MEE1081: APPLIED MECHANICS LAB

Credits: 01   **Semester I/II**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	**List of Experiments** • Study of functioning of gear trains. • Deflection of simply supported beam and verification of theoretical values. • To determine the modulus of rigidity of rod with the help of torsion testing machine. • To study functioning of belt pulley systems. • To find the mechanical advantages, velocity ratio and efficiency of worm and worm wheel. • To find the coefficient of friction between the surface of a given wood slide bar and an inclined plane. • To find the coefficient of friction between belt and pulley using belt pulley system. • To find reaction at the supports of a simply supported beam with different types of loading. • To find moment of inertia of a fly wheel about the axis of rotation using electronic counter machine. • To find centre of gravity of different geometrical objects. • To find forces in members of a truss for different load conditions. • To study conversion of momentum. • To verify the law of conservation of energy. • To verify law of polygon of forces. • To verify law of parallelogram of forces. • Demonstration for centrifugal forces.	24

Outcome: *At the end of the course the student will be able to*

- *Know the practical skills to analyze the forces, moments, and their equilibrium*
- *Know the practical skills to analyze the effect of friction*
- *Develop basic know how and awareness to deal with practical aspects of applied mechanics*

EEE1081: ELECTRICAL & ELECTRONICS LAB

Credits: 01   **Semester I/II**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	**LIST OF EXPERIMENTS:** • To verify the Thevenin's theorem (DC circuits). • To verify the maximum power transfer theorem (DC circuits). Also draw graph between power and load resistance. • To verify the Superposition Theorem (DC circuits). • To study the phenomenon of resonance in R-L-C series circuit and to draw graph between frequency and current. Also show half power points. • To determine the V-I characteristics of a semiconductor diode. Also calculate forward and reverse static and dynamic resistances. • To study the half wave and full wave (center tapped) rectifier with and without filter. Also to calculate the ripple factor in both cases (without filter). • To study single phase (induction type) energy meter. • To study various logic gates such as OR, AND, NOT, NAND, NOR. • Study of CRO and measurement of voltage and frequency using CRO. • V-I characteristics of Zener diode. • Identification of active and passive components. • V-I characteristics of bipolar junction transistor in common base mode.	24

Head of the Department
Computer Engineering & Applications
Institute of Engineering & Technology
GLA University, Mathura

CSE3001: DATA STRUCTURES & ALGORITHMS

Prerequisite: *Fundamentals of Computer Programming, Problem solving using Computers.*

Credits: 04   **Semester III**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction:** Basic Terminology, Elementary Data Organization, Properties of an Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic Notations – Big-Oh; Operations on Data Structure, Abstract Data Types (ADT). **Linked Lists:** Implementation of Singly Linked Lists, Doubly Linked List, Circular Linked List, Operations on a Linked List - Insertion, Deletion, Traversal; Generalized Linked List, Polynomial Representation and Addition. **Stacks:** Primitive Stack Operations - Push & Pop, Array and Linked Implementation of Stack in C, Application of Stack: Prefix and Postfix Expressions, Evaluation of Postfix Expression, conversion of Infix to Postfix expression, Recursion, Principles of Recursion, Tail Recursion, Removal of Recursion, use of stack in Recursion, Tower of Hanoi Problem. **Queues:** Operations on Queue - Add, Delete operations, Implementation of Queue Using Array and Linked List, Circular Queues, Deque and Priority Queue.	13
II	**Trees:** Basic Terminology, Array Representation and Dynamic Representation; Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Tree Traversal Algorithms - Inorder, Preorder and Postorder; Threaded Binary Trees, Traversing Threaded Binary Trees. **Search Trees:** Binary Search Trees (BST), Insertion and Deletion in BST, AVL Trees, Introduction to M-Way Search Trees, B Trees & B+ Trees. **Searching:** Sequential Search, Binary Search. **Sorting:** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Two Way Merge Sort, and Heap Sort.	14
III	**Graphs:** Terminology, Adjacency Matrices, Adjacency List, Graph Traversal - Depth First Search and Breadth First Search; Spanning Trees, Minimum Cost Spanning Trees – Prim's and Kruskal's Algorithm; Shortest Path Algorithm – Warshall's Algorithm and Dijkstra's Algorithm. **Hashing:** Hash Function, Collision Resolution Strategies. **File Structures**: Physical Storage Media, File Organization, Organization of Records into Blocks, Sequential Files, Indexing and Hashing, Primary Indices, Secondary Indices, B+ Tree Index Files, B Tree Index Files, Indexing and Hashing Comparisons.	13

Text Book:
- Aaron M. Tanenbaum, Yedidyah Langsam and Moshe J. Augenstein (2009), "Data Structures Using C and C++", 2nd Edition, PHI.

Reference Books:
- Horowitz and Sahani (2004-05), "Fundamentals of Data Structures", 3rd Edition, W H Freeman & Co.
- Jean Paul Trembley and Paul G. Sorenson (2007), "An Introduction to Data Structures with Applications", 2nd Edition, TMH.
- R. Kruse, "Data Structures and Program Design in C" (2004), 2nd Edition, Pearson Education.
- Lipschutz Schaum's Outline Series (2010), "Data Structures", 12th Reprint, TMH.
- G A V Pai (2009), "*Data Structures and Algorithms",* TMH.

Outcome:
After completion of course, student will be able to implement the structuring of data in desired manner

CSE3002: COMPUTER ORGANIZATION

Prerequisite: *Fundamentals of Computer & Programming, Electronics Engineering.*

Credits: 04   **Semester III**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction:** Number representation; fixed and floating-point number representation, IEEE standard for floating point representation. Error detection and correction codes. Basic organization of the computer and block level description of the functional units, Introduction to Assembly language, instruction set, instruction cycles. Register, bus and memory transfer. **Central Processing Unit**: Addition and subtraction of signed numbers, look ahead carry adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation. Processor organization, general register organization, stack organization and addressing modes.	13
II	**Multiprogramming and Multiprocessing**; Introduction to pipelined operation. **Control Unit:** Instruction types, formats, micro-operations, execution of a complete instruction. Hardwired and micro programmed control: micro programmed sequencing, Microinstruction with next address field, pre-fetching microinstructions, concept of horizontal and vertical microprogramming.	14
III	**Memory:** Basic concept and hierarchy, RAM memories, 2D, 2 & 1/2D memory organization. ROM memories. Cache memories: concept and design issues, performance, address mapping and replacement. Auxiliary memories: magnetic disk, magnetic tape and optical disks. Virtual memory: concept and implementation. **Input/Output**: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Buses, bus architecture, types of buses and bus arbitration. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Standard communication interfaces.	13

Text Book:

- M. Mano (1996), "*Computer System Architecture*", 3rd Edition, PHI.

Reference Books:

- D.W. Patterson (2008), "*Computer Organization and Design*", 4th Edition, Elsevier Publication.
- William Stalling (2011), *"Computer Organization",* 8th Edition, PHI
- V. Carl Hamacher, Zaky (1996), "*Computer Organization",* 4th International Edition, TMH.
- John P Hays, *"Computer Organization",* 2nd Edition, TMH.
- Tannenbaum (2005), "*Structured Computer Organization*", 5thEdition, PHI.
- P Pal Chaudhry (2002), "*Computer Organization & Design*", 2nd Edition, PHI.

Outcome:

After completion of the course, the student will be:
- *Familiar with the organization of major subsystems.*
- *Familiar with the basic knowledge of design of digital logic circuits and apply to computer organization.*

CSE3003: DATABASE MANAGEMENT SYSTEM

Prerequisite: *Fundamentals of Computer & Programming, Problem solving using Computers.*

Credits: 04   **Semester III**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction:** An Overview of Database Management System, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence, Database Language and Interfaces (DDL, DML, DCL), Overall Database Structure, Database Users, Database Development Life Cycle (DDLC). **Data Modeling using the Entity Relationship Model:** ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Specialization, Generalization, Aggregation, Reduction of an ER Diagram to Tables, Extended ER Model, Relationship of Higher Degree. **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.	13
II	**Introduction on SQL:** Characteristics of SQL, Advantage of SQL, SQL Data Type and Literals, Types of SQL Commands, Insert, Update and Delete Operations, SQL Operators and their Procedure, Tables, Views and Indexes, Queries and Sub Queries, Aggregate Functions, Joins, Unions, Intersection, Minus, **Data Base Design & Normalization:** Functional Dependencies, Primary Key, Foreign Key, Candidate Key, Super Key, Normal Forms, First, Second, Third Normal Forms, BCNF, 4th Normal Form, 5th Normal Form, Lossless Join Decompositions, Canonical Cover, Redundant Cover, Synthesis the Set of Relation, MVD and JDs, Inclusion Dependence.	14
III	**PL/SQL:** Basic structure of PL/SQL block, Cursors, Procedure and Function, Triggers. **Transaction Processing Concept:** Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Deadlock Handling. **Distributed Database:** Introduction of Distributed Database, Data Fragmentation and Replication. **Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, 2PL, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes.	13

Text Book:

- Elmasri and Navathe (2010), *"Fudamentals of Database Systems"*, 6th Edition, Addision Wesley.

References:

- Date C J,*" An Introduction to Database Systems"*, 8th Edition, Addision Wesley.
- Korth, Silbertz and Sudarshan (1998), "*Database Concepts"*, 5th Edition*,* TMH.
- Bipin C. Desai, "*An Introduction to Database Systems"*, Galgotia Publications.
- Majumdar & Bhattacharya, *"Database Management System",* TMH.

Outcome:

After the completion of the course, the student will be:

- *Familiar with the relational database theory, and understand the design principles for logical design of databases, including the E-R method and normalization approach.*

AHM3001: ENGINEERING MATHEMATICS-III

Prerequisite: *Knowledge of Intermediate level Mathematics & Mathematics II.*

Credits: 04   **Semester III**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Partial Differential Equations:** Introduction, Formation, First order Lagrange's linear and quasi – linear partial differential equations, Higher order linear partial differential equations, Classification of second and higher order partial differential equations, Method of separation of variables, One dimensional wave and heat flow equations, D'Alembert's solution.	13
II	**Laplace Transform:** Properties of Laplace transform, Laplace transform of derivatives and integrals, Unit step and Dirac – delta function, periodic functions, Partial Fractions, Properties of inverse Laplace transform, convolution theorem. Application of Laplace transform in solving ordinary & partial differential equations.	14
III	**Complex Analysis:** Analytic functions, Cauchy – Riemann equations, Harmonic Functions, Line integral in a complex plane, Cauchy's integral theorem and formula, Cauchy integral formula for derivatives, Taylor and Laurent series (without proof),Singularities, Residue at a pole, Cauchy's Residue theorem and its application in evaluation of real integrals (excluding poles on the real axis).	13

Text Book:

- Manish Goyal and N. P. Bali: A Text Book of Engg. Maths (9th Ed.), Laxmi Pub., Delhi
- B.S. Grewal: Higher Engg. Mathematics, Khanna Publishers, Delhi
- B.V.Ramanna : Higher Engg. Mathematics, TMH.

Reference Books:

- R. V. Churchill and J. W. Brown, Complex variables and applications (7th Ed.), McGraw – Hill (2003).
- J. M. Howie, Complex analysis, Springer –Verlag (2004)
- Jain, Iyengar and Jain: Advanced Engg. Mathematics, Narosa Publishing House.

AHS3001: ENVIRONMENTAL STUDIES

Credits: 02   **Semester III/IV**   **L–T–P: 2–0–0**

Module No.	Content	Teaching Hours
I	**Basics of Environmental Studies**: Environmental Studies: Introduction, Scope and Importance Environment: Concept, Natural and Anthropogenic Environment Natural Environment: Structure & Function of Atmosphere, Hydrosphere, Lithosphere and Biosphere Ecology and Ecosystem: Definitions Types, Structure & Functions of Ecosystem. Natural Resources: Introduction, Classification, Concept of Conservation Present Status and Major Issues Related to Water Resources, Forest Resources and Mineral Resources.	9
II	**Current Environmental Problems**: Energy Resources: Introduction, Classification, Energy Use Patterns, Energy Crisis, Alternative Energy Resources Present Status and Major Issues Related to Fossil Fuels, Hydroelectricity, Nuclear Energy, Solar Energy and Biomass Energy. Effects of Human Activities on Environment: Effect of Agriculture, Housing, Mining, Transportation and Industries Environment Pollution: Causes, Effects and Control of Air Pollution, Water Pollution, Land Pollution and Noise Pollution Introduction and Management of Solid Wastes and Hazardous Wastes Global Environmental Challenges: Global Warming, Ozone Layer Depletion, Acid Rain, Urbanization, Overpopulation and Biodiversity Depletion.	9
III	**Environmental Protection:** Role of Citizens, Role of Government, Initiatives by NGOs, Contribution of International Agencies and Conventions Approaches to Environmental Protection: Public Awareness, Environmental Education, Environmental Ethics, Environmental Laws and Environmental Economics Tools and Strategies: Environmental Impact Assessment, Life Cycle Assessment, Ecological Footprints and Sustainable Development Efforts towards Environmental Protection in India.	8

References:

- Benny Joseph, **Environmental Studies.**
- Deswal & Deshwal, **Textbook on Environmental Studies.**
- AK De , **Environmental Studies.**
- Shashi K Singh and Anisha Singh, **Environmental Science & Ecology.**
- Agarwal and Sangal, **Environment & Ecology.**

AHE3001: ETHICS & VALUES

Credits: 02   **Semester III/IV**   **L–T–P: 2–0–0**

Module No.	Content	Teaching Hours
I	**Conceptual Foundations:** Foundations of Morality; Professional Ethics; Professional Standards in Engineering Practice; Major Theories of Ethics and Different Ethical Approaches; Normativity of Science and Technology. **Professions and Moral Dilemmas:** Contemporary Ethical Issues; Conflict of Interests; Contracts; Rights and Violations; Consent and Dissent; Privacy and Confidentiality; Consultancy; Allocation of Burdens and Benefits; Direct and Indirect Responsibility; Patents, Piracy and Clones.	14
II	**Decision Making:** Theoretical Bases; Foundational Values; Greater Welfare Approach; Risk-Benefit Analysis; Right-based Approach; Priority Allocation; Binding Grounds of Decisions; Public Norms and Professional Guidelines.	14
III	**Social Responsibility:** Individual and Collective Responsibility; Corporate Social Responsibility; Justice and Fairness; Beneficence and Safety; Respect for Humanity, Life, and Nature; Sustainable Development.	11

MBA5031: INDUSTRIAL ECONOMICS

Preamble: The Course of Industrial Economics Aims to Familiarize Students with the Basic Concepts of Economics Used in the Analysis of Firms and Industries and Act as a Guiding Tool in Decision Making with the Availability of Limited Resources in the Organization.

Objectives:
1. To Familiarize Students with the Basic Concepts of Economics.
2. To Enable the Students to Make Better Decisions in their Course of Action.

Credits: 02   **Semester III**   **L- T -P: 2-0-0**

Module No.	Content	Teaching Hours
I	**Basic Economic Concepts:** Meaning, Nature and Scope of Economics, Methodology of Economics - Deductive vs Inductive, Economics - Statics & Dynamics, Basic Economic Problems - Scarcity & Choice, Relation among Science, Engineering, Technology and Economics. **Market Demand**: Demand, Meaning and Types, Law of Demand, Exceptions to the Law of Demand, Elasticity of Demand, Methods of Measuring Elasticity of Demand, Marginal Utility Analysis.	07
II	**Demand Forecasting:** Meaning, Significance and Methods, Production Function, Laws of Returns to Scale & Diminishing Returns to Scale. **Cost Concepts**: - Meaning and Types of Costs, Short Run and Long Run Cost Curves.	07
III	**Market Structure:** Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition. **Inflation and Business Cycles**: Causes, Effects and Methods to Control Inflation, Concepts of Business Cycles, Concept of National Income and Measurement.	07

Reference Books:

1. Dewett, K.K. (2005).*Modern Economic theory.* New Delhi. S. Chand.
2. Geetika, G.,Ghosh, Piyali., & Choudhray,Purba.(2008). *Managerial Economics.*TMH.
3. Dwivedi, D, N. (2005).*Managerial Economics*. New Delhi: Vikas Publishing House.
4. Peterson, Craig, H. Lewis, Cris, W. & Jain, Sudhir, K. (2008).*Managerial Economics.* New Delhi: Pearson Education.

CSE3081: DATA STRUCTURES & ALGORITHMS LAB

Credits: 01   **Semester III**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	• Program to implement various operations in a singly linked list. • Program to implement insertion, deletion and traversal in a doubly linked List. • Program to implement polynomial addition using linked list. • Program to demonstrate the various operations on stack. • Program to convert an infix expression into postfix expression. • Program to evaluate a given postfix expression. • Program to implement Tower of Hanoi problem using Recursion. • Program to demonstrate the implementation of various operations on linear and circular queue. • Program to demonstrate the implementation of insertion and traversals on a binary search tree. • Program to implement Dijkstra's Algorithm to find the shortest path between source and destination. • Program to search a given element as entered by the user using sequential and binary search to search a given element as entered by the user. • Implementation of various sorting algorithms like Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort and Heap Sort.	24

CSE3082: COMPUTER ORGANIZATION LAB

Credits: 01   **Semester III**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	- Bread Board Implementation of Flip-Flops. - Experiments with clocked Flip-Flops. - Design of Counters. - Bread Board implementation of Counters & Shift Registers. - Implementation of Arithmetic Algorithms. - Bread Board implementation of Adder/Subtractor (Half, Full). - Bread Board implementation of Binary Adder. - Bread Board implementation of Seven Segment Display.	24

CSE3083: DATABASE MANAGEMENT SYSTEM LAB

Credits: 01   **Semester III**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	Write the SQL queries for data definition and data manipulation language. • To implement various operations on a table. • To implement various functions in SQL. • To implement restrictions on the table. • To implement concept of grouping of Data. • To implement concept of Joins in SQL. • To implement the concept of sub-queries. • To implement the concept of views, sequence. • To implement the concept of PL/SQL using cursor. • To implement the concept of Procedure function and Triggers.	24

AHE3080: SOFT SKILLS-I

After two courses on spoken English namely Spoken English - 1 & 2, this course focuses more on the use of English, specifically in business situations. The course is based on diverse range of business themes which help students visualize the expectations from a professional.

Course Objective:

Soft Skills-I programme will ensure that the students gain confidence and belief in what they are doing and do not overly doubt themselves. Being aware of learning what they need both in and out of the classroom, they will acquire clarity on what is expected from them.

Credit: 01   **Semester III**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	Who am I and why am I here, Change is the only Constant, Learning to Learn, Technology know–how for a Fresher, Knowledge on Tools, Application Orientation, Career Management (Journey and options).	10
II	Business Communication, Service Mindset, Customer Mindset, Myths about Business, Values in Business, Business Etiquette, Email Etiquette, Telephone Etiquette, Team Building, Role of a Manager.	10
III	Attitude for Success, Role Models, Handling Peer Competition, Building Relationships, Branding Yourself.	10

References:

- Cook, S. *The Effective Manager (e-book).* IT Governance Publishing.
- Lesikar, R. V., & Pettit J. B..*Business Communication: Theory and Application.* New Delhi: All India Traveller Book Seller.
- Bhatnagar, Nitin & Mamta Bhatnagar, *Effective Communication and Soft Skills: Strategies for Success.* New Delhi, Pearson (Dorling Kindersley, India Ltd.).
- Mohan, Krishan & NP Singh, *Speaking English Effectively*, New Delhi: Macmillan Publishers India Ltd.
- Pillalamarri, J. K. *Management of Soft Skills* Chennai: Schitech Publications.
- Rao, M.S. & Ramana, P.S.V., *Soft Skills for Better Employability*. ICFAI University Press.

CSE4001: OPERATING SYSTEMS

Credits: 04   **Semester IV**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction:** Operating System and its Classification - Batch, Interactive, Multiprogramming, Time sharing, Real Time System, Multiprocessor Systems, Multithreaded Systems, System Protection, System Calls, Reentrant Kernels, Operating System Structure- Layered structure, Monolithic and Microkernel Systems, Operating System Components, Operating System Functions and Services. **Processes**: Process Concept, Process States, Process State Transition Diagram, Process Control Block (PCB), Process Scheduling Concepts, Threads and their management. **CPU Scheduling:** Scheduling Concepts, Performance Criteria, Scheduling Algorithms, Multiprocessor Scheduling.	14
II	**Process Synchronization:** Principle of Concurrency, Producer / Consumer Problem, Inter Process Communication models and Schemes, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Synchronization Hardware. **Classical Problem in Concurrency:** Dining Philosopher Problem, Readers Writers Problem. **Deadlock:** System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock, Combined Approach.	13
III	**Memory Management**: Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Paging, Segmentation, Paged segmentation. **Virtual memory concepts:** Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Locality of reference. **I/O Management and Disk Scheduling**: I/O devices, I/O subsystems, I/O buffering, Disk storage and disk scheduling. **File System:** File concept, File organization and access mechanism, File directories, File system implementation issues, File system protection and security.	13

Text Book:

- Silberschatz, Galvin and Gagne (2005), *"Operating Systems Concepts",* 7th Edition, Wiley.

Reference Books:

- Sibsankar Halder and Alex A Aravind (2009),*"Operating Systems"*, 6th Edition, Pearson Education.
- Harvey M Dietel (2002), *"An Introduction to Operating System"*, 2nd Edition, Pearson Education.
- D M Dhamdhere (2006), "*Operating Systems: A Concept Based Approach"*, 2nd Edition.
- M. J. Bach. (1986), *"Design of the Unix Operating System"*, PHI.

Outcome:

After the completion of the course, the student will be able to:

- *Identify the services provided by operating systems.*
- *Understand the internal structure of an operating system and be able to write programs using system calls.*
- *Understand and solve problems involving process control, mutual exclusion, deadlock and synchronization.*

CSE4002: INTRODUCTION TO MICROPROCESSORS

Prerequisite: *Fundamentals of Computer & Programming, Computer Organization.*

Credits: 04   **Semester IV**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction**: Microprocessors Evolution and Types, Overview of 4004, 8080, 8085, 8086, 80286, 80386, 80486 and Pentium Microprocessor, Microprocessor Application, **8-Bit Microprocessor:** 8085 Microprocessor and its Architecture, Addressing Modes, The 8085 Programming Model, Instruction Classification, Instruction Format, Overview of Instruction Set - Data Transfer Operation, Arithmetic Operation, Logic Operations and Branch Operations; Introduction to Assembly Language Program.	13
II	**Programming Technique with Additional Instruction**: Looping, Counting, Indexing, Additional Data Transfer and 16-Bit Arithmetic Instruction, Counters and Time Delays, Stack and Subroutine. **16 Bit Microprocessor:** Architecture of 8086 – Register Organization, Execution Unit, Bus Interface Unit, Signal Description, Physical Memory Organization, Mode of Operation, I/O Addressing Capabilities.	14
III	**Peripheral Interfacing:** I/O Programming, Programmed I/O, Interrupt Driven I/O, DMA I/O, Memory-Mapped I/Os. **Peripheral Devices:** 8237 DMA Controller, 8255 Programmable Peripheral Interface, 8253/8254 Programmable Timer/Counter, 8259 Programmable Interrupt Controller.	13

Text Book:

- N Senthil Kumar, M Saravanan, and S Jeevananthan (2010), "*Microprocessors and Microcontrollers*", Oxford University Press India.

Reference Books:

- Ramesh S. Gaonkar (2000), "*Microprocessor Architecture Programming and Applications with 8085*", 4th Edition, Penram International Publishing.
- Ray A.K.Bhurchandi.K.M (2002), "*Advanced Microprocessor and Peripherals*", TMH.
- D. V. Hall (1992), "*Microprocessors and Interfacing: Programming and Hardware*", 2nd Edition, TMH**.**
- Y.C. Liu and G.A. Gibson (2003), "*Microcomputer Systems: The 8086/8088 Family Architecture Programming and Design*", 2nd Edition, PHI.

Outcome:

After the completion of the course, the student will be able to:

- *Analyze, specify, design, write and test assembly language programs of moderate complexity.*
- *Select an appropriate 'architecture' or program design to apply to a particular situation.*

CSE4003: COMPUTER NETWORKS

Prerequisite: *Fundamentals of Computer & Programming.*

Credits: 04   **Semester IV**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction Concepts:** Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design, connecting devices, Physical Layer Transmission Media, Line coding scheme, Basic idea of modulation and multiplexing, Switching methods. **Medium Access sub layer:** Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols, CSMA, CSMA/CD, Overview of IEEE standards	13
II	**Data Link Layer –** HDLC and point to point protocol, Error detection and correction, Flow control (sliding window protocol) **Network Layer:** Network Layer –IP addressing, Internetworking, Address mapping, introduction to IPv6, transition from IPv4 to IPv6, routing.	14
III	**Transport Layer:** Transport Layer - Design issues, connection management, Flow control, TCP window management, congestion control-slow start algorithm **Session Layer-** Design issues, remote procedure call. **Presentation Layer-**Design issues, Data compression techniques, cryptography A**pplication Layer:** Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals	13

Text Book:

- Forouzan B. A. (2004), "*Data Communication and Networking*", 4th Edition, McGrawHill.

References:

- Kurose, J.F. and Ross K.W. *(*2005), *"Computer Networking: A Top-Down Approach Featuring the Internet"*, 3rd Edition*,* Addison-Wesley.
- A.S.Tanenbaum (2006), "*Computer Networks"*, 2nd Edition*,* Prentice Hall India.

Outcome:

After the completion of the course, the student will be able to:
- *Understand the terminology and concepts of the OSI reference model and the TCP/IP reference model.*
- *Apply the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.*

CSE4004: OBJECT ORIENTED PROGRAMMING

Prerequisite: *Fundamentals of Computer & Programming, Problem solving using Computers.*

Credits: 04   **Semester IV**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction To UML**: Conceptual Model of the UML, Architecture; Object Oriented Techniques, Structural Modeling - Classes, Relationships, Class & Object Diagrams, Collaboration Diagrams, Sequence Diagrams; Behavioral Modeling - Use Cases, Use Case Diagrams, Activity Diagrams, State Machine, Process and Thread, Event and Signals, Time Diagram, Interaction Diagram, Package Diagram; Architectural Modeling - Component, Deployment, Component Diagrams and Deployment Diagrams. **Java Fundamentals:** Introduction to Java, Features, Objects, Methods & Classes, Constructors, Abstract Classes, Polymorphism.	13
II	**Object Design Implementation:** Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Architecture and Thread Control Methods, I/O, String Handling, Introduction to Wrapper Classes & Generic Class, Collection Framework. **GUI Programming**: Java Applet, Graphics & Animations, Controlling Animations through Threads, Introduction to AWT Programming, Basic UI Components, Layout and Component Managers, Event Handling, Swing Components – Creating a Swing Applet and Application.	14
III	**JDBC:** Types of Drivers, The Connectivity Model, JDBC/ODBC Bridge, Communicating with Database. **Multimedia Experience:** Processing Image using Java, Java Cryptography, Java Security API, Introduction to Java Web Services, Composite Computing Model. **Remote Method Invocation:** RMI Architecture, Creating RMI Client/ Server Application, Java Beans & Introduction to Enterprise Java Beans, Java Servlets - Servlet Basics, Servlet API.	13

Text Book:

- Michael R Blaha, James R. Rumbaugh, *"Object Oriented Modeling and Design with UML"*, 2nd Edition, Pearson Education.
- Naughton, Schildt, *"The Complete Reference JAVA2",* 7th Edition, TMH.

Reference Books:

- Cay Horstmann, *"Big Java",* 5th Edition, Wiley India Edition.
- Loy & Wood, *"Java Swing"*, O'Reilly.
- Bhave & Patekar, *"Programming with Java",* Pearson Education.

Outcome:

After the completion of the course, students will be able to develop programs based on OOP features.

CSE4005: DISCRETE MATHEMATICS

Prerequisite: *Fundamentals of Computer & Programming, Mathematics – I.*

Credits: 4   **Semester IV**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Sets and Relations:** Introduction to Set Theory, Venn diagrams, algebra of Sets, Inclusion-Exclusion Principle, Partitions, Proof Techniques, Relations, Properties and their types. Recurrence Relations and Generating Functions **Introduction to Counting Principle**: Permutation, Combination, Permutation with Repetition, Combination with Repetition, Pigeonhole Principle.	13
II	**Probability Theory**: Introduction to Probability Theory, Conditional Probability, Baye's Theorem. **Propositional Logic** - Logical Connectives, Truth Tables, Normal Forms(Conjunctive and Disjunctive), Validity; **Predicate Logic** - Quantifiers, Inference Theory, Methods of Proof.	14
III	**Algebra**: Motivation of Algebraic Structures, Finite Groups, Subgroups and Group Homomorphism; Lagrange's Theorem; Commutative Rings and Elementary Properties; **Graph Theory:** Introduction to Graphs, Types, Operations on Graphs, Connectivity.	13

Text Book:

- Kenneth H Rosen (2012), "*Discrete Mathematics and Its Applications", 7th edition,* TMH.

Reference Books:

- J.P.Tremblay (1997)*, "Discrete Mathematical Structures with Applications to Computer Science",* TMH, New Delhi.
- V. Krishnamurthy (1986), "*Combinatorics: Theory and Applications",* East-West Press, New Delhi.
- Ralph P. Grimaldi (2004), "*Discrete and Combinatorial Mathematics- An Applied Introduction"*, 5th Edition, Pearson Education.
- C.L.Liu (2000), "*Elements of Discrete Mathematics"*, 2nd Edition, TMH.

Outcome:

After the completion of the course, the student will be able to:
- *Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.*
- *Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.*
- *Use effectively algebraic techniques to analyze basic discrete structures and algorithms.*

AHE3001: ETHICS & VALUES

Credits: 02 **Semester III/IV** **L–T–P: 2–0–0**

Module No.	Content	Teaching Hours
I	**Conceptual Foundations:** Foundations of Morality; Professional Ethics; Professional Standards in Engineering Practice; Major Theories of Ethics and Different Ethical Approaches; Normativity of Science and Technology. **Professions and Moral Dilemmas:** Contemporary Ethical Issues; Conflict of Interests; Contracts; Rights and Violations; Consent and Dissent; Privacy and Confidentiality; Consultancy; Allocation of Burdens and Benefits; Direct and Indirect Responsibility; Patents, Piracy and Clones.	14
II	**Decision Making:** Theoretical Bases; Foundational Values; Greater Welfare Approach; Risk-Benefit Analysis; Right-based Approach; Priority Allocation; Binding Grounds of Decisions; Public Norms and Professional Guidelines.	14
III	**Social Responsibility:** Individual and Collective Responsibility; Corporate Social Responsibility; Justice and Fairness; Beneficence and Safety; Respect for Humanity, Life, and Nature; Sustainable Development.	11

AHS3001: ENVIRONMENTAL STUDIES

Credits: 02   **Semester III/IV**   **L–T–P: 2–0–0**

Module No.	Content	Teaching Hours
I	**Basics of Environmental Studies:** Environmental Studies: Introduction, Scope and Importance Environment: Concept, Natural and Anthropogenic Environment Natural Environment: Structure & Function of Atmosphere, Hydrosphere, Lithosphere and Biosphere Ecology and Ecosystem: Definitions Types, Structure & Functions of Ecosystem. Natural Resources: Introduction, Classification, Concept of Conservation Present Status and Major Issues Related to Water Resources, Forest Resources and Mineral Resources.	9
II	**Current Environmental Problems:** Energy Resources: Introduction, Classification, Energy Use Patterns, Energy Crisis, Alternative Energy Resources Present Status and Major Issues Related to Fossil Fuels, Hydroelectricity, Nuclear Energy, Solar Energy and Biomass Energy. Effects of Human Activities on Environment: Effect of Agriculture, Housing, Mining, Transportation and Industries Environment Pollution: Causes, Effects and Control of Air Pollution, Water Pollution, Land Pollution and Noise Pollution Introduction and Management of Solid Wastes and Hazardous Wastes Global Environmental Challenges: Global Warming, Ozone Layer Depletion, Acid Rain, Urbanization, Overpopulation and Biodiversity Depletion.	9
III	**Environmental Protection:** Environmental Protection: Role of Citizens, Role of Government, Initiatives by NGOs, Contribution of International Agencies and Conventions Approaches to Environmental Protection: Public Awareness, Environmental Education, Environmental Ethics, Environmental Laws and Environmental Economics Tools and Strategies: Environmental Impact Assessment, Life Cycle Assessment, Ecological Footprints and Sustainable Development Efforts towards Environmental Protection in India.	8

Reference Books:

- Benny Joseph , Environmental Studies [Tata McGraw-Hill Education]
- Deswal & Deswal, Environment and Ecology [Dhanpat Rai & Co.]
- A K De , Environmental Studies. [New Age International Publisher, New Delhi.
- Shashi K Singh and Anisha Singh , Environmental Science & Ecology. [A.B. Publication (Publishers & Distributors]
- Agarwal and Sangal , Environment & Ecology. [Krishna's Educational Publisher's Meerut]

CSE4081: OPERATING SYSTEMS LAB

Credits: 01   **Semester IV**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	• Write a Program in C to Implement CPU Scheduling Algorithm A) FCFS b) SJF c) Priority d) Round- robin. • Simulation of Bankers Deadlock Avoidance and Prevention Algorithms. • Implementation of Process Synchronization a) Reader-Writer b) Producer-Consumer • Simulation of Page Replacement Algorithms a) FIFO b) LRU c) LFU • Simulation of Disk Scheduling Algorithms a) FCFS b) SSTF c) SCAN d) C-SCAN e) LOOK f) C-LOOK • Simulation of File Organization Techniques a) Single-Level Directory b) DAG	24

CSE4082: MICROPROCESSORS LAB

Credits: 01   **Semester IV**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	- To study 8085 microprocessor System. - To study 8086 microprocessor System. - To develop and run a program to find out largest and smallest number. - To develop and run a program for converting temperature from ^{0}F to ^{0}C. - To develop and run a program to compute square root of a given number. - To develop and run a program for computing ascending/ descending order of the numbers. - To perform interfacing of RAM chip to 8085/8086. - To perform interfacing of keyboard controller. - To perform interfacing of DMA controller. - To perform interfacing of UART/USART.	24

CSE4083: OBJECT ORIENTED PROGRAMMING LAB

Credits: 01   **Semester IV**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours

I	• Programs based on the concepts of:
	
	Java Classes, Constructors, Polymorphism and Keyword Static.
	
	• Programs based on the concepts of:
	
	Inheritance Using Java, Multithreading Using Thread Class & Interface Runnable, String Handling, Generic Classes and Collection API.
	
	• Programs based on the concepts of:
	
	   o Applet Programming, Combining Multithreading with Graphics,
	
	   o UI Development Using AWT and Swings, Handling Events on UI Components.
	
	• Handling Database Connectivity with Java.
	
	• Concepts of Image Processing Using Java.
	
	• Implementation of Distributed Computing using RMI.
		24

AHE4080: SOFT SKILLS- II

Objectives:

- To make the students aware of the primary skills and sub skills involved in using English effectively at the contemporary corporate workplace with a global presence.
- To provide practice and guidance to enhance skills to the proficiency level expected by any organization.

Credit-01   **Semester IV**   **L-T-P: 0-0-2**

Module No.	Content	Lab Hours
I	- Introduction to English and Grammar. - Speaking face to face vs. over the phone. - Auxiliary and Modal verbs. 4 Techniques of reading- Skim, Scan, Intensive, Extensive. - ABC of writing, The KISS concept. - Presenting ideas, information and opinions with clarity. - Listening for information and making inferences. - Intonation, Word stress, Pacing, Sound clarity.	10
II	- Second level of reading to interpret information - Subject Verb Agreement - Understanding ideas and making inferences - Indianism, Question Tags, Phrasal verbs - Prepositions, Active and Passive voice - Third level reading and data interpretation - Sentence stress, connected speech - Tenses	10
III	- Adverbs, Adjectives, Modifiers, Collocation - Discussing data and coming to conclusions - Link expressions, Compound nouns - Negotiation skills - Business quiz, idioms and phrases - Individual presentation on speaking and writing - Feedback and Poster creation	10

References:

- Hornby, A.S., An Advanced Learners' Dictionary of Current English, OUP.
- Murphy, Raymond, Intermediate English Grammar, Cambridge University Press.
- Rizvi, Ashraf, M. *Effective Technical Communication.* New Delhi: Tata McGraw Hill.
- Infosys modules on English lab.
- PPT slides & videos provided by Infosys.

Material:

- Audio-Video Material available in the Language Lab.

CSE5001: DESIGN & ANALYSIS OF ALGORITHMS

Prerequisite*: This course requires basic knowledge of Data structures and Algorithms.*

Credits: 04 **Semester V** **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Algorithms:** Analyzing algorithms, Complexity of Algorithms. Growth of Functions: Asymptotic Notations, Recurrence Relations, Performance Measurements. **Sorting And Order Statistics:** Shell Sort, Heap Sort, Comparison Of Sorting Algorithms. **Divide And Conquer:** Quick Sort, Merge Sort. **Sorting In Linear Time:** Counting Sort, Radix Sort.	14
II	**Advanced Data Structures:** RB Trees, B – Trees, Binomial Heaps, Fibonacci Heaps, Data Structure for Disjoint Sets, Augmenting Data Structures. **Elementary Graph Algorithms**: DFS, BFS. Single Source Shortest Path Algorithms: Dijkstra's & Bellman Ford Algorithms, Maximum Flow Problem. **Greedy Approach:** Activity Selection Problem, Huffman Codes, Minimum Spanning Trees, Fractional Knapsack.	13
III	**Dynamic Programming: Matrix Chain Multiplication,**,0/1 Knapsack Problem, Longest Common Subsequence (LCS),Optimal Binary Search Tree. **Back Tracking and Branch & Bound:** N Queen Problem, TSP Problem,0/1 Knapsack Problem, Graph Coloring Problem. **String Matching:** Naïve, Rabin Karp, Knuth-Morris-Pratt, Automata Matcher, **NP-Completeness and complexity classes** **Approximation Algorithms**	13

Text Book:

- Thomas H. Coremen, Charles E. Leiserson and Ronald L. Rivest (2008), *Introduction to Algorithms,* Third edition, Prentice Hall of India.

Reference Books:

- Gilles Brassard Paul Bratley (1996)," *Fundamentals of Algorithms",* Prentice Hall.
- Ellis Horowitz, Sartaj Sahni*,* Sanguthevar Rajasekaran (2008), "*Fundamentals of Computer Algorithms",* Orient Longman Pvt. Ltd.
- Levitin (2008), "*An Introduction to Design and Analysis of Algorithms"*, Pearson.

Outcome:

After completion of this course student will be able to design and analyze the algorithms to solve any problem and proper use of the data structure to improve the efficiency of the algorithms.

CSE5002: SOFTWARE ENGINEERING

Prerequisite: *Understanding of programming principles and concepts of computer and software.*

Credits: 04   **Semester V**   **L–T–P: 4–0–0**

Module No.	Content	Teaching Hours
I	**Introductory Concepts**: The evolving role of software – characteristics, components and applications. **Process Models:** Waterfall Model, Prototyping, Incremental, Spiral, RAD. **Software Requirement Specification**: Requirement Process, SRS Components, Requirement Specifications with Use Cases Diagram, Requirements Validation. **Software Project Planning:** Project Planning Objectives. **Software Metrics:** Size, Function Point, Staffing, Project Estimation Methods– Decomposition Techniques; Empirical Estimation Models – COCOMO Model.	14
II	**Function-Oriented Design**: Problem Partitioning, Abstraction, Top Down and Bottom Up Design. **Module-Level Concepts:** Coupling, Cohesion, Design Notation and Specification - Structure Charts; Structured Design Methodology - Data Flow Diagram. **OO Analysis and OO Design:** OO Concepts, Introduction to UML Design Patterns. **Design Verifications:** Design Walkthroughs, Critical Design Review, Consistency Checkers. **Coding:** Coding Process, Verification - Code Inspections, Static Analysis, Proving Correctness; Metrics- Size Measures and Complexity Metrics.	13
III	**Testing Fundamentals**: Test Case Design, White Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing Strategies, Unit Testing, Integration Testing, Validation Testing, Reliability Estimation, Basic Concepts and Definitions, Reliability Model. Software Quality, ISO 9000 Certification for Software Industry, SEI Capability Maturity Model. **Software Configuration Management:** Introduction to SCM, Version Control and Change Management. **Risk Management:** Risk Mitigation, Monitoring, and Management. **Software Maintenance**: Models, Cost of Maintenance, Re-engineering, Reverse Engineering.	13

Text Book:

- R. S. Pressman (2010), "*Software Engineering: A Practitioners Approach*", 7th Edition, McGraw Hill.

Reference Books:

- K. K. Aggarwal and Yogesh Singh (2008), "*Software Engineering*", 3rd Edition, New Age International Publishers.
- Rajib Mall (2009), "*Fundamentals of Software Engineering*", 3rd Edition, PHI Publication.
- R.E Fairley (2004), "*Software Engineering*", McGraw Hill.
- Sommerville (2010), "*Software Engineering*", 9th Edition, Pearson Education.

Outcome:

- *The ability to apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to the development and maintenance of complex software systems.*
- *The ability to design and experiment with software prototypes and to select and use software metrics.*
- *Effective communications skills through oral and written reports and software documentation evaluated by both peers and faculty.*
- *The ability to elicit, analyze and specify software requirements through a productive working relationship with project stakeholders.*

CSE5003: THEORY OF AUTOMATA & FORMAL LANGUAGES

Prerequisite: *This course requires basic knowledge of Discrete Mathematics.*

Credits: 04   **Semester V**   **L-T-P: 3-1-0**

Module No.	Content	Teaching Hours
I	**Introduction:** Alphabets, Strings and Languages; Automata and Grammars, Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Myhill-Nerode Theorem; FA with Output - Moore and Mealy machine, Applications and Limitations of FA. **Regular expression (RE):** Regular Expression to FA, DFA to Regular Expression, Arden Theorem, Non Regular Languages, Pumping Lemma for Regular Languages, Applications of Pumping Lemma, Closure Properties of Regular Languages.	13
II	**Context Free Grammar (CFG) and Context Free Languages (CFL):** Introduction, Derivation Trees, Ambiguity in Grammar, Ambiguous to Unambiguous CFG, Simplification of CFGs, Normal Forms for CFGs - CNF and GNF; Pumping lemma for CFLs. **Push Down Automata (PDA):** Introduction, Language of PDA, Acceptance by Final State, Acceptance by Empty Stack, Deterministic PDA, Equivalence of PDA and CFG.	14
III	**Turing machines (TM):** Basic Model, Definition and Representation, Variants of Turing Machine and their equivalence, TM for Computing Integer Functions, Universal TM, Church's Thesis, Recursive and Recursively Enumerable Languages, Halting Problem, Introduction to Computational Complexity	13

Text Book:

- K.L.P. Mishra and N.Chandrasekaran (2006), "*Theory of Computer Science: Automata, Languages and Computation*", 3rd Edition, PHI.

Reference Books:

- Hopcroft, Ullman (2013), "*Introduction to Automata Theory, Languages and Computation*", 3rd Edition, Pearson Education.
- Martin J. C (2011), *"Introduction to Languages and Theory of Computations"*, 4th Edition, TMH.

Outcome:

> *At the end of this course, the students should be able to distinguish between the different mathematical models and be able to use these models in solving different types of problems.*

CSE5004: WEB TECHNOLOGY

Prerequisite*: UML design patterns, Internet architecture and Java programming concepts.*

Credits: 04   **Semester V**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction to Client Server Architecture**: Components of Client-Server Application, Client-Server Models and their Benefits, Server Side Component Architecture, Multitier Architecture, Web Portal Development & Testing. **Client Side Implementation:** HTML - List, Table, Frame, Image, Form and Other Tags with their Usage, Formatting using CSS, DHTML; JavaScript - DOM Basics, Statements, Integrating JavaScript with Various Elements of HTML, XHTML.	13
II	**XML:** Domain Languages, Comparison with HTML, DTD, CSS, XSL, Content Creation - Entities, Attributes, XML Schema, XML Parsing Techniques, XML and Data Binding, JAXB, Integrating XML with Other Applications, XLINK, XPOINTER; Introduction to AJAX and Applications. **Distributed Object Computing**: ActiveX, COM & DCOM.	14
III	**Web Servers & Application Servers:** Web Security, Middleware Standards - CORBA, Enterprise Java Beans and DNA, Web Services and SOA. **Server Side Implementation:** CGI Background, Overview of PERL, Introduction to ASP, Objects, Components, Connecting with Databases, JSP Architecture Objects, JSP Directive Elements, Variables & Methods, Sharing Session & Application Data; Introduction to PHP – Basics, Array and Functions.	14

Text Book:

- Chris Bates, (2007), **"***Web Programming – Building Internet Application***"**, 2nd Edition, Wiley - Dreamtech India Pvt. Ltd.

Reference Books:

- Holzener, Steven, (2001), "*Inside XML",* Techmedia Publication.
- Bergstan, Hans, (2004), "*Java Server Pages",* O'Reilly Publication.
- Nicholas C. Zakas, (2011), "Professional JavaScript for Web Developers", Wiley Publication.
- Leon Shklar, Rich Rosen (2009),"Web Application Architecture: Principles, Protocols and Practices", 2nd Edition, Wiley Publication.
- Burdman, Jessica, (2000),"*Collaborative Web Development",* Addison Wesley.

Outcome:

Web based applications development and deployment on web server. Operational knowledge of middleware technologies and security issues related to web.

CSE5005: COMPUTER GRAPHICS

Prerequisite: *Fundamentals of Computer & Programming, Computer Organization.*

Credits: 04　　　　　　　　　**Semester V**　　　　　　　　　**L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Graphics Systems**: Refresh CRT, Raster-Scan Displays, DVST, Plasma Displays, LCD, Input Devices - Functions Provided by Input Devices, Basic Working of these Input Devices. **Output Primitives**: Lines DDA, Bresenham & Circle Drawing Algorithms; Filled Area Primitives - Scan Line Polygon Fill Algorithm, Inside Outside Tests, Boundary Fill & Flood Fill Algorithm. **Line Clipping Algorithms**: Cohen Sutherland Line Clipping Algorithm, Liang Barsky Algorithms. **Polygon Clipping Algorithms:** Sutherland Hodgeman, Weiler Atherton Algorithms.	13
II	**Transformation:** Translation, Rotation, Scaling, Mirror Images, Transformation About an Arbitrary Point; 3D - Transformation, Rotation About an Arbitrary Axis. **Projection:** Orthogonal Projections, Multiple Views, Isometric Projection, Perspective Projections (One, Two and Three Vanishing Points); Quadric Surfaces, Spline Representation, Spline Specification. Bezier Curves and Surfaces, B-Splines and Surfaces, Displaying Spline Curves and Surfaces.	14
III	**Hidden Line and Surface Removal Algorithms**: Back Face Detection, Depth-Buffer and A-Buffer Methods; Introduction to Shading. **Graphics Standards**: GKS/PHIGS. **Multimedia:** Multimedia Architecture, Multimedia File Formats. **Compression:** Image Compression, Video Compression, Audio Compression. **DVI Technology**: Video & Audio Codecs, Virtual Reality, GUI Design - Playback, Hypermedia Linking and Embedding.	13

Text Book:

- D. Hearn and M. P. Baker (1996), "*Computer Graphics*", PHI.

Reference Books:

- W.K. Gilloi (2007), *"Interactive Computer Graphics*", PHI.
- D.F. Rogers (1998), "*Procedural Elements for Computer Graphics*", TMH.
- J.D. Foley and A.D. Van (1982), *"Fundamentals of Interactive Computer Graphics"*, Addison-Wesley.
- Rogers and Adam (1976)**, "***Mathematical Elements for Computer Graphics",* TMH.
- R. Steinmetz and K. Nahrstedt (1995), "*Multimedia: Computing, Communications and Applications",* PHI, PTR.

Outcome:

After the completion of the course, the student will be able to understand, appreciate and follow the development and advancement of computer graphics technologies.

CSE5081: DESIGN & ANALYSIS OF ALGORITHMS LAB

Prerequisite*: This lab requires basic knowledge of Data Structures and Algorithms. Student must have the knowledge of any high-level programming language.*

Credits: 01   **Semester V**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	**Sorting Technique:** • Implementation and Analysis of Bubble Sort, Selection Sort Insertion sort, Counting Sort, Heap Sort. **Divide and Conquer Approach**: • Implementation and Analysis Quick sort & Merge Sort. **Graph Traversal Algorithms:** • Implementation and Analysis of Depth first Search. • Implementation and Analysis of Breath First Search. **Greedy Algorithms**: • Implementation and Analysis of Prim's Algorithm. • Implementation and Analysis of Kruskal's Algorithm. • Implementation and Analysis of single source shortest path problem using Dijkstra's Algorithm. **Dynamic Programming**: • Implementation and Analysis of 0/1 Knapsack problem. • Implementation and Analysis of Matrix Chain Multiplication. • Implementation and Analysis of Longest Common Subsequence. **Backtracking Approach:** • Implementation and Analysis of 4-queen problem.	24

Text Book:

• Thomas H. Coremen, Charles E. Leiserson and Ronald L. Rivest (2003), "*Introduction to Algorithms",* 3rd Edition, Prentice Hall of India.

Reference Book:

• Behrouz A. Forouzan and Richard F. Gilberg (2007), "*Computer Science – A Structured Programming Approach Using C"*, Cengage Learning.

Outcome*:*

After completion of this lab work student will be able to design and implement the algorithms to solve any problem and uses of different data structures to store the information.

CSE5082: WEB TECHNOLOGY LAB

Prerequisite*: Familiarity with Java programming constructs.*

Credits: 01   **Semester V**   **L–T–P : 0–0–2**

Module No.	Content	Lab Hours
I	• Web page design using following HTML elements: Font, Color - Background & Foreground, Margins, Lists, Links, Graphics – Image scaling, Alignments, Text wrapping between images, Table, Bordering, Image, Cell color, Cell alignment. • Apply various types of CSS to above experiment. • Web form designing for user registration with some constraints using JavaScript. • Working with JavaScript functions. • Designing of XML document using DTD concept and applying CSS. • Working with XML data binding using JavaScript/Java. • Implementation of XML parsing using javaScript/Java. • Working with ASP objects. • Working on database connectivity model. • Working on JSP objects and database access model.	24

Text Book:

• Chris Bates (2007), **"***Web Programming – Building Internet Application***"**, 2nd Edition, Wiley - Dreamtech India Pvt. Ltd.

Reference Books:

• Holzener, Steven (2001), "*Inside XML",* Techmedia Publication.
• Bergstan, Hans (2004), "*Java Server Pages",* O'Reilly Publication.

Outcome*:*

After completing the course, the students should be able to do web application development and deployment using various technologies.

CSE5083: MINI PROJECT –I

Prerequisite*: Sound knowledge of C and Data Structures.*

Credits: 02   **Semester V**   **L–T–P: 0–0–4**

Module No.	Content	Lab Hours
I	A project comprising of minimum 1500 LOC in a modular structure has to be developed in C/C++ language. Each module is to be based on any of the topics/concepts studied in the previous semesters and should have a proper Graphical User Interface (GUI).	48

Outcome*:*

After completing the project, the students should be able to develop logical thinking. They should gain an insight into the nuances of C programming.

AHE5080: SOFT SKILLS-III

This course focuses on the use of English, specifically in industry situations. The course is based on diverse range of business themes which help students visualize the expectations from a professional.

Course Objectives:

- Gain a functional understanding of Basic English.
- Practice language skills to eliminate errors in pronunciation and sentence construction.
- Understand and enhance interpersonal communication process.

Credit: 01 **Semester V** **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	Business Communication Skills English Language Enhancement Verbs, Tenses, Phrasal Verbs, Synonyms, Antonyms and homonyms Descriptive Words, Combining Sentences, Business Idioms	10
II	Indianisms in English, Frequently Mispronounced Words, Signposts in English. The Art of Communication: The communication Process, Effective Listening, Non Verbal Communication.	10
III	Intrapersonal & Interpersonal Relationship Skills Self-Awareness, Self Esteem & Confidence, Assertiveness and Confidence Dealing with Emotions, The Team Concept, Elements of Teamwork, Stages of Team Formation, What is an Effective Team? Essential Building Blocks of Effective Teams, Team Player Styles	10

Reference Books:

- Cook, S. *The Effective Manager (e-book).* IT Governance Publishing
- Lesikar, R. V., & Pettit J. B..*Business Communication: Theory and Application.* New Delhi: All India Traveller Book Seller.
- Bhatnagar, Nitin & Mamta Bhatnagar, *Effective Communication and Soft Skills: Strategies for Success.* New Delhi, Pearson (Dorling Kindersley, India Ltd.)
- Mohan, Krishan & NP Singh, *Speaking English Effectively*, New Delhi: Macmillan Publishers India Ltd.
- Pillalamarri, J. K. *Management of Soft Skills* Chennai: Schitech Publications
- Rao, M.S. & Ramana, P.S.V., *Soft Skills for Better Employability*. ICFAI University Press.

CSE6001: COMPILER DESIGN

Prerequisite: *This course requires basic knowledge of Theory of Automata & Formal Languages.*

Credits: 04　　　　　　　　**Semester VI**　　　　　　　　**L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Introduction to Compiler**: Phases and passes, bootstrapping, Optimization of DFA-Based Pattern Matchers implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, YACC, Context free grammars, derivation and parse trees, capabilities of CFG. **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.	14
II	**Advance Parser:** Constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables. **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 Reference, Cases: in arithmetic expressions, procedures call, declarations and case statements.	13
III	**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. **Code Generation:** Design Issues, 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.	13

Text Book:

- Aho, Sethi & Ullman (2008), "*Compilers: Principles, Techniques and Tools", 2nd Edition,* Pearson Education.

Reference Books:

- V Raghvan (2010), "*Principles of Compiler Design"*, 2nd Edition, TMH.
- Kenneth Louden (1997), "*Compiler Construction*", 1st Edition, Cengage Learning.
- Charles Fischer and Ricard LeBlanc (2005), "*Crafting a Compiler with C",* Pearson Education.

Outcome*:*

> *After completion of this course student will be able to design translator for any language and can also use the concepts in natural language processing.*

CSE6002: OPTIMIZATION TECHNIQUES

Prerequisite*: Idea about systematic procedures for assisting decision makers in evaluating alternative choices.*

Credits: 04   **Semester VI**   **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Linear Programming**: OR Models, Formulation of LPP, Graphical Method, Simplex Method, Big M Method, Two Phase Method, Primal– Dual construction, Dual Simplex, Sensitivity Analysis. **Integer Programming:** Definition & Application of IP, Solution of IP Using Cutting Plane Method, Branch & Bound Methods.	14
II	**Transportation and Assignment:** Formulation of Transportation Problem, Initial Feasible Solution Methods, Optimality Test, Degeneracy in TP; Assignment Problem, Hungarian Method, Travelling Salesman Problem. **Game Theory, Sequencing & Replacement:** Two Person Zero Sum Game, Pure and Mixed Strategies Methods, Sequencing Problem, Processing of n Jobs through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem. Replacement of Model which Deteriorate with Time, Money Value, Group Replacement Policies.	13
III	**Dynamic Programming:** Introduction to Dynamic Programming, Bellman Principle of Optimality, Applications of DP in Reliability, Capital Budgeting, Inventory Control & Linear Programming. **Queuing Models:** Elements of Queuing Model, Poisson (arrival pattern) & Erlang (service time) Distribution, Single Server and Multi-server Markovian Models with Infinite and Finite Capacities, Machine Repair Model, Networks of Queues. **Project Management:** Phases of Project Management, Guidelines for Network Construction, CPM and PERT.	13

Text Book:

- D.S.Hira, P.K Gupta (2005), "*Operation Research"*, S. Chand Publication.

Reference Books:

- Taha, H.A. (2010), "*Operations Research - An Introduction"*, 9th Edition, Prentice Hall.
- S.D.Sharma (2011), "*Computer Based Optimization Techniques"*, Kedar Nath Publication.
- Kanti Swaroop, Man Mohan (2008), "*Operation Research"*, Sultan Chand & Sons.

Outcome*:*

After completion of this course students are expected to the role of approximations and errors in the implementation and development of numerical methods. In general, students would master the different techniques for solving a given problem.

CSE6003: UNIX OPERATING SYSTEM

Prerequisite*: Students should be familiar with the basic concept of an operating system. Previous experience in any high-level programming language is essential.*

Credits: 04   **Semester VI**   **L–T–P: 4–0–0**

Module No.	Content	Teaching Hours
I	**Overview of the system:** History, System Structure. **Introduction to the Kernel:** Architecture of the UNIX Operating System, Introduction to System Concept, Kernel Data Structures, System Administration. **Internal representation of files:** Inodes, Structure of Regular File, Directories, Conversion of a Path Name to an Inode, Super Block, Inode Assignment to a New File, Allocation of Disk Blocks, Other File Types. **System Calls for the File System:** Open, Read, Write, File and Record Locking, Adjusting the Position of File I/O-LSEEK, Close, File Creation, Creation of Special Files, Change Directory and Change Root, Change Owner and Change Mode, STAT and FSTAT, Pipes, Dup, Mounting and Unmounting File Systems, Link, Unlink, File System Abstractions, File system Maintenance.	13
II	**The Structure of Processes:** Process States and Transitions, Layout of System Memory, The Context of a Process, Saving the Context of a Process, Manipulation of the Process Address Space, Sleep. **Process Control:** Process Creation, Signals, Process Termination, Awaiting Process Termination, Invoking Other Programs, The User ID of a Process. **Process Scheduling and Time:** Process Scheduling, System Calls for Time, Clock. **Memory Management Policies:** Swapping, Demand Paging, A Hybrid System with Swapping and Demand Paging.	14
III	**The I/O Subsystem:** Driver Interfaces, Disk Drivers, Terminal Drivers, Streams. **Interprocess Communication:** Process Tracing, System V IPC, Network Communications, Sockets. **Multiprocessor Systems:** Problems of Multiprocessor System, Solution with Master and Slave Processor, Solution with Semaphores.	13

Text Book:

- M.J. Bach (2000), "*Design of the Unix Operating System*", 3rd Edition, PHI Publication.

Reference Books:

- Sumitabh Das (2006), "*Unix Concepts and Applications*", 3rd Edition, TMH Publication.
- S. Parata (2008), "*Advanced Unix: A Programmer's Guide*"', BPB Publication.
- W. Stevens, Bill Fenner, Andrew Rudoff (2003), "Unix Network Programming: The Sockets Networking API", Volume 1, 3rd Edition, Pearson Education.

Outcome:

At the end of the course, students will have the fundamental concept of UNIX operating system.

CSE6004: SOFT COMPUTING

Prerequisite: *The prerequisite for this course is a basic understanding of problem solving, design and analysis of algorithms and computer programming. A prior course in Artificial Intelligence will be an advantage.*

Credits: 04　　　　　　　　**Semester VI**　　　　　　　　**L–T–P : 3–1–0**

Module No.	Content	Teaching Hours
I.	**Neural Networks :**Introduction to Soft Computing & Neural Computing, Fundamentals of Artificial Neural Network(ANN), Models of ANN, Architectures of ANN(Feed Forward and Feedback or Recurrent N/W), Learning Methods in ANN, Taxonomy of ANN System, Single Layer Perceptron, Linearly Separable Task and XOR Problem, Introduction to Error Back Propagation Network(EBPN), Back Propagation Learning, Error Back Propagation Learning Algorithm, Associative Memory, Auto Associative Memory, Bidirectional Hetro-Associative Memory, Adaptive Resonance Theory, Applications of Neural Network, ADALINE, MADALINE Network, Rosenblatt's Perception.	13
II.	**Fuzzy Logic:** Introduction to Fuzzy Sets & Crisp Sets, Fuzzy Membership and Fuzzy Operations, Properties of Fuzzy Sets, Crisp Relations and Fuzzy Relations, Fuzzy System, Crisp Logic, Propositional Logic and its Laws, Inference in Propositional Logic (Modus Ponens, Modus Tollens and Chain Rule), Fuzzy Logic, Inference in Fuzzy Logic (GMP and GMT), Fuzzy Rule Based System, Fuzzyfications & Defuzzifications, Applications of Fuzzy Logic.	14
III.	**Genetic Algorithm(GA):**Introduction to GA, Search optimization Method, Evolutionary Algorithm Working Principle, Biological Background of GA, Working Principles of GA, Flow Chart of Genetic Programming, Encoding(Binary, Value, Permutation, Tree), Operators of GA(Random Population, Reproduction or Selection), Crossover and Mutation, Basics of Genetic Algorithm with Example for Maximize $f(x)=x^2$.	13

Text Book:

- S. Rajsekaran & G.A. Vijayalakshmi Pai(2003), *"Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications",* 4th Edition, Prentice Hall of India*.*

Reference Books:

- Timothy J Ross (2009), *"Fuzzy Logic with Engineering Applications",* 3rd Edition, John Wiley and Sons.
- David E. Goldberg (2009), *"Genetic Algorithm in Search Optimization and Machine Learning ",* Adission-Wesley*.*
- Karray (2009), *"Soft Computing and Intelligent Systems Design: Theory, Tools and Applications",* 1st Edition, Pearson Education*.*

Outcome*:*

> *By the end of the course a student is expected to become able to apply Fuzzy Logic, Genetic Algorithms and Artificial Neural Networks as computational tools to solve a variety of real world problems in their area of interest ranging from Optimization problems to Pattern recognition and control tasks.*

MBA5034: INDUSTRIAL MANAGEMENT

Credits: 04　　　　　　　**Semester VI**　　　　　　　**L–T–P: 4–0–0**

Module No.	Content	Teaching Hours
I	**Introduction to Management:** Concept, levels of Management, Management functions & skills. **Planning & Organizing:** Concept, Types of planning, Planning Process and premises, Concept of organization structure, Relationship between authority, responsibility and accountability. Directing & Leadership: Concept and principles of direction, Leadership style and traits. Motivation:- Maslow's hierarchy of needs theory, Herzberg's Motivator-hygiene theory, Alderfer's ERG Theory, Vroom's Expectancy theory. Controlling- Types of Controlling, Controlling Process. Staffing:- Concept, significance, Human resource Planning (HRP) Concept, significance and HRP Process. Performance Management: Definition, methods of appraisal: Critical Incidents Method, Comparative Evaluation Method (Ranking & Paired Comparisons), Management By Objectives, Assessment Centers, 360-Degree Feedback..	13
II	Financial Management: Meaning, Objective, Financial Management Functions:- Financial Decision, Investment Decision, Dividends Decision. Profit & Loss statements, Balance sheet preparation, cash flow analysis, Break even Analysis. Time value of Money, Capital budgeting and its techniques: Net present value (NPV), Internal rate of Return (IRR) and Payback method. Material Management: Concept, Scope and objective of Material Management, Inventory Management, Material flow process, Deterministic and Probabilistic model of Inventory control, Material requirements planning, Brief introduction of Just-in-Time(JIT), Enterprise Resource Planning (ERP), Supply chain Management(SCM), Business process re-engineering.(BPR).	14
III	Marketing Management: Marketing: Definition, Scope, Marketing Mix:-Product, Price, Place, Promotion. Segmenting, Targeting and Positioning. Quality Management: Concept of Quality, types of Quality: quality of design, conformance and performance, phases of quality management. An overview of Quality Management assistance tools: Ishikawa diagram, TQM, Kaizen, Five S(5S), six sigma. ISO 9000 : ISO 9001:2008, ISO 9000:2005, ISO 9004:2009, ISO 19011:2011.	13

Text Book:

- Khanna, O.P. (2011) Industrial Engineering & Management. N.Delhi: Dhanpat Rai & Co. Pvt Ltd.
- Khanka, S .S. (2007). Entrepreneurial Development. N.Delhi: S.Chand & Company Ltd..

Reference Books:

- Gopalakrishanan, P. (2005). Material Management. New Delhi: India:Prentice Hall of India.
- Chandra, P. (2006). Projects. New Delhi: India: Tata McGraw-Hill Publishing Company Limited.
- Desai,V.(2007). Dynamics of Entrepreneurship Development and Management. Mumbai: Himalaya Publishing House..

Outcome*:*

After completion of this course student will be able to understand the important managerial dimensions of Industrial Management. To make student's able to apply their thoughts and subject understanding in real practice to support industrial progress.

CSE6081: COMPILER DESIGN LAB

Prerequisite*: Students should be familiar with the basic concept of C/C++ .*

Credits: 01   **Semester VI**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	- Practice of Lex/ YACC of compiler writing. - Write a program to check whether a string belongs to the grammar or not. - Write a program to generate a parse tree. - Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *. - Write a program to find leading terminals. - Write a program to find trailing terminals. - Write a program to compute FIRST of non-terminals. - Write a program to compute FOLLOW of non-terminals. - Write a program to check whether a grammar is left recursive and remove left recursion. - Write a program to remove left factoring. - Write a program to check whether a grammar is operator precedent.	24

Text Book:

- Aho, Sethi & Ullman (2008), "*Compilers: Principles, Techniques and Tools",* 2nd Edition, Pearson Education.

Reference Books:

- V Raghvan (2009), "*Principles of Compiler Design",* TMH.
- Kenneth Louden (1997), "*Compiler Construction*", 1st Edition, Cengage Learning.
- Charles Fischer and Ricard LeBlanc (2007), "*Crafting a Compiler with C",* Pearson Education.

Outcome*:*

In the lab sessions students implement Lexical analyzers and code for each phase to understand compiler software working and its coding in detail.

CSE6082: UNIX/LINUX LAB

Prerequisite*: Students should be familiar with the basic concept of an operating system. Previous experience in any high-level programming language is essential.*

Credits: 01   **Semester VI**   **L–T–P: 0–0–2**

Module No.	Content	Lab Hours
I	**Objective:** To teach students various unix/linux utilities and shell scripting. **Commands** • Unix/linux basic commands. • vi editor commands • Process and process control related commands • Filter related commands • IPC related commands **Shell Scripts** • Write a shell script that print out the date information in the following order, time, date of week, day, month, year. • Write a shell script that tells you its name and its PID. • Write a shell script that takes three command line arguments. The first argument is the name of the destination file and other two arguments are the names of files to be placed in the destination file. • Write a shell script that takes the command line argument and report whether it is a directory or a file or something else. • Write a shell script that accept the file name on the command line if the file is readable than count the no. of lines ,words and characters in this file. • Write a shell script to find all login users on your system whose user-id is greater than 200. • Write a shell script to calculate the following series without multiplication. • Write a shell program which displays the number of occurrences of string 2 in string 1. • Write a shell script to find out the length of the input string. • Write a shell script to compare two strings input by the user, **System Calls In C** • File related system calls • IPC related system calls	**24**

Reference Books:

- Sumitabh Das (2006). "*Unix Concepts and Applications*", 4th Edition, TMH Publication.
- S. Parata (2008), "*Advanced Unix: A Programmer's Guide*", BPB Publication.
- Yashwant Kanetkar (2009), "*Unix Shell Programming*", BPB Publication.

Outcome:

After completing this lab the student will be able to
- *Understand Linux or Unix Operating system.*
- *Understand Logging in the system and Create and modify files and use basic file permissions. Perform basic process and job control.*
- *Understand vi text editor.*
- *Understand Shell Programming and system programming.*