**Four Year Degree Course in Engineering and Technology**
**Course and Examination Scheme with Model AICTE Curriculum**
**Third Semester Computer Science and Engineering**

| Course Category | Course Code | BoS | Course Title | Teaching Scheme | | | | Examination Scheme | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Hours per week | | | Number of Credits | THEORY | | | | | | PRACTICAL | | | |
| | | | | L | T | P | | Duration of Paper (Hrs.) | Max. Marks ESE | Max. Marks Sessional | | Total | Min. Passing Marks | Max. Marks TW | Max. Marks POE | Total | Min. Passing Marks |
| | | | | | | | | | | MSE | IE | | | | | | |
| BSC/ESC /HSMC | SE101CS | **S&H** | Applied Mathematics-III | 2 | 0 | 0 | 2 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| PCC | SE102CS | **Computer** | Data structure & Algorithms | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| PCC | SE103CS | **Computer** | Computer Organization & Architecture | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| ESC | SE104CS | **Electronics** | Digital Electronics | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| HSMC | SE105CS | **HSMC** | Effective Technical Communication in English | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| | | | | | | | | | | | | | | | | | |
| PCC | SE106CS | **Computer** | Data structure & Algorithms | 0 | 0 | 2 | 2 | - | **-** | **-** | **-** | - | - | **25** | **25** | 50 | 25 |
| PCC | SE107CS | **Electronics** | Digital Electronics | 0 | 0 | 2 | 2 | - | **-** | **-** | **-** | - | - | **25** | **25** | 50 | 25 |
| PCC | SE108CS | **Computer** | Computer Workshop | 0 | 0 | 2 | 2 | - | **-** | **-** | **-** | - | - | **25** | **25** | 50 | 25 |
| MC | SE109CS | **S&H** | Environmental Sciences | - | - | - | 0 | - | **-** | **-** | **-** | - | - | **-** | **-** | - | - |
| | | | | | | | | | | | | | | | | | |
| | | | | 14 | 0 | 06 | 20 | - | | | | | | | | | |
| | | | | **20** | | | **20** | | | | | **500** | | | | **150** | |
| | | | | | | | | **650** | | | | | | | | | |

**Four Year Degree Course in Engineering and Technology**

## Course and Examination Scheme with Model AICTE Curriculum
## Fourth Semester Computer Science and Engineering

| Course Category | Course Code | BoS | Course Title | Teaching Scheme | | | | Examination Scheme | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Hours per week | | | Number of Credits | THEORY | | | | | | PRACTICAL | | | |
| | | | | L | T | P | | Duration of Paper (Hrs.) | Max. Marks ESE | Max. Marks Sessional | | Total | Min. Passing Marks | Max. Marks TW | Max. Marks POE | Total | Min. Passing Marks |
| | | | | | | | | | | MSE | IE | | | | | | |
| PCC | SE201CS | **S&H** | Discrete Mathematics | 3 | 1 | 0 | 4 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| PCC | SE202CS | **Computer** | Design & Analysis of Algorithms | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| PCC | SE203CS | **Computer** | Operating Systems | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| ESC | SE204CS | **Computer** | Object Oriented Programming | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| HSMC | SE205CS | **S&H** | Finance & Accounting | 3 | 0 | 0 | 3 | 3 | **80** | **10** | **10** | 100 | 40 | **-** | **-** | - | - |
| | | | | | | | | | | | | | | | | | |
| PCC | SE206CS | **Computer** | Design & Analysis of Algorithms | 0 | 0 | 2 | 2 | - | **-** | **-** | **-** | - | - | **25** | **25** | 50 | 25 |
| PCC | SE207CS | **Computer** | Operating Systems | 0 | 0 | 2 | 1 | - | **-** | **-** | **-** | - | - | **25** | **25** | 50 | 25 |
| PCC | SE208CS | **Computer** | Object Oriented Programming | 0 | 0 | 2 | 1 | - | **-** | **-** | **-** | - | - | **25** | **25** | 50 | 25 |
| | | | | | | | | | | | | | | | | | |
| | | | | 15 | 01 | 06 | 20 | | | | | | | | | | |
| | | | | **22** | | | **20** | | | | | **500** | | | | **150** | |
| | | | | | | | | **650** | | | | | | | | | |

**Four Year Degree Course in Engineering and Technology**
**Course and Examination Scheme with Model AICTE Curriculum**
**Third Semester Computer Science and Engineering**

**Course Code: SE102CS**
**Title of the Course: Data Structure and Algorithms**

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | **Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis. | 08 |
| II | **Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis. | 08 |
| III | **Stacks and Queues:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis. | 08 |
| IV | **Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis. | 08 |
| V | **Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. **Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis. | 08 |
| | **Total** | 40 |

## Text Book/s:


1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.


## Reference Book/s:


1. "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

**Course Code:** **SE103CS**
**Title of the Course:** **Computer Architecture and Organization**

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational concepts, Bus Structures, Software, Distributed Computing. Addressing Methods and Machine Program Sequencing : Memory Locations, Addresses and Encoding of Information, Main Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Stacks, Subroutine. | 08 |
| II | The processing Unit: Some Fundamental Concepts, Execution of a complete Instruction, Sequencing of Control Signals. Computer peripherals : I/O Devices. Processors: Introduction to RISC Processors, Array Processors, Loosely coupled, Tightly coupled Systems. | 08 |
| III | Microprogrammed Control: Microinstructions, Grouping of control signals, Micro Program Sequencing, Micro instructions with next address field, Perfecting Microinstructions, Emulation, Bit Slices, Introduction to Microprogramming | 08 |
| IV | Arithmetic : Number Representation, Addition of Positive Numbers, Logic Design for Fast Adders, Addition and Subtraction, Arithmetic and Branching Conditions, Multiplications of positive numbers, Signed – Operand Multiplication, Fast Multiplication | 08 |
| V | The Main Memory: Some Basic Concepts, Semiconductor RAM Memories, Memory System Considerations, Semiconductor ROM Memories, Multiple module Memories and Interleaving, Cache Memories, Virtual Memories, Memory Management Requirements | 08 |
| | **Total** | 40 |

## Text Book/s:


1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, " Computer Organization", V edition, McGraw-Hill Inc, 1996.Organisation", V edition, McGraw-Hill Inc, 1996
2. Computer Organization & Architecture 7e By william Stallings PHI, edition


## Reference Book/s:


1. Computer System architecture: M. Morris Mano PHI, edition

**Course Code:** **SE104CS**
**Title of the Course:** **Digital Electronics**

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | **Fundamentals of Digital Systems and logicfamilies:** Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-statelogic. | 08 |
| II | **Combinational DigitalCircuits:** Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serialadder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization. | 08 |
| III | **Sequential circuits and systems:** A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flipflops, Applications of flipflops, shiftregisters, applications of shift registers,serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flipflops, special counter IC's, asynchronous sequential counters, applications of counters. | 08 |
| IV | **A/D and D/A Converters:** Digital to analog converters: weighted resistor/converter, R-2R Ladder D/Aconverter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit,analog to digital converters: quantization and encoding, parallel comparator A/Dconverter,successive approximation A/D converter, counting A/D converter, dual slope A/Dconverter, A/Dconverterusing voltage to frequency and voltage to time conversion, specifications of A/Dconverters, example of A/D converterICs | 08 |
| V | **Semiconductor memories and Programmable logic devices:** Memory organization and operation, expanding memory size, classification And characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA). | 08 |
| | **Total** | 40 |

## Text Book/s:


1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.


## Course Code: SE105CS
## Title of the Course: Effective Technical Communication in English

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | **Definition and Features of Technical communication:** Definition and features of technical communication (precision, relevance, format, style, use of visual aids), Differences between general writing and technical writing, Types of technical communication (oral and written) | 08 |
| II | **Technical Writing-I (Official correspondence):** Emails, IOM, Business letters, Business proposals. | 08 |
| III | **Technical writing-II (Reports):** Project report, Feasibility report, Progress report, Evaluation report. | 08 |
| IV | **Technical writing- III (Manuals):** Types of manuals, User manual, Product manual, Operations manual. | 08 |
| V | **Information Transfer and Presentations:** Non-verbal (bar diagram, flow chart, pie chart, tree diagram) to verbal (writing), Verbal (written) to non-verbal, Important aspects of oral and visual presentations. | 08 |
| | **Total** | 40 |

## Reference Book/s:


1. Raman, Meenakshi & Sharma, Sangeeta. (2015). Technical Communication: Principles and Practice (3rd ed.). New Delhi, OUP.
2. Rizvi, Ashraf, M. (2017). Effective Technical Communication (2nd ed.). New Delhi, Tata McGraw Hill Education.
3. Sharma, R. C., & Mohan, Krishna. (2017). Business Correspondence and Report Writing: A Practical Approach to Business & Technical Communication (4th ed.). New Delhi, Tata McGraw Hill Education. Faculty of Engineering, O.U. AICTE Model Curriculum with effect from Academic Year 2019-20 28
4. Tyagi, Kavita &Misra, Padma. (2011). Advanced Technical Communication. New Delhi, PHI Learning.
5. Jungk, Dale. (2004). Applied Writing for Technicians. New York, McGraw-Hill Higher Education.

**Course Code:** **SE106CS**

**Title of the Course:** **Data Structure and Algorithms**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | 01 | 02 | 02 | 25 | 25 | 50 |

| | List of Practicals |
|---|---|
| I | 1st & 2nd Practical should be based on Linear & Circuler Linked list resp. |
| II | 3rd & 4th Practical should be based on Stacks & Queues. |
| III | 5th & 6th Practical should be based on Trees |
| IV | 7th & 8th Practical should be based on Arrays and Searching & Sorting techniques resp. |
| V | 9th & 10th Practical should be based on Graphs. |

**Course Code:** **SE107CS**
**Title of the Course:** **Digital Electronics**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | 01 | 02 | 02 | 25 | 25 | 50 |

| | List of Practicals |
|---|---|
| | Hands-on experiments related to the course contents of SE104 |

**Course Code:** **SE108CS**

**Title of the Course:** **Computer Workshop**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | 01 | 02 | 02 | 25 | 25 | 50 |

| | List of Practicals |
|---|---|
| 1 | Introducing a new object oriented programming, Python |
| 2 | Implement basic syntax in python. |
| 3 | Enabling students to learn Big Data, Machine Learning etc. |
| 4 | To learn programs in MATLAB environment |
| 5 | To handle Functions, Polynomials by using MATLAB commands |
| 6 | Ability to solve any Mathematical functions |
| 7 | To plot Graphics (2-D) easily and effectively |

**Course Code:** **SE109CS**

**Title of the Course:** **Environmental Sciences**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | -- | 00 | 00 | 00 | 00 | 00 |

| | List of Practicals |
|---|---|
| 1 | Create awareness and impart basic knowledge about the environment and its allied problems |
| 2 | Know the functions of ecosystems |
| 3 | Understand importance of biological diversity |
| 4 | Study different pollutions and their impact on environment. |
| 5 | Know social and environment related issues and their preventive measures. |

**Course Code:** **SE201CS**
**Title of the Course:** **Discrete Mathematics**

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 01 | -- | 04 | 04 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | Set Theory: Basic Concepts of set theory, The power set, Some operations on sets, Venn diagram, Basic set identities, Cartesian product, Properties of binary relation in a set, Matrix and the Graphs of a relation, Equivalence relation, Partial order relation, comp ability, Composition of binary relation, Function, Composition of functions, Inverse Functions, Characteristics Function of a set. | 08 |
| II | Mathematical Logic: Statements Connectives: Negotiation, Conjunction, Disjunction, Conditional and biconditional, statement formulas and truth table. Tautologies, Equivalence of formulas, Duality laws, Tautological implication. Theory of inference for statement calculus, Theory of inference for Predicate calculus. | 08 |
| III | Algebraic Structures: Semigroups and Monoids, Groups (definitions and examples) Cyclic groups, Permutation groups, subgroups and Homomorphisms. Cosets and Lagranges theorem, Normal subgroups, Rings (definition and examples), subrings, Ring Homomorphisms, Ideals and Quotient Rings, Polynomial Ring, finite fields and integral domain | 08 |
| IV | Lattice Theory & Boolean Algebra: Lattices as partial ordered set (definition and examples), some problems of lattices as algebraic system, Sub lattices, Direct Product, Homomorphism, Some special lattices, Boolean algebra (definition and examples), application to switching circuits. | 08 |
| V | Graph Theory: Basic concepts of Graph Theory, Basic definitions, Paths, Rechability and | 08 |

| | | |
|---|---|---|
| | connectedness, Matrix representation of Graphs, Trees, Tree Searching, Undirected Trees, Minimal Spanning Trees. | |
| | **Total** | 40 |

## Text Book/s:

1. Discrete Mathematics Structures with application to Computer Science by J.P.Trembly & R. Manohar
2. Discrete Maths for Computer Scientists & Mathematicians (Chapter 2,5,7) by J.L.Mott, A. Kandel, T.P.Baker
3. Discrete Mathematics by J.K.Sharma, Macmillan Publishers India

## Reference Book/s:

1. Elements of Discrete Mathematics by C.L.Liu., Tata McGraw-Hill, 2008.
2. Discrete Mathematics by Lipschutz, McGraw Hill Professional, 2007
3. Discrete Mathematics by R. Johnsonbaugh., 9th edition, John Wiley & Sons, 2006

## Course Code: SE202CS
## Title of the Course: Design & Analysis of Algorithms

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | **Introduction:** Analyzing and Designing algorithm, Asymptotic notations: Big Oh, Omega, Theta notation, Average, Best and Worst case analysis of algorithms for Time and Space complexity, Amortized Analysis, Solving Recurrence Equations using Substitution method, Recursion-Tree Method and Master method. | 08 |
| II | **Divide-and-Conquer and Greedy Strategy:** Binary Search, Merge and Quick Sort, The maximum-subarray problem, Strassen's algorithm for matrix multiplication. Greedy MethodGeneral Strategy, Knapsack problem, Job sequencing with deadlines problem, minimum cost spanning trees: Prim's algorithm, Kruskal's algorithm, Single source shortest path: BellmanFord algorithm, Dijkstra's algorithm, Difference constraints and shortest paths, Huffman Coding etc. | 08 |
| III | **Dynamic Programming:** Basic strategy, all pair shortest path: Shortest paths and matrix multiplication, Floyd-Warshall algorithm, Single source shortest paths, optimal binary search trees, Matrix-chain Multiplication, Elements of dynamic programming, traveling salesman problem | 08 |

| | | |
|---|---|---|
| IV | **Backtracking and Hash tables:** The general method, 8-Queen's problem, Sum of subsets, Graph Coloring, Hamiltonian Cycle , Graph Coloring , Hash tables, Hash functions, Open addressing. | 08 |
| V | **NP-Hard And NP-Complete Problems**: Basic concepts, Non-Deterministic algorithm, The Classes NP-Hard and NP-complete. NP-Complete problems-Satisfiability problem, vertex cover problem. NP-Hard graph problem, scheduling problem, code generation problems, Simplified NP Hard Problems. | 08 |
| | **Total** | 40 |

## Text Book/s:


1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Third Edition, PHI.
2. Ellis Horowitz, Sartaj Sahani, Rajasekaran,"Fundamentals of Computer Algorithms", Second Edition, Universities Press.


## Reference Book/s:


1. V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Addison Wesley
2. Brassard, Bratley, "Fundamentals of Algorithms", PHI


## Course Code: SE203CS
## Title of the Course: Operating Systems

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | Introduction, basic h/w support necessary for modem operating systems -Services provided by OS, system programs and system calls - brief discussions of evolution of OS - real time and distributed systems: a brief overview of issues.<br>Processes and 3 levels of scheduling - process control block and context switch -goals of scheduling and different scheduling algorithms - threads: user level and kernel level. | 08 |
| II | CPU Scheduling: Review of multiprogramming, concepts, scheduling concepts, scheduling algorithms, algorithm evaluation, multiple processor scheduling.<br>Process cooperation and synchronization, mutual exclusion and implementation, semaphores, conditional critical regions and monitors -classical inter - process communication problems - message passing. | 08 |
| III | Deadlocks and strategies for handling them - protection and security issues - access lists, capabilities, and cryptographic techniques - introduction to distributed systems.<br>File systems, user interface - disk space management and space allocation strategies -examples from | 08 |

| | | |
|---|---|---|
| | UNIX, DOS, Windows etc - directory structures - disk caching - file system consistency and logs -disk arm scheduling strategies. Disk scheduling: physical characteristics, FCFS scheduling, SSTF scheduling, SCAN, CSCAN, Selecting a disk-scheduling algorithm, sector queuing. | |
| IV | Memory management techniques - contiguous and non-contiguous -paging and segmentation - translation look aside buffers (TLB) and overheads - virtual memory and demand paging - page faults and instruction restart - problems of large address spaces - page replacement algorithms and working sets - miscellaneous issues. | 08 |
| V | Protection and Security: Goal of Protection, Mechanism and policies, domain of protection, access matrix, implementation of access matrix, dynamic protection structures, revocation, existing systems, language based protection, protection problems security. | 08 |
| | **Total** | 40 |

## Text Book/s:


1. Modern Operating Systems - Tanenbaum, Pearson Edn. 2nd edn.
2. Operating System concepts - Silberchatz & Galvin, Addison Wesley, 2nd Edn.
3. Operating System Concepts & Design - By Milan Milenkovic (TMH)


## Course Code: SE204CS
## Title of the Course: Object Oriented Programming

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | Principles of Object-Oriented Programming, Beginning with C++, Tokens, Expressions and Control Structures | 08 |
| II | Functions in C++, Function protopying, call by reference, Return by reference, Inline Function, Default Arguments, Function Overloading, Friend and Virtual Function, Classes and Objects, Defining Member Functions, Arrays within a class, Memory allocation for Objects, Arrays of Objects, Objects as Function Arguments, Friend Functions, Pointers to members | 08 |
| III | Constructors and Destructors, Parameterized constructors, Constructors with Default Arguments, | 08 |

| | | |
|---|---|---|
| | Dynamic Initialization of Objects, Copy constructors, Dynamic constructors, Constructing Two-dimensional Arrays, const Objects, Operator Overloading and Type Conversions, Inheritance: Extending Classes, Types of inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes | |
| IV | Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions and Polymorphism | 08 |
| V | Managing Console I/O Operations, Working with Files, Templates | 08 |
| | **Total** | 40 |

## Text Book/s:

1. Object Oriented Programming with C++ by E Balagurusamy McGraw-Hill
2. Let Us C++ by Y. kanetkar

## Reference Book/s:

1. C++ : The Complete reference , by Herbert Schildt , 4thedition,Tata McGraw Hill
2. Mastering C++ by K R Venugopal & Prasad, Tata McGray Hill

## Course Code: SE205CS
## Title of the Course: Finance & Accounting

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | Duration of paper, hrs | MSE | IE | ESE | Total |
| 03 | 00 | -- | 03 | 03 | 03 | 10 | 10 | 80 | 100 |

| Unit | Contents | Hours |
|---|---|---|
| I | **Basics of Accounting:** Financial Accounting–Definition- Accounting Cycle – Journal - Ledger and Trial Balance-Cash Book-Bank Reconciliation Statement (including Problems) | 08 |
| II | **Final Accounts:** Trading Account-Concept of Gross Profit- Profit and Loss Account-Concept of Net ProfitBalance Sheet (including problems with minor adjustments) | 08 |
| III | **Financial System and Markets:** Financial System-Components-Role-Considerations of the investors | 08 |

| | | |
|---|---|---|
| | and issuers- Role of Financial Intermediaries. Financial Markets-Players- Regulators and instruments - Money Markets Credit Market- Capital Market (Basics only) | |
| IV | **Basics of Capital Budgeting techniques:** Time Value of money- Compounding- Discounting- Future Value of single and multiple flows- Present Value of single and multiple Flows- Present Value of annuitiesFinancial Appraisal of Projects– Payback Period, ARR- NPV, Benefit Cost Ratio, IRR (simple ratios). | 08 |
| V | **Financial statement Analysis:** Financial Statement Analysis- Importance-Users-Ratio Analysis- liquidity, solvency, turnover and profitability ratios. | 08 |
| | **Total** | 40 |

## Reference Book/s:


1. Satyanarayana. S.V. and Satish. D., Finance and Accounting for Engineering, Pearson Education
2. Rajasekharan, Financial Accounting, Pearson Education
3. Sharma. S.K. and Rachan Sareen, Financial Management, Sultan Chand
4. Jonathan Berk, Fundamentals of Corporate Finance, Pearson Education
5. Sharan, Fundamentals of Financial Management, Pearson Education


**Course Code:** **SE206CS**

**Title of the Course:** **Design and Analysis of Algorithms**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | 01 | 02 | 02 | 25 | 25 | 50 |

| | List of Practicals |
|---|---|
| | The student is expected to perform 10 practicals based on following topics. |
| 1 | Practical No. 1 & 2 should be based on Unit No.I |

| | |
|---|---|
| 2 | Practical No.3 & 4 should be based on Unit No. 2 |
| 3 | Practical No. 5 & 6 should be based on Unit No. 3 |
| 4 | Practical No. 7 & 8 should be based on Unit No. 4 |
| 5 | Practical No. 9 & 10 should be based on Unit No. 5 |

**Course Code:** **SE207CS**

**Title of the Course:** **Operating Systems**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | 01 | 02 | 02 | 25 | 25 | 50 |

| | List of Practicals |
|---|---|
| | The student is expected to perform 10 practicals based on following topics. |

| | |
|---|---|
| 1 | Practical no. 1 & 2 should be based on CPU scheduling algorithms like FCFS,SJF,RR, Priority etc for multiprogramming system |
| 2 | Practical no. 3&4 should be based on process synchronization problems. |
| 3 | Practical no.5 &6 should be based on deadlock detection problems . |
| 4 | Practical no. 7 should be based on disk scheduling |
| 5 | Practical no. 8, 9 & 10 should be based on memory management. |

**Course Code:** **SE208CS**

**Title of the Course:** **Object Oriented Programming**

| Course Scheme | | | | | Evaluation Scheme (Laboratory) | | |
|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/week | Credits | TW | POE | Total |
| -- | -- | 01 | 02 | 02 | 25 | 25 | 50 |

| | List of Practicals |
|---|---|

| | The student is expected to perform 10 practicals based on following topics. |
|---|---|
| 1 | Write a Simple C++ program without using Class & Object |
| 2 | Write a program using Class & Object. |
| 3 | Write a program using Function Overloading. |
| 4 | Write a program using Operator Overloading. |
| 5 | Write a program using Inheritance. |
| 6 | Write a program using Virtual Function. |
| 7 | Write a program using Friend Function. |
| 8 | Write a program using Constructor. |
| 9 | Write a program using Dynamic Initialization of Objects. |
| 10 | Write a program using Copy Constructor. |
| 11 | Write a program using Virtual Base Class. |
| 12 | Write a program using Abstract Class. |
| 13 | Write a program for file handling |