and manage a Scrum board for a small project.
8. Develop a quality management plan for a project.
9. Identify stakeholders and perform a stakeholder analysis.
10. Develop a change management plan for a project.
11. Use software tools to track project progress and update status.
12. Create a communication plan for stakeholders.
13. Prepare a final report for a completed project.
14. Explore and use tools like JIRA, Trello, or MS Project for project management.
15. Conduct a retrospective meeting to capture lessons learned from a project.

CCAC-355 **Minor Project**

1. Submit a proposal for a minor project including objectives and scope.
2. Conduct a literature review related to the chosen project topic.
3. Gather requirements through interviews or surveys.
4. Create system architecture and design diagrams.
5. Implement the project as per the design specifications.
6. Develop and execute test cases for the project.
7. Prepare project documentation including user manuals.
8. Create a presentation summarizing the project.
9. Conduct peer reviews of the project with classmates.
10. Submit the final project report and all related documents.
11. Use version control (like Git) for project management.
12. Deploy the minor project on a platform.
13. Gather user feedback on the project for future improvements.
14. Conduct a meeting with stakeholders to review project outcomes.
15. Write a reflection on lessons learned during the project development process.

DCAC-355 **System Programming Lab**

1. Write and execute a simple assembly language program.
2. Create and use macros in assembly programming.
3. Implement system calls in C/C++.
4. Write programs for file handling in system programming.
5. Implement dynamic memory allocation in C/C++.
6. Use IPC mechanisms like pipes or message queues.
7. Write programs to create and manage processes.
8. Implement multithreading in C/C++.
9. Write a program to demonstrate signal handling.
10. Create a client-server application using socket programming.
11. Use debugging tools to troubleshoot system programs.
12. Implement a simple shell in C.
13. Understand and implement basic linker and loader concepts.
14. Write a simple device driver program.
15. Use system calls to monitor system performance.

DCAC-357 **Digital Image Processing Lab**

1. Load and display an image using a programming language (e.g., Python with OpenCV).
2. Apply histogram equalization to improve image contrast.
3. Implement low-pass and high-pass filters.
4. Perform image transformations (scaling, rotation).
5. Convert images between RGB and grayscale.
6. Implement basic image segmentation techniques (thresholding, clustering).
7. Apply edge detection algorithms (Sobel, Canny).
8. Implement morphological operations (dilation, erosion).
9. Apply image compression techniques (JPEG, PNG).
10. Implement basic image restoration techniques (inpainting).
11. Extract features from images using techniques like SIFT or SURF.
12. Implement a basic face detection algorithm using OpenCV.
13. Create a panorama by stitching images together.
14. Apply watermarking techniques to images.
15. Use machine learning for image classification tasks.

CCAC 302 ARTIFICIAL INTELLIGENCE L T P 3 1 0

Unit - I

Introduction: Introduction to Artificial Intelligence, History, What is AI, Importance of AI, Issues, AI Examples ,problem solving in games, Search algorithms: Informed search, Uninformed search, Depth first search, Best first search, And or graph , Intelligent Agent.

Unit - II

Processing and understanding Natural Languages: Understanding Natural Languages: Applications of Natural Languages, Natural Language processing,Parsing techniques: Rules of parsing, Top down parsing, Bottom up parsing, , Transition networks, Fillmore's grammars, Shanks Conceptual Dependency.

Unit - III

Knowledge Representation: Graphs, Frames structuresand related structures, Semantic Nets and Partitioned Nets,Scripts, Production Rules, Knowledge Based systems, Inference engine, Forward deductions and backward deductions,

Unit - IV

Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit - V

Pattern Recognition Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Speech Recognition. **Programming Language** Introduction to programming Language, Introduction to PROLOG.

Reference Books :

1. Char Nick, "*Introduction to Artificial Intelligence"*, Addision Wesley, 2007.

2. Stuart Russell and Peter Norvig, ``*Artificial Intelligence: A Modern Approach*.", Prentice Hall, Third Edition, 2010.

3. Elaine Rich, Kevin Knight and ShivashankarB.Nair, "*Artificial Intelligence*", Tata McGraw-Hill, Third edition, 2009.

CCAC 304 **COMPUTER GRAPHICS** **L T P 3 1 0**

Unit I

CRT Monitor ,Line generation: Points lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Input devices, Display control text.

Unit-II Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, creating deleting and renaming segments, visibility, image transformations.

Unit-III Transformations: Matrices transformation, transformation routines, displays procedure. Windowing and Clipping: Viewing transformation and clipping, generalize clipping, multiple windowing.

Unit-IV Three Dimension: 3-D geometry primitives, transformations, projection clipping. Interaction: Hardware input devices handling algorithms, Interactive techniques.

Unit-V Hidden Line and Surface: hidden line methods. Rendering and Illumination: Introduction to curve generation, Bezier,and B-spline algorithms and their comparisons.

References:

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
2. Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill
3. Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition
4. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

SCAC 302 MANAGEMENT INFORMATION SYSTEMS L T P 3 1 0

Unit-I

Management Information System(MIS): Concept & definition, Role of MIS, Process of Management, MIS-A tool for management process, Impact of MIS, MIS & computers, MIS & the user, IMS- a support to the Management.

Unit-II

Concept of organizational planning, The Planning Process, Computational support for planning, MIS planning, Characteristics of control process, the nature of control in an organization.

Unit-III

Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

Unit-IV

Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes. Define the problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs.

Unit-V

Plan the implementation, organize for implementation, develop procedures for implementation, computer related acquisitions, develop forms for data collection and information, dissemination, test the system, document the system.

References

1. O Brian, “Management Information System”, TMH
2. Gordon B. Davis &Margrethe H. Olson, “Management Information System”, TMH.
3. O Brian, “Introduction to Information System”, MCGRAW HILL.
4. Murdick, “Information System for Modern Management”, PHI.
5. Jawadekar, “ Management Information System”, TMH.
6. Jain Sarika, “Information System”, PPM
7. Davis, “Information System”, Palgrave Macmillan

SCAC-302 A **Business Intelligence and Analytics**

Unit 1: Introduction to Business Intelligence

- Overview of Business Intelligence (BI)
- Importance and Benefits of BI
- Components of BI Systems

Unit 2: Data Warehousing

- Concepts of Data Warehousing
- ETL Process (Extract, Transform, Load)
- Data Warehouse Architecture

Unit 3: Data Mining Techniques

- Introduction to Data Mining
- Classification, Clustering, and Regression Techniques
- Applications of Data Mining in Business

Unit 4: Business Analytics

- Descriptive, Predictive, and Prescriptive Analytics
- Tools and Techniques for Business Analytics
- Case Studies in Business Analytics

Unit 5: Implementation of BI Solutions

- BI Implementation Strategies
- Challenges in BI Implementation
- Future Trends in Business Intelligence

Textbooks:

1. "Business Intelligence: A Managerial Approach" by Ramesh Sharda, Dursun Delen, and Efraim Turban.
2. "Data Warehousing for Dummies" by Thomas C. Hammergren.

Reference Books:

1. "Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, and Jian Pei.
2. "Business Analytics: Data Analysis & Decision Making" by S. Christian Albright and Wayne L. Winston.

SCAC-302 B **Information Systems Strategy**

Unit 1: Strategic Role of Information Systems

- Importance of Information Systems in Organizations
- Alignment of IT with Business Strategy
- Types of Information Systems

Unit 2: Information Systems Planning

- Information Systems Strategic Planning Process
- Developing an Information Systems Plan
- Tools for IS Planning

Unit 3: Information Systems Governance

- Concepts of IT Governance
- Frameworks for IT Governance
- Risk Management in Information Systems

Unit 4: Evaluation of Information Systems

- Methods for Evaluating IS Performance
- Cost-Benefit Analysis of Information Systems
- Measuring ROI for Information Systems

Unit 5: Future Trends in Information Systems

- Emerging Technologies and Their Impact on IS Strategy
- Cloud Computing, Big Data, and AI in IS
- Ethical Considerations in Information Systems

Textbooks:

1. "Information Systems: A Manager's Guide to Harnessing Technology" by John Gallaugher.
2. "Information Systems for Managers: With Business Strategy Games" by George W. Reynard.

Reference Books:

1. "Strategic Information Systems: Concepts, Frameworks and Applications" by Paul M. T. van der Meer and Andrew R. T. C. Tay.
2. "IT Strategy: Issues and Practices" by James D. McKeen and Heather Smith.

SCAC-302 C **Enterprise Resource Planning**

Unit 1: Introduction to ERP

- Overview of ERP Systems
- Importance and Benefits of ERP
- Key Components of ERP

Unit 2: ERP Implementation Process

- Phases of ERP Implementation
- Change Management in ERP Projects
- Best Practices for Successful Implementation

Unit 3: ERP Modules and Functions

- Overview of Common ERP Modules (Finance, HR, Supply Chain)
- Integration of Modules within ERP
- Customization vs. Standardization in ERP

Unit 4: ERP Systems and Business Process Reengineering

- Relationship between ERP and Business Processes
- Concepts of Business Process Reengineering (BPR)
- Case Studies on ERP and BPR

Unit 5: Future Trends in ERP

- Cloud-Based ERP Solutions
- Role of AI and Machine Learning in ERP
- Challenges and Trends in ERP Systems

Textbooks:

1. "Enterprise Resource Planning: Fundamentals of Design and Implementation" by K. S. Rajasekaran and M. K. Ganesh.
2. "ERP: Making It Happen" by Thomas F. Wallace and Michael A. Kremzar.

Reference Books:

1. "Modern ERP: Select, Implement, and Use Today's Advanced Business Systems" by Marianne Bradford.
2. "Enterprise Resource Planning (ERP): The Dynamics of Operations Management" by N. A. El-Masri and P. E. H. B. de Lange**.**

SCAC-302 D Information Security Management

Unit 1: Introduction to Information Security

- Importance of Information Security
- Basic Concepts of Information Security
- Information Security Policies and Procedures

Unit 2: Risk Management

- Risk Assessment and Analysis
- Risk Mitigation Strategies
- Business Continuity Planning

Unit 3: Security Technologies and Tools

- Overview of Security Technologies (Firewalls, Intrusion Detection Systems)
- Encryption and Cryptography Basics
- Secure Network Design

Unit 4: Security Governance and Compliance

- Frameworks for Information Security Governance
- Legal and Regulatory Requirements
- Auditing and Compliance in Information Security

Unit 5: Emerging Trends in Information Security

- Cybersecurity Challenges and Threats
- Future Trends in Information Security
- The Role of AI in Cybersecurity

Textbooks:

1. "Information Security Management Principles" by Andy Taylor, Andrew Burnett, and Chris K. Walker.
2. "Security in Computing" by Charles P. Pfleeger and Shari Lawrence Pfleeger.

Reference Books:

1. "Managing Information Security" by Michael E. Whitman and Herbert J. Mattord.
2. "Principles of Information Security" by Michael E. Whitman and Herbert J. Mattord.

SCAC 304 **Software Testing** **L T P 4 0 0**

Unit-I

Basic concepts: Basic Testing Vocabulary, Quality Assurance versus Quality Control, The Cost of Quality, Software Quality Factors, How Quality is Defined, Defect, The Multiple Roles of the Software Tester(People Relationships), Scope of Testing

Unit-II

When Should Testing Occur?Testing Constraints, Life Cycle Testing, Independent Testing, What is a QA Process?Levels of Testing, The "V" Concept of Testing

Unit-III

Testing Techniques:Structural versus Functional Technique Categories, Verification versus Validation, Static versus Dynamic Testing, Examples of Specific Testing Techniques

Unit-IV

Test Administration: Test Planning, Customization of the Test Process, Budgeting, Scheduling, Prerequisites to test planning, Understand the Characteristics of the Software Being Developed, Build the Test Plan, Write the Test Plan

Unit-V

Test Cases:Test case Design, Building test cases, Test data mining, Test execution, Test Reporting, Defect Management, Test Coverage – Traceability matrix

Test Metrics – Guidelines and usage

Test reporting: Guidelines for writing test reports

Reference Books:

1. 1.Bob Hughes and Mike Cotterell, "*Software Project Management"*, Tata McGraw-Hill, Fifth Edition, 2008.
2. 2.Roger S. Pressman, "*Software Engineering – A Practitioner's approach*", McGraw-Hill, Seventh Edition, 2009.
3. Jain Sarika, "Information System", PPM
4. Davis, "Information System", Palgrave Macmillan

SCAC 306 SOFT COMPUTING L T P 3 1 0

Unit-I

Neural Networks-1(Introduction & Architecture)

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

Unit-II

Neural Networks-II (Back propogation networks)

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

Unit-III

Fuzzy Logic-I (Introduction)

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit-IV

Fuzzy Logic –II (Fuzzy Membership, Rules)

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications&Defuzzificataions, Fuzzy Controller, Industrial applications.

Unit-V

Genetic Algorithm(GA)

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Books:

1. S. Rajsekaran& G.A. VijayalakshmiPai, “Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications” Prentice Hall of India.

2. N.P.Padhy,”Artificial Intelligence and Intelligent Systems” Oxford University Press.

Reference Books:

3. SimanHaykin,"Neural Netowrks"Prentice Hall of India

4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

5. Kumar Satish, "Neural Networks" Tata McGraw Hill

SCAC 308 **Mobile computing** **Cr L-T-P**

4 3- 1-0

Unit – I

Introduction, issues and challenges in mobile computing, overview of wireless telephony: cellular concept, UMTS, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, policy based handoff process, channel allocation in cellular systems, CDMA, GPRS.

Unit – II: ISM band, Spread Spectrum, physical layer accessing techniques – FHSS, DSSS, OFDM, (IEEE 802.11a) HR-DSSS, OFDM (IEEE 802.11g)Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, Wireless applications, data broadcasting, Mobile IP-entities and terminology, IP Packet delivery, Agent discovery, Registration, Tunneling and encapsulation, optimization and reverse tunneling WAP: Architecture, protocol stack, application environment, applications.

Unit – III: Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system-consistency, CODA, Ficus, MIO-NFS, Rover, Disconnected operations.

Unit – IV: Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment, TCP over wireless-Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast recovery, Transmission-time out Freezing, selective retransmission, Transaction oriented TCP, TCP over 2 G and 3 G wireless network.

Unit – V Ad Hoc networks, localization, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS Parameters in Ad Hoc Networks-routing, bandwidth, delay, Jitter, Location management, handoff and energy management, fault tolerance in MANET, MANET applications.

Reference Books:

1. Jochen Schiller, "*Mobile Communications"*, Pearson Education, Second Edition, Second Impression, 2007.
2. Asha Mehrotra, "*GSM System Engineering*", Artech House, Second Edition Illustrated, 1997.
3. M. V. D. Heijden, M. Taylor, "*Understanding WAP Wireless Applications, Devices and Services*" , Artech House, July 2000.
4. Raj Kamal, "*Mobile Computing*", OxfordUniversity Press, First Published 2007.

Asoke K. Talukder, Roopa R. Yavagal, "*Mobile Computing: Technology, Applications and Service Creation*", Tata McGraw-Hill Publishing Company Limited, New Delhi, Fifth Reprint, 2007.

ARTIFICIAL INTELLIGENCE LAB.

CCAC-352

1. Write a Prolog Program to count the numbers.
2. Write a Prolog Program for addition.
3. Write a Prolog Program for subtraction.
4. Write a Prolog Program multiplication.
5. Write a Prolog program for division.
6. Write a Prolog program to find smaller number.
7. Write a Prolog program to find greater number.
8. Write a Prolog program to find the factorial of a number.
9. Write a Prolog program to do the best first search.
10. Write a Prolog program to do the depth first search.
11. Write a Prolog program to make a family tree.

COMPUTER GRAPHICS LAB.

CCAC-354

1. Write a program to draw a line using DDA.
2. Write a program to draw a line using Bresenham's algorithm.
3. Write a program to draw a circle using Bresenham's algorithm.
4. Write a program to Translate a triangle using 2-D transformation.
5. Write a program to Rotate a triangle by 45o using 2-D transformation.
6. Write a program to Scale triangle using 2-D transformation.
7. Write a program to Translate a triangle using 3-D transformation.
8. Write a program to Rotate a triangle using 2-D transformation.
9. Write a program to Scale a triangle using 2-D transformation.
10. Write a program to clip the line whose co. ordinate (2, 3) and (8, 4) and whose lower left corner is (1, 2) and upper right corner (9,8).using Cohen-sutherland line clipping algorithm.

1. Write the program for pendulum using Bezier curve

CCAC-356 **Seminar &Group**

1. Students choose a seminar topic and conduct preliminary research
2. Design a PowerPoint presentation based on the researched topic.
3. Practice verbal and non-verbal communication skills.
4. Simulate a group discussion on a current event or controversial topic.
5. Provide constructive feedback to classmates on their presentations.
6. Organize a panel discussion with select students as panelists and others as the audience.
7. Present a research paper summarizing findings on a specific topic.
8. Conduct a mock interview as an interviewer and interviewee.
9. Simulate a conflict scenario in a group setting and practice resolution techniques.
10. Experiment with creative presentation methods (e.g., storytelling, infographics).
11. Simulate a conflict scenario in a group setting and practice resolution techniques.
12. Create an infographic to summarize key information visually.
13. Engage in role-playing to explore different perspectives in a conflict scenario.
14. Develop presentation skills using visual aids effectively.
15. Practice giving and receiving constructive feedback.

DCAC-357 **PROJECT WORK**

1. Develop a detailed project proposal, including objectives, methodology, and expected outcomes.
2. Conduct a literature review on the selected project topic and summarize key findings.
3. Create a project plan using Gantt charts or project management software (e.g., MS Project).
4. Collect and analyze project requirements through interviews or surveys.
5. Prepare design documentation, including architecture diagrams and user interface mockups.
6. Implement a specific module of the project, ensuring code quality and functionality.
7. Develop testing strategies, perform testing, and document results for the implemented module.
8. Prepare a project budget, including resource allocation and cost estimation.
9. Identify potential risks and create a risk management plan with mitigation strategies.
10. Prepare and present a progress report on the project to stakeholders.
11. Collect relevant data for the project and perform statistical analysis.
12. Present the final project outcomes, including objectives met and future work.
13. Document each phase of the project, including challenges faced and lessons learned.
14. Create a user manual that guides end-users in utilizing the project deliverables.
15. Gather feedback from peers and mentors and evaluate project outcomes against objectives.