M.SC COMPUTER SCIENCE SYLLABUS

UNDER

CHOICE BASED CREDIT SYSTEM

1/2 semester: - 2020-2021 onwards
3/4 semester: - 2021-2022 onwards

P.G. DEPARTMENT OF COMPUTER SCIENCE

KHALLIKOTE AUTONOMOUS
COLLEGE
BERHAMPUR

KHALLIKOTE AUTONOMOUS COLLEGE
Course Structure of M.Sc. (Computer Science)

FIRST SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
CSC -1.01	Discrete Mathematical Structures	20	80
CSC -1.02	Computer Architecture	20	80
CSC -1.03	Object Oriented Programming using C++	20	80
CSC -1.04	Advanced Data Structure	20	80
CSL -1.05	Object Oriented Programming using C++ Lab & Data Structure Lab	---	100

SECOND SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
CSC -2.01	Advanced Database Management Systems	20	80
CSC -2.02	Advanced Operating System	20	80
CSC -2.03	Theory of Computation	20	80
CSC -2.04	Java Programming	20	80
CSC -2.05	Advanced Database Management Systems Lab &Java Programming Lab	---	100

THIRD SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
CSC -3.01	Optimization Techniques	20	80
CSC -3.02	Design and Analysis of Algorithms	20	80
CSC -3.03	Advanced Computer Network	20	80
CSE -3.04	Computer Graphics	20	80
CSE -3.05	Advance Java Lab & Computer Networking Lab	---	100

FOURTH SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
CSP - 4.01	Software Engineering	20	80
CSP - 4.02	Elective-I (Compiler Design)	20	80
CSP - 4.03	Elective-II (Data Mining & Data Warehousing)	20	80
CSP - 4.04	Project Work & Viva	----	200

Elective-I

1. Mobile Computing
2. Pattern Classification
3. Parallel and Distributed Computing
4. Digital Image Processing
5. Compiler Design

Elective-II

1. Systems Modeling & Simulations
2. Artificial Intelligence
3. Data Mining & Data Warehousing
4. Cryptography and Network Security
5. Machine Learning

FIRST SEMESTER
CSC -1.01 Discrete Mathematical Structures

Unit I
Logic: Fundamentals of logic, Logical inferences, Methods of proof of an implication, First Order Logic and other methods of Proof, Rules of Inference for quantified Propositions, Mathematical induction.

Unit II
Relations and Diagraphs : Relations and Directed Graphs special Properties of Binary Relation, Equivalence Relations, Ordering Relations, Lattices and Enumerations. Operations on Relations, Paths and Closures, Directed Graphs and Adjacency matrices

Unit III
Graphs: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi Graphs and Euler Circuits, Hamiltonian Graphs.

Unit IV
Boolean algebra: Introduction to Boolean algebra, Boolean Functions, Switching Mechanisms, Minimization of Boolean Functions.
Algebraic structures & Applications to Finite State Machines and Language: Binary Operations, Semi Groups, Groups, finite State Machines, Semi Groups, Machines and Languages, simplifications of Machines.

Reference Books:
1. Discrete Mathematics for Computer Scientists & Mathematics J. Mott, A. Kandel, T. P. Baker PIII (1999) [Chapters 1.5-1.10,4.1-4.7,5.1-5.10,6.1-6.5]
2. Discrete Mathematical Structures for Computer Science, Bernard Kolman, Robert C. Busby, Saaron Ross, PIII (1999) [Chapters 9.1,9.2,9.4,10.3,10.6]

CSC - 1.02 Computer Architecture

Unit I
Information Representation: Number systems, Binary numbers, Sign Magnitude & 2s complement representation. Fixed and Floating point, IEEE-754 Single Precision format, IEEE-754 Double Precision format, Floating-Point Arithmetic, IEEE Standard for Binary Floating-Point Arithmetic , Precision and range, BCD code, ASCII and EBCDIC
Digital Electronics: Boolean algebra, Logic gates, Truth Tables, Combinational circuits, Karnaugh map, Flip-flops, Sequential circuits

Unit II
Combination RTL Components : Integrated circuits, Multiplexer, Demultiplexers, Decoder, Encoder, Registers, Shift Registers, Binary Counters, Memory Unit - RAM, ROM. Parity generators and checkers, Error detection and correction : Hamming Code, Binary Adder-Subtracter, Decimal adder, Binary multiplier, magnitude comparator, Programmable Logic Devices- PLA, PAL, ROM. Sequential RTL components : Registers counters

Unit III
Central Processing Unit : General Register Organization, Stack Organization, Reverse Polish Notation, Machine Language instructions, Addressing modes, Instruction formats, Instruction set selection, Instruction cycle and execution cycle, RISC vs CISC
8085 Microprocessor: Block diagram, System Bus, Addressing modes, Instruction Set, Instruction Set Classification, Instruction Format, Simple assembly language Programming using 8085 microprocessor
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Unit IV
Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures: Time shared common bus, Multiport memory, Crossbar switch, Multistage switching network, Hypercube system. Interprocessor Arbitration, Interprocessor communication and Synchronization, Cache Coherance
Pipeline and Vector Processing: Parallel processing, Flynn's classification, Pipelining, Arithmetic Pipeline, Instruction pipeline, RISC Pipeline, Pipelining in CPU design, Superscalar processors, Vector Processing, Array Processing.
Quantitative principles of Computer Design : Clock cycle, Clock cycle time, Clock speed, CPU time, Instruction count, Instructions per clock, Cycles per second, Clock cycles per instruction, CPU clock cycles, Amdahl's Law,

Text Books:
1. Mano M, Computer System and Architecture (3rd Ed) (PHI)
2. J.L.Hennessy&D.A.Patterson – Computer Architecture – A Quantative approach 2nd Edition – Mergan Kaufman Pub – 1996
3. V.C.Hammacher, Z.G.Vranesic, S.G.ZAky – Computer Organization McGraw Hill 1996
Reference Books:
1. K.Hwang – Advanced Computer Architecture, McGraw Hill, 1993
2. D.Sima, T.Fountation, P.Kacsak – Advanced Computer Architecture – A design space Approach, Addison Wesley, 1997

CSC -1.03 Object Oriented Programming using C++

Unit I
Introduction to object oriented Programming, Features of OOPS. Getting started with C++ Data type, variables, expression, control structure, Concept of reference variable, I/O Stream class. Function: Definition, parameter passing, references, inline function, function overloading, function with arguments and reference, returning by reference.

Unit II
Class: Structure and class comparison Classes & objects , private, public & protected access specifies, data member and member function , static data member & member function, inline function ,friend function, constructor, types of constructor, destructor.

Unit III
Dynamic memory management (new and delete), pointer to object. Inheritance: What is inheritance? Types of inheritance, Member accessibility, function overriding, derived class by derived by different access specifiers, multipath inheritance and pointer to objects in inheritance. Polymorphism: Run time polymorphism & virtual function, abstract class, object slicing.

Unit IV
Operator Overloading: Overloading of unary & binary operators, overloading using member function & friend function, overloading of Stream operator, Copying object, Type Conversion – Class to basic conversion, basic to class conversion
Exception Handling - Exception and derived classes, try, catch, throw statement, catching all exception, unexpected exception, re-throwing an exception.
Templates - Function templates, class templates, Introduction to STL - Containers, algorithms, iterators

Reference Books:
1. A.N. Kamthane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education.
2. E. Balguruswamy, "Object Orientd Programming with C++", TMH Publisher.
3. K.R.Venugopal, Rajkumar,,TRavishankar, "Mastering C++", TMH Publisher

CSC -1.04 Advance Data Structure

Unit I
Basic Concepts of OOPs, Templates Function and class templates. Algorithms: performance analysis: time complexity and space complexity. ADT, List (Singly, Doubly and Circular) Implementation, Array, Pointer

Unit II
Stacks and Queues: ADT, Implementation and Applications. Trees: General Tree, Binary Search tree, Expression tree, AVL. Introduction to Red Black trees, B Trees, Implementations, Tree Traversals

Unit III
Priority Queue, Implementation, Graphs, Directed Graphs, Shortest Path Problem.
Undirected Graph: Spanning Trees, Graph Traversals: BFS, DFS
Hash table representation: hash functions, collision resolution, separate chaining, open addressing, linear probing: quadratic probing, double hashing, rehashing, Garbage collection and Compaction,

Unit IV

Searching Techniques , Sorting , Bubble Sort , Insertion Sort ,Quick Sort ,Heap Sort, Radix Sort ,Merge Sort , Introduction to Designing Techniques : Divide and Conquer , Dynamic Programming, Greedy Algorithm , Backtracking.

Text Books:

1. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++ ‖ , Pearson Education, 2002.
2. Aho Hopcroft Ullman, —Data Structures and Algorithms ‖ , Pearson Education, 2002.
3. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition,
4. E. Balguruswamy. Object-Oriented Programming with C++, 3rdEdition, 2007, Tata McGraw-Hill (TMH) Publication Pvt. Ltd., New Delhi.

Reference Books:

1. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI
3. C++ Primer – Lippman, Addison Wesley

CSL -1.05 Object Oriented Programming using C++ Lab

01. Implementing classes and creation of objects.
02. Checking Precedence of operators & side effects.
03. Implementing various control structures & loops.
04. Making structured programming & stepwise refinement.
05. Implementing Procedural abstraction with functions.
06. Implementing Constructors and destructors.
07. Implementing Data abstraction & inheritance.
08. Implementing Multiple & hybrid inheritance.
09. Implementing Polymorphism concepts.
10. Implementing Operator overloading & friend's functions.
11. Working with new & delete, object copying.
12. Implementing Object slicing, this operator.
13. Exception handling mechanisms.
14. Implementing class templates & function templates.
15. Creating files in C++ and file related operations.

Data Structure Lab

01. Matrix Operations-Add, Multiply, Rank, Det.etc.
02. Stack & Queue operations using Arrays.
03. Self-referential structures & single linked list operations.
04. Implementing Stack and queues using linked lists.
05. Implementing Polish Notations using Stacks.
06. Circular and double linked list operations.
07. Implementing priority queue & dequeue using lists.
08. Evaluating polynomial operations using Linked lists.
09. Implementing set related operations & Hashing.
10. Linear & binary search, bubble sort technique.
11. Insertion sort, selection sort & merge sort techniques.
12. Quick sort, counting sort and Shell sort techniques.
13. Radix (bucket) and address calculation sort methods.
14. Binary tree traversals (preorder, inorder, postorder).
15. Heap sort & AVL tree implementations.
16. Graph representation with matrix & adjacency lists.

SECOND SEMESTER

CSC -2.01 Advanced Database Management Systems

Unit I
Introduction: Introduction to File and Database systems- History- Advantages, disadvantages- Data views – Database Languages – DBA – Database Architecture – Data Models -Attribute types – Keys -ER diagram–EER Diagram- Overview of Network and Hierarchical models.

Unit II
Relational Model: The relational data model, Relational constraints, Relational calculus. The domain relational calculus, Relational algebra .ER and ERR to relational mapping Query languages – SQL – Data definition – Queries in SQL – SQL: Basic queries .Complex queries, Insert delete and update statement in SQL, Views, Constraints and assertion, Updates

Unit III
Database Design: Design Phases – Pitfalls in Design –Functional Dependence – Amstrong Axioms, Normalization (1NF, 2NF, 3NF, BCNF, 4NF, 5NF).

Unit IV
Transaction Management: Transaction concept – state- Serializability – Recoverability- Concurrency Control –Locks- Two Phase locking – Deadlock handling– Time stamp odering, File Organization – Organization of Records in files – Indexing and Hashing.
Query processing and Optimization: Basic algorithms for Query operations, Using heuristics selectivity & cost estimates in query optimization, semantic query optimization
Current Trends: Object-Oriented Databases- OODBMS- rules – ORDBMS- Complex Data types – Distributed databases – characteristics, advantages, disadvantages, rules- Homogenous and Heterogeneous-Distributed data Storage –Overview Data mining- Data Warehousing

Text Book:
1. Rameez Elmasri, Shamkant B. Navathe, 'Fundamentals of Database Sytems', 5th Ed., Pearson Education, 2009.

Reference Book:
1. Philip J. Pratt, Joseph J Adamski, 'Database Management Systems', Cengage Learning, 2009.
2. Abraham Silberschatz, Henry F. Korth & S. Sudarshan, 'Database System Concepts',. McGraw Hill International Edition, 2006
3. Arun K Majumdar, Pritimoy Bhattacharyya, 'Database Management Systems', TMH, 2009
4. ISRD group, 'Introduction to Database Management Systems', TMH, 2008
5. Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', McGraw Hill ,International Edition, 2003.
6. Ramon A Mata-Toledo, Pauline K Cushman, 'Database Management Systems', TMH, 2008.

CSC -2.02 Advance Operating System

Unit I
Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems. Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations. System Boot.

Unit II
Process: Process Concept, Process Scheduling, Operations on Processes, Inter-Process Communication, Examples of IPC Systems, Communication in Client-Server Systems Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Process synchronization: Background, Critical section problem, Semaphore, Overview of classical synchronization problem: The Bounded-Buffer problem, The Reader-Writers Problem, The Dining -Philosopher Problem, Monitors.

Unit III
Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.

Unit IV
Virtual-Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.Introduction to advanced OS, It's evolution, Categorization, Distributed operating system:Architectures, issues in Distributed operating systems, Limitation of Distributed Systems.

Text Books:
1. Abraham Silberschatz and Peter Bear Galvin, "Operating System Concepts", Addison Wesley.
2. Mukesh Singnal and Niranjan G. Shivaratri , Advanced Concepts in operating System, TMH.

Reference Books:
1. Milan Milenkovic, System Concepts & Design, TMH
2. H.M. Beitel, Operating System, Pearson.
3. Andrew, S Tannenbaum , "Operating System", PHI

CSC -2.03 Theory of Computation

Unit I
Introduction to finite automata, Central concepts of automata theory, Informal picture of finite automata, Deterministic finite automata, Non-deterministic finite automata, Application, Formal Language

Unit II
Regular expressions, Finite automata and Regular expressions, Applications of regular expressions, Algebraic laws of regular expressions, Pumping Lemma and its application for regular languages, Closure and Decision properties of regular languages

Unit III
Context-Free Grammars, Parse trees, Ambiguity in Grammar & Languages, Pushdown automation. The language of PDA, Equivalence of PDA's and CFG's, Deterministic pushdown automata, Chomsky Normal form, The pumping Lemma for context free languages, Decision properties of CFL's

Unit IV
The Turing machine, Programming techniques for Turing machines, Extension to the basic Turing machine, Restricted Turing machine, Turing machines and computers. Non-Recursively enumerable languages, Undecidable problem that in recursively enumerable, Undecidable problem about Turing machines, Post's correspondence problem, other undecidable problems.

Text Books
1. Introduction to Automata Theory, Languages and Computation- J.Hoperoft, R.Motwani, J.D.Ullman – Pearson Education
2. Mishra, Chandrashekharan, "Theory of Computer Science", PHI

Reference Books
1. Introduction to Theory of Computation – M.Siper, Thomson Learning
2. P. Linz, "An Introduction to formal Languages and Automata", Norasa, 2000
3. LewishPapadimitra: theory of Computations, Prentice Hall of India, New Delhi

CSC -2.04 Java Programming

Unit I
Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes.

Unit II
Use of Keywords: static, final, this, Class Abstraction and Encapsulation, Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading, Object: The Cosmic Superclass, Abstract Classes and Interfaces, Packages, Object-Oriented Design and Patterns.

Unit III
GUI Programming: GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Exception Handling, Binary I/O.
Files & Streams, Recursion, Dynamic Binding, Generics & Generic Programming, Java Collections Framework, Algorithm Efficiency, Searching & Sorting.

Unit IV
Multithreading, Networking, JDBC, Internationalization, Advanced GUI Programming: MVC, JavaBeans and Bean Events, Containers, Layout Managers, and Borders, Menus, Toolbars, Dialogs and Swing Models, JTable and JTree, New Features of Java.

Reference Books:
1. Y. Daniel Liang, "Introduction to Java Programming: Comprehensive Version", 7th Edition, 2009, Pearson Education Inc., New Delhi. (Book Chapters: 1 to 24, 26, 29 to 37)
2. Herbert Schildt, "Complete reference of Java" 7th edition, TMH, New York
3. Richard A. Johnson, "An Introduction to Java Programming and Object Oriented Application Development", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. E. Balagurusamy, "Programming with Java: A Primer", 3rdEdition, 2008, McGraw-Hill Education (India), New Delhi.
5. Harvey M. Deitel& Paul J. Deitel, "Java How to Program", 8thEdition, 2009, PHI Learning Pvt. Ltd., New Delhi.
6. Mahesh P. Bhave& Sunil A. Patekar, "Programming with Java", First Edition, 2009, Pearson Education, Inc. New Delhi.

CSL -2.05 Advanced Database Management Systems Lab
01. Learning basic DDL and DML commands
02. Learning basic DCL and TCL commands.
03. Insertion, Deletion, Updating to a table using SQL commands
04. Working with dual table.
05. Data retrieval using Select & where clause.
06. Oracle inbuilt functions-Date, aggregate, group by etc.
07. Use of Joins and Sub queries.
08. Views, sequences and indexes.
09. Managing users, privileges and roles.
10. PL/SQL-Data types, control structures.
11. Creating procedures with PL/ SQL.
12. Error handling in PL/ SQL.
13. Cursor Management in PL/ SQL.
14. Writing Programs on Packages & triggers.

Java Programming Lab
01. Introduction to java, Compiling & executing a java program.
02. Program with data types & variables.
03. Program with decision control structures: if, nested if etc.
04. Program with loop control structures: do, while, for etc.
05. Program with classes and objects.
06. Implementing data abstraction & data hiding.
07. Implementing inheritance.
08. Implementing and polymorphism.
09. Implementing packages.
10. Program with modern features of java.
11. Implementing interfaces and inner classes
12. Implementing wrapper classes
13. Working with files.
14. Working with AWT
15. Working with JDBC

THIRD SEMESTER

CSC - 3.01 Optimization Techniques

Unit I
Graphical solution of linear programming problems, The Simplex Method: Computational procedure, .Artificial variable techniques, Two-phase simplex method.
Duality in linear programming: Concept of duality. Formulation of primal dual pairs, Duality and simplex method, Dual simplex method and algorithm, Computational procedure of the revised simplex method

Unit II
Transportation Problems: Mathematical formulation, Vogel's method with optimality test - MODI method, Unbalanced transportation problem. Assignment problem - Mathematical formulation, Hungarian assignment method, the travelling salesman's problem
Sequencing problems: Problems with n jobs & 2 machines, n jobs and k machines, 2 jobs and k machines

Unit III
Integer Programming: Gomory's methods, Branch & Bound method.
Network Scheduling: Basic terms, Critical path methods, PERT
Queuing Theory: Characteristics of queuing systems, Poisson process and exponential distribution, Steady state M/M/1, M/M/C (Models I, II, IV, V)

Unit IV
Inventory Control: Inventory Costs, Economic order quantity, Deterministic inventory problems, EOQ problems with no shortage, With shortage, Production problem with no shortage, with shortage
Replacement Problem: Replacement of items that deteriorate, Replacement of items that fail - Group and individual replacement, Recruitment and promotion problems.

Reference Books:
1. Operations Research - Kanti Swarup, P. K. Gupta & Man Mohan, Sultan Chand & Sons Pub.
2. Operations Research – S. D. Sharma, Kedar Nath Ram Nath Pub.
3. Operation Research - Hamdy A. Taha, McMillan Pub.

CSC- 3.02 Design and Analysis of Algorithm

Unit I
Introduction to design and analysis of algorithms, Growth of functions, Recurrences, Solution of recurrences by Substitution, Recursion tree and Master method, Worst case analysis of Merge sort, Quick sort and Binary search
Heapsort: Heaps, Building a heap, The Heapsort algorithm, Priority Queue, Lower bounds for sorting

Unit II
Dynamic Programming: Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence
Greedy Algorithms: An activity- selection problem, Elements of greedy strategy, Fractional knapsack problem, Huffman codes

Unit III
Data structures for Disjoint Sets: Disjoint set operations, Linked-list representation of disjoint sets, Disjoint-set forests.
Graph Algorithms: Elementary Graph Algorithms: Representations of graphs, Breadth-first search, Depth-first search, Minimum Spanning Trees: Kruskal and Prim's algorithms, Single-Source Shortest Paths: The Bellman-Ford and Dijkstra's algorithm, All-Pairs Shortest Paths: The Floyd-Warshall Algorithm

Unit IV
Maximum Flow: Flow Networks, The Ford-Fulkerson method, Polynomials and the FFT: Representation of polynomials, The DFT and FFT, String Matching: The naïve stringmatching algorithm, The Rabin-Karp algorithm.
NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs, NP-completeness problems, Approximation Algorithms: The vertex-cover problem, The travelling-salesman problem, The set-covering problem, The subset-sum problem

Reference Books:
1. Introduction to Algorithms: T. H. Cormen, C. E. Leiserson, R. L. Rivest (PHI), Second Edition.
2. E. Horowitz, S. Sahani, S. Rajsekharan, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2007
3. Algorithm Design – Goodrich, Tamassia, Wiley India.
4. Algorithms By Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education

CSC-3.03 Advanced Computer Network

Unit I
Introduction: Data Communication, Network Protocols and Standards, Point to Point and Multi Point line configuration, Network Topologies: Mess, Star, Tree, Bus, Ring Transmission Modes: Simplex, Half Duplex, Networks: LAN, MAN, WAN. The OSI Models: Function of Layers. TCP/ IP Protocol Suit
Signals: Analog and Digital signals, Periodic and Aperiodic signal,
Encoding and Modulating: Digital to Digital conversion. Unipolar. Polar Bipolar, Analog to Digital conversion AM, FM, PM

Unit II
Transmission of Digital data: Parallel and Serial transmission. DTE/DCE interface, Modems, Guided and Unguided transmission media. Transmission impairment, Performance Multiplexing: Frequency division, Wave division and Time division multiplexing, the Telephone system, Digital Subscriber Line (DSL), Error Detection and Correction: Types of Error, Redundancy Checks (VRC, LRC, CRC), Error Correction

Unit –III
Data Link Control: Line Discipline, Flow Control, Error Control
Data Link Protocol: Asynchronous and Synchronous Protocols, Character and Bit Oriented Protocols.
Local Area Networks: IEEE 802 standards, Ethernet, Token Bus, Token Ring, FDDI
Switching: Circuit Switching, Packet Switching, Message Switching
Integrated Services Digital Network (ISDN), Services, History, Subscribers access to ISDN, The ISDN layers, Broadband ISDN

Unit IV
X.25: X.25 Layers, Protocols related to X.25
Frame Relay: Introduction, Frame Relay operation. Frame Relay layers, Congestion Control, Leaky bucket algorithm. Traffic control
Networking and Internetworking Devices: Repeaters, Bridges, Routers, Gateways, Routing Algorithms.
TCP/IP Protocol Suite: Overview, Network Layer, Addressing Subneting, Transport Layer, Application Layer: Client Server Model, BOOTP, DHCP, DNS, Telnet, FTP, SMTP, SNMP, HTTP, WWW

Reference Books:
1. Behrouz A Forouzen "Data Communications and Networking " Tata McGraw Hill.
2. Stalling W "Computer Communication Networks " Prentice Hall
3. Tannenbaum A.S "Computer Networks" PHI
4. Bartee T.C "Data Communication ,Network and systems" BPB
5. Schweber WL"Data Communication "Mc Graw Hill
6. Steven W.R: TCP/IP Illustrated ,Vol 1 ,The protocols" Addition Wesley

CSC -3.04 Computer Graphics

Unit I
A survey of computer graphics: Computer Aided Design, Presentation graphics, Computer Art, Entertainment, Education and training, Visualization, Image processing, Graphical User Interfaces.
Overview of graphics Systems: Video display devices, Raster Scan Displays, Random Scan Displays, Input devices, Hard-copy devices, Graphics software. Output Primitives: Points and Lines, Line drawing Algorithms (DDA and Bresenham's Line algorithm), Mid-point circle algorithm, Filled-Area Primitives. Attributes of Output
Primitives: Line Attributes, Curve Attributes, Color and Grayscale Levels, Area-Fill Attributes and Character Attributes, Bundled attributes and anti-aliasing.

Unit II
Two dimensional geometric Transformation: Basic Transformation(Translation, Rotation, Scaling), Matrix representation and Homogenous Coordination, Composite Transformation, Reflection Shear, Transformation between coordinate systems, Two dimensional viewing: The Viewing Pipeline, Viewing coordinate reference frame, window to viewport coordinate transformation, Line Clipping: (Cohen-Sutherland & Liang-Barsky algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).

Unit III
Three dimensional object Representation: Polygon Surfaces, Quadratic Surfaces, Spline Representation, Beizer Curves and Surfaces, B-Spline Curves and Surfaces, Fractal Geometry Methods: Fractal Generation Procedures, Classification of Fractals, Fractal Dimension, Geometric Construction of Deterministic Self Similar Fractals, Self Squaring fractals.
Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling. Reflections, Shears, Composite Transformations, Modeling and coordinate Transformations. Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Perspective) Clipping.

Unit IV
Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer Method, A-Buffer Method, Scan line and Depth Sorting, Illumination Models and Surface-Rendering Methods: Basic Illumination Models, Displaying Light Intensities, Halftone Patterns and Dithering Techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading),

Text Books:
1. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004, Pearson Education, Inc. New Delhi.

Reference Books:
2. J.D. Foley, A.Dam, S.K. Feiner, J.F. Hughes: Computer Graphics Principle and Practice Addision Wisely.

FOURTH SEMESTER

CSC -4.01 Software Engineering

Unit I
Introduction to software Engineering: Basic concepts about software and program and Evolution of Software Engineering, Basic concepts on process and life cycle models. Models: Waterfall, Prototype, Evolutionary, Incremental, Spiral, V Model, RADM. Requirements Engineering, Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, Software design: Methods and strategies, desirable design attributes, Concept of good design, Cohesion and coupling.

Unit II
Function-Oriented Software Design: Structured system analysis and structured design, formal approach design, data flow oriented design. Software Coding and Testing: Coding Standard and Guidelines, Code Review, Software Inspection, Testing: Unit, Integration, System Testing, Black box and White box testing, Incremental Testing, Formal Proof of Correctness, Software Matrix. Introduction to Software Verifications.

Unit III
Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD. Object oriented vs. function-oriented design, Object oriented modelling.
Context Models, Interaction Models, Structural Models, Behavioural Models, Model-Driven, Engineering, Architectural Design, Architectural Design Decisions, Architectural Views, Architectural Patterns, Application Architectures.

Unit IV
A Case Study: (Ex: - ATM, Trading System, Banking System, Library Information System, Student Information System etc.)
Software Reliability and Quality Management: S/W and H/W Reliability, Reliability Matrices, S/W Quality, ISO9000. Software Engineering Management: Introduction to Capability Maturity Model, Quality Assurance and Software Cost Estimation (Delphi, COCOMO), Introduction to Computer Aided Software Engineering, Software Reuse and Maintenance.

Reference Books:
1. Rajib Mall, "Introduction to S/W Engineering", PHI.
2. Rohit Khurana, "Software Engineering Principles and Practices" 2nd Ed.
3. R.S. Pressman, "Software Engineering, A practitioner's approach", McGraw Hill.
4. Grady Booch, Rambaugh, IvarJacohson, "Unified Modeling Language", User Guide Pearson.
5. H. Srimathi, H. Sriram, A. Krishnamurthy, Scitech, "Object Oriented Analysis & Design Using UML"
6. Craig Larman , "Applying UML and Patterns".
7. Satzinger, Jackson, Burd, "Object-Oriented Analysis & Design with the Unified Process" Cengage Learning.

CSE-4.02 Elective-I (Compiler Design)

Unit -I
Introduction: Overview and phases of compilation.
Non-deterministic and deterministic finite automata (NFA & DFA), Conversion of NFA to DFA
Classification of grammars, regular grammar, regular expressions and regular languages,
Context free grammars, ambiguous grammar

Unit -II
Scanners: Top down parsing, LL grammars, Bottom up parsing, Polish expressions.
Operator precedence grammar, LR grammars, Comparison methods Error handling
SLR parsers and construction of SLR parsing tables, LR(1) parsers and construction of
LR(1) parsing tables, LALR parsers and construction of efficient LALR parsing tables,
parsing using ambiguous grammars
Symbol table handling techniques, Organisation for non-block and block structured
Languages

Unit – III
Syntax Directed Translation: Syntax directed definitions (SDD), inherited and synthesized
attributes, dependency graphs, semantic rules, application of syntax directed translation.
DAG for expressions, three address codes - quadruples and triples, types and declarations,
translation of expressions, array references, type checking and conversions, translation of
Boolean expressions and control flow statements, back patching, intermediate code
generation for procedures.
Run time storage administration, Static and Dynamic allocation

Unit-IV
Intermediate forms of source program, Semantic analysis and code generation.
Code optimization folding, peephole optimization, Redundant sub-expression evaluation,
redundant and un-reachable codes, Optimization with interactive loops. Basics of flow of
control optimization

Reference Books:
1. A.V. Aho, R. Sethi & J.D. Ullman "Compilers Principles Techniques and Tools"
Pearson Education
2. Kenneth C. Louden "Compiler Construction Principles & Practice "Cengage
Learning Indian Edition.

CSE- 403 ELECTIVE-II (DATA WAREHOUSING AND DATA MINING)

UNIT- I
Concept of Data warehousing, 3-tier architecture, multidimensional data model, schemas for multidimensional databases, OLAP, ROLAP, MOLAP and HOLAP operations, data mining: characterization & discrimination, association analysis, classification and prediction, cluster analysis.

UNIT- II
Concept hierarchies, interestingness measures, data mining query language, data generalization and summarization-based characterization, Mining association rules, mining single-dimensional Boolean association rules, Apriori algorithm for finding frequent itemsets, iceberg queries, mining multilevel association rules, mining distance-based association rules, correlation analysis.

UNIT - III
Classification and prediction: decision tree based classification, Bayesian classification, classification by back propagation, k-nearest neighbor classifier, prediction based on linear and multiple regression, Cluster analysis: categorization of clustering methods, partitioning methods, k-Means and k-Medoids, hierarchical methods, Density-based clustering (DBSCAN)

Unit - IV
Mining spatial databases, mining multimedia databases, mining text databases, mining WWW, classification of web documents, web usage mining, data mining applications in e-commerce and intrusion detection.

Books:

1. Data mining; Concepts and techniques by J. Han and M. Kamber (Morgan Kaufmann)

2. Data Mining by A.K. Pujari (University press)

CSE- 404 (Project Work & Viva)

F.M:200

(Thasis:80,presentation:80,viavoce:40)

Duration:6 Hrs