



NAGARJUNA UNIVERSITY

4-year B. Tech. Degree Course  
(Semester System)

**COMPUTER SCIENCE &  
ENGINEERING**

**SYLLABUS**

**W.E.F. 2000 – 2001**

**UNIT-I**

FOURIER SERIES: Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, odd and even functions, Expansions of odd and even periodic functions, Half - range series, typical wave forms, Parseval's formula, complex form of Fourier series, practical Harmonic analysis.

**UNIT-II**

INTEGRAL TRANSFORMS: Introduction, Definition, Fourier integrals, Fourier sine and cosine integrals - complex form of Fourier integrals. Fourier transforms, Fourier sine and cosine transforms - Finite Fourier sine and cosine transforms, Fourier transforms of the derivatives of a function.

Solution of Algebraic and Transcendental Equations : Introduction, Bisection method, Iteration method, Method of false position, Newton - Raphson method, Solution of simultaneous linear equations - Gauss elimination and Gauss - Seidel iterative methods.

**UNIT-III**

INTERPOLATION : Introduction, Finite Differences - Forward, Backward, Central Differences, Symbolic Relations, Differences of a polynomial, Newton's formula for interpolation, Central difference interpolation formulae -Gauss's, Sterling's, Bessel's formulae Interpolation with unequal intervals - Lagrange's and Newton's Interpolation formulae.

Numerical Differentiation - finding first and second order differentials using Newton's formulae.

**UNIT-IV**

NUMERICAL INTEGRATION - Trapezoidal rule, Simpson's rule and Gauss quadrature formula.

Numerical solutions of ordinary and partial differential equations - Euler's method, Taylor's series method Picard's method. Runge - Kutta method of 4th order (for first order equations only), Boundary value problems, Solution of Laplace's and Poisson's equations by iteration methods.

**Textbooks:**

1. B.S.Grewal, 'Higher Engineering Mathematics', 36<sup>th</sup> edition, Khanna Publishers, Delhi.
2. S.S.Sastry, 'Introductory Methods of Numerical Analysis', PHI, New Delhi.

**Reference Books:**

1. Erwin Kreyszig, 'Advanced Engineering Mathematics'. New Age International (P) Ltd. Wisely Eastern Ltd.
2. M.K.Jain, S.R.K.Iyengar, R.K.Jain, 'Numerical Methods for Scientific and Engineering Computation' Wisely Eastern Ltd.,
3. M.K.Venkata Raman, 'Engineering Mathematics', 5<sup>th</sup> edition, The National Publishing Co., Chennai.

**UNIT-I**

INTRODUCTION : The unit of charge, Voltage, Current, Power and Energy, Circuit Elements ; Circuit concept, Resistance, Inductance and capacitance, KVL and KCL, Series and parallel combination of network elements types of sources, energy stored inductors and capacitors.

METHODS OF ANALYSING CIRCUITS: Mesh analysis, Nodal analysis, Source transformations.

**UNIT-II**

NETWORK THEOREMS: Star-Delta transformation, Superposition Thevenin, Norton, Reciprocity, compensation, Maximum power, Tellegen and Application of theorems to DC & AC circuits

ALTERNATING PERIODIC WAVEFORMS: Instantaneous current, voltage and power, peak, effective and average voltage and current, Crest factor and form factor, phase and phase difference.

SINUSOIDAL STEADY STATE ANALYSIS: 'j' notation and phasor representation. Response of RLC, series, parallel and series parallel circuits to sinusoidal excitation, computation of active, reactive and complex power, power factor.

**UNIT-III**

TWO-PORT NETWORK: Two-port Network, Open circuit impedance (Z), short circuit admittance (Y), Hybrid parameters.

RESONANCE: Series and parallel resonance, selectivity, bandwidth and Q of tuned circuits. Time constant

**UNIT-IV**

POLYPHASE CIRCUITS: Polyphase system, Advantages of three phase systems, Generation of 3-phase voltages, phase sequence, interconnection of 3 phase sources and loads, star to delta and delta to star transformation. Voltage, current and power in star and delta connected systems, 3-phase balanced circuits.

**Textbooks:**

1. William H, Hayt & Jack E. Kemmerly, 'Engineering Circuit Analysis', 5<sup>th</sup> edition, McGraw Hill Co.
2. A.Sudhakar & S.P.Shyammohan, 'Circuits & Networks : Analysis and Synthesis', 2<sup>nd</sup> edition, Tata McGraw Hill Co.
3. Edminister, 'Electric Circuits', 3<sup>rd</sup> edition, Schaum Series, Tata McGraw Hill Pubs.

**Reference Books:**

1. M.E.Vanvankanberg, 'Network Analysis', 3<sup>rd</sup> edition, PHI, New Delhi
2. F.F.Kuo & Franklin, F, 'Network Analysis & Synthesis', 2<sup>nd</sup> edition, Johnwiley Pubs.

**UNIT-I**

SEMICONDUCTOR DIODES : Semiconductor Diode, Resistance levels, Diode Equivalent circuits, Zener diodes, Load line Analysis, Series diode configurations with D.C Inputs, Half-Wave rectification, Full-Wave rectification, Clippers and Clampers.

BIPOLAR JUNCTION TRANSISTOR: Transistor construction, Transistor operation, Common base configuration. Transistor amplifying action, Common emitter configuration, Common collector configuration, Operating Point, Fixed Bias circuit, Emitter Stabilized Bias circuit, Voltage divider Bias, Transistor h-parameter model, Analysis of transistor amplifier using h-parameters.

**UNIT-II**

UNIPOLAR DEVICES: Construction and characteristics of JFETs, Transfer characteristics. Depletion type MOSFETs, Enhancement type MOSFETs, Fixed bias configuration, Self-bias configuration, FET small signal model. Source Follower Circuit, Common Gate circuit, Uni junction Transistor

OPTICAL DEVICES: Light Emitting Diodes, Liquid Crystal Display, Photo Diodes, Photo Conductive Cells, Solar Cells, Principles of Cathode Ray Tube.

**UNIT-III**

FEEDBACK AND OSCILLATOR CIRCUITS: Feedback concepts. Feedback -Connection types, Barkhausen Criteria, Phase-Shift Oscillator, Wien Bridge Oscillator, Hartley Oscillator, Colpitts Oscillator.

POWER AMPLIFIERS: Amplifier types, Series-fed Class A Amplifiers, Class B Amplifier operation, Class C and D Amplifiers.

**UNIT-IV**

OPERATIONAL AMPLIFIERS: Differential and Common Mode operation, Op-Amp basics. Op-Amp specifications, Voltage Summing, Voltage Buffer, Differentiator and Integrator.

LINEAR I.C's - Timer IC unit operation. Voltage Controlled Oscillator.  
VOLTAGE REGULATORS: I.C. Voltage regulators,

**Textbooks:**

Robert Boylestad and Louis Nashelsky, 'Electronic Devices and Circuit Theory', 6<sup>th</sup> Edition, PHI  
NN Bhargava & Kulasresta, 'Basic Electronics', Tata McGraw Hill Pubs.

**Reference Books:**

Milliman & Halkies, 'Integrated Electronics', Tata McGraw Hill Pubs.  
S.Salivahanan & Vallavaraj, 'Electronic Devices & Circuits', Tata McGraw Hill Pubs.

**UNIT-I**

Algorithm Analysis : Mathematical Background, Model, What to Analyze, Running Time Calculations.

Lists, Stacks and Queues : Abstract Data Types, The List ADT, The Stack ADT, The Queue ADT.

**UNIT-II**

Binary Trees : Implementation, Expression Trees.

Search Trees : Binary Search Trees.

AVL Trees : Single Rotation, Double Rotation.

Splay Trees : A Simple Idea, Splaying.

B-Trees, B+ Trees.

**UNIT-III**

Internal Sorting : Preliminaries, Insertion Sort, A lower band for simple sorting Algorithms, Shell Sort, Heap Sort, Merge Sort, Quick sort, Bucket sort, Searching.

**UNIT-IV**

Hashing : General Idea, Hash Function, Separate Chaining, Open addressing, Rehashing, Extendible Hashing, Binary Heap and Applications, Leftist Heaps.

**Textbook:**

Mark Allen Weiss, 'Data Structures and Algorithm Analysis in C', Second Edition, Addison Wesley Pubs.

**Reference Books:**

Langsam, Augenstein & Tenenbaum, 'Data Structures Using C and C++', 2<sup>nd</sup> edition, PHI

Robert L.Kruse, Leung & Tondo 'Data Structures and Program Design in C',PHI

**UNIT-I**

Review of Number systems & codes.

**BOOLEAN ALGEBRA AND LOGIC GATES:** Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and Properties of Boolean Algebra, Boolean functions, Canonical and Standard Forms, Other operations, Digital Logic Gates.

**SIMPLIFICATION OF BOOLEAN FUNCTIONS:** The Map Method, Two and three variable Maps, Four-variable Map, Five and six-variable Maps, Product of Sums Simplification, NAND and NOR implementation, other two-level implementations, Don't-Care conditions, The Tabulation Method, Determination of Prime Implicants, Selection of Prime-Implicants.

**UNIT-II**

**COMBINATIONAL LOGIC:** Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multi NOR Circuits.

**COMBINATIONAL LOGIC WITH MSI AND LSI:** Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers.

**UNIT-III**

**SEQUENTIAL LOGIC:** Flip Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation tables, Design Procedure, Design of Counters, Design with state equations.

**UNIT-IV**

**REGISTERS, COUNTERS AND THE MEMORY UNIT:** Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences.

**MEMORY AND PROGRAMMABLE LOGIC:** Read-Only Memory (ROM), Programmable Logic Device (PLD), Programmable Logic Array (PLA) , Programmable Array Logic (PAL).

**Textbook:**

M.Morris Mano, 'Digital Logic and Computer Design', PHI.

**Reference Books:**

M.Morris Mano, 'Computer Engineering Hardware Design', PHI.

Floyd, 'Digital Fundamentals', UBS 3<sup>rd</sup> edition.

**UNIT-I**

Complex Analysis: Introduction, continuity, Cauchy-Riemann equations. Analytic functions, Harmonic function, Orthogonal systems

**UNIT-II**

Complex integration, Cauchy's integral theorem, Cauchy's integral formula, Poisson's integral formula, Taylor's series, Laurent's series, Zeros and singularities.

**UNIT-III**

Residue theorem, calculation of residues, evaluation of real definite integrals (by applying the residue theorem)

Series solutions of differential equations: Introduction, series solution, validity of series solution, general method (Frobenius method), forms Of Series solution.

**UNIT-IV**

Series solution of Bessel's and Legendre's equation. Recurrence formulae, generating functions, Rodrigue's formula. Orthogonality of Bessel's functions and legendre polynomials.

**Textbook:**

B.S.Grewal, 'Higher Engineering Mathematics', 36<sup>th</sup> edition, Khanna Publishers, Delhi.

**Reference Books:**

Erwin Kreyszig, 'Advanced Engineering Mathematics'. New Age International (P) Ltd. Wisely Eastern Ltd.

**UNIT-I**

REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic.

**UNIT-II**

MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

CENTRAL PROCESSING UNIT: General register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).

**UNIT-III**

COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication Algorithms, Division Algorithms Floating-point Arithmetic operations.

MEMORY ORGANIZATION: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Men Cache Memory, Virtual Memory, Memory Management hardware.

**UNIT-IV**

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor, Serial Communication.

**Textbook:**

Morris M. Mano, 'Computer Systems Architecture', 3<sup>rd</sup> edition, (Chapters: 4,5,7 to 13).

**Reference Books:**

1. John P Hayes, 'Computer Architecture and Organization', 2nd edition.
- V.Carl Hamacher et.al, 'Computer Organization' 2<sup>nd</sup> edition.

**UNIT-I**

Foundations: Sets, Relations & functions, Proof & Problem Solving, Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication, First Order Logic & Other methods of proof, Rules of Inference and quantified propositions.

**UNIT-II**

Mathematical Induction, Elementary Combinations, Basics of counting, Combinations and permutations with & without repetitions, Fuzzy sets.

**UNIT-III**

Recurrence relations, Generating Functions, Recurrence relations, Solving recurrence relations, The methods of characteristics roots

**UNIT-IV**

Relations & Digraphs, Relations & Directed graphs, Equivalence relations, Ordering relations, Lattices & enumerations, Operations on Relations, Paths & Closures, Directed graphs & Adjacency matrices

**Textbook:**

O. L.Mott, Abraham Kandel & Theodore P.Bakev, 'Discrete Mathematics for Computer Scientists & Mathematics' PHI.

**REFERENCE BOOKS**

1. C.L.Liu, 'Elements of Discrete Mathematics'
2. Rosen, 'Discrete Mathematics'

**UNIT-I**

External Sorting : Why we need new Algorithms, Model for external sorting, The simple algorithm, Multiway Merge, Polyphase Merge, Replacement Section.

File Structures:

**UNIT-II**

Set ADT : Equivalence Relations, The Dynamic Equivalence problem, Basic Data Structure, Smart Union Algorithms, Path Compression, Worst Case for union-by-Rask and path compression, An Application.

Graph Algorithms : Definitions, Topological Sort.

**UNIT-III**

Shortest-path Algorithms : Unweighted Shortest Paths, Dijkstra's algorithm, Graphs with Negative Edge costs, A Cyclic Graphs, All-pairs shortest-Path.

Network Flow Problems : A Simple maximum-flow Algorithm.

**UNIT-IV**

Minimum spanning trees : Prim's Algorithm, Kruskal's Algorithm.

Applications of Depth-First Search : Undirected Graphs, Biconnectivity, Euler Circuits, Directed Graphs, Finding Strong Components.

**Textbooks:**

1. Mark Allen Weiss, 'Data Structures and Algorithm Analysis In C', Second Edition, Wesley Publishers.
2. J.P.Tremblay & P.G.Sorenson, "Introduction to Data Structures", (For File Structures Chapter) 2<sup>nd</sup> edition, Tata McGraw Hill Co.

**Reference Books:**

- Langsam, Augenstein & Tenenbaum, 'Data Structures Using Card C++', 2<sup>nd</sup> edition, PHI
2. Robert L.Kruse, Leung & Tondo 'Data Structures and Program Design in C', PHI

**UNIT-I**

1. An introduction to Micro-Computers and Micro-Processors: Objectives, Computers. 8086, 80186, 80188 & 80286 Microprocessors, 8086 internal Architecture, Introduction to programming the 8086.
2. 8086 Family Assembly Language Programming: Program development steps, Constructing the machine codes for 8086 instructions, Writing Programs for use with an Assembler, Assembly language Program development tools
3. 8086 Assembly Language Programming Techniques; Practice with simple sequence programs, Flags, Jumps and WHILE-DO implementation. REPEAT-Until implementation and examples Debugging Assembly Language Programs.

**UNIT-II**

4. If-Then-Else Structures, Procedures and Macros. If -Then. If-then-Else and Multiple If-Then-Else Programs, Writing and using procedures, Writing and using Assembler Macros
5. 8086 Instruction Descriptions and Assembler directives: Instruction descriptions. Assembler directives

**UNIT-III**

6. 8086 Systems Connections and Timing: 8086 Hardware review, Addressing Memory and ports in Micro-computer Systems
7. Interrupts and Interrupt Service Procedures. 8086 Interrupts and interrupt Responses, Hardware Interrupt applications.

**UNIT-IV**

8. Multiple Micro-Processor Systems and Buses: The 8086 Maximum mode. Direct Memory Access (DMA) data transfer, Interfacing and Refreshing Dynamic RAM, The 80186 and 80188 Processors with integrated peripherals. The 8087 Main Coprocessor, Multiple Bus Micro Computer Systems.

**Textbook :**

Douglas V.Hall, 'Micro-processors and Interfacing Programming and Hardware', 2<sup>nd</sup> edition, Tata McGraw Hill Pubs.

**Reference Book:**

Brey, 'Intel Microprocessor's-The 8086, 8088, 80186, 80286, 80386, 80486 Architecture, Programming & Interfacing', 4<sup>th</sup> edition, PHI.

Liu Gibson, 'Microcomputer System Design – Using 8086,8088,'

**UNIT-I**

Introduction to Operation Research: Introduction, Modelling in Operations Research, Phases of OR study, Scope of OR.

Linear Programming and its Applications: Linear Programming Problem – Graphical solution of LP Problem. Simplex method, Revised Simplex method, Dual Simplex method.

**UNIT-II**

Transportation and Assignment models: Introduction – Methods of basic feasible solution, Optimality test, Degeneracy in transportation problem, Unbalanced transportation Problem, Hungarian method for assignment problem, Travelling salesman problem.

Theory of Games: Introduction, to solve the rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, solution of a two person zero sum 2Xn game, Graphical method for 2Xn and nX2 games.

**UNIT-III**

Inventory Control: Introduction – EOQ with uniform rate of demand, Economic lot size with finite rate of replenishment, Quantity discounts, Deterministic model with Shortages, ABC analysis of inventory.

Dynamic Programming: Introduction, The recursive equation approach, Computational Procedure in dynamic Programming, An application to inventory Control.

**UNIT-IV**

Project Management by PERT/CPM: Introduction, Basic steps in PERT/CPM techniques, Network diagram presentation, Rules of drawing network diagram, Fulerson's rule, Time estimates and Critical path in network analysis, Project evaluation and review technique, Application areas of PERT/CPM techniques.

Simulation: Introduction, Monte-carlo Simulation, Application to Inventory Control, Application to Queuing Problems.

**Textbooks:**

SD Sharma, 'Operations Research (units: I, IV)' Kedarnath, Ramnath & Co., Meerut.

BS Goel & S.K.Mithal, 'Operations Research (Units: II,III)' Pragati Prakasham, Meerut.

**Reference Book:**

Kanathi Swarup, PK Gupta & Manmohan, 'Operations Research' Sultanchand & Sons, New Delhi.

**UNIT-I**

BACKGROUND: Introduction to System Software; System Software and Machine Architecture; The simplified Instructional Computer (SIC):

SIC Machine Architecture; SIC/XE Machine Architecture;

SIC Programming examples; Traditional (CISC) Machines: VAX Architecture; Pentium Pro Architecture; Risc Machines: Ultra SPARC Architecture; Power PC Architecture; Cray T3E Architecture.

**UNIT-II**

ASSEMBLERS: Basic Assembler Functions: A Simple SIC Assembler; Assembler

Algorithm and Data Structure; Machine – Dependent Assembler Features: Instruction Formats and Addressing modes; Program Relocation;

Machine – Independent Assembler Features: Literals; Symbol – Defining Statements; Expressions; Program Blocks; Control Sections and Program Linking;

Assembler Design Option: One – Pass Assembler; Multi – Pass Assembler;

Implementation Examples: MSAM Assembler; SPARC Assembler; AIX Assembler.

**UNIT-III**

LOADERS AND LINKERS: Basic Loader Functions: Design of an Absolute Loader;

A simple Bootstrap Loader; Machine Dependent Loader Features: Relocation; Program Linking; Algorithm and data structures for a Linking Loader

Machine Independent Loader Features: Automatic Library Search; Loader Options;

LOADER DESIGN OPTIONS: Linkage editors; Dynamic linking; Bootstrap loaders; Implementation Examples:

MS – DOS Linker; Sun OS Linker; Cray MPP Linker.

**UNIT-IV**

MACRO PROCESSORS & OTHER SYSTEM SOFTWARE:

Basic Macro Processor Functions: Macro definition and Expansion; Macro Processor Algorithm and Data Structures; Machine independent Macro Processor features: Concatenation of Macro Parameters; Generation of unique labels; Conditional macro expansion; Macro Processor design Option: Recursive macro expansion; General purpose macro processors; Macro Processing with in Language translators; Implementation Examples: MASM Macro Processor; ANSIC Macro Language; The ELENA Macro

Processor;

Text Editors: Overview of the Editing Process; User Interface; Editor Structure;

Interactive Debugging Systems: Debugging functions & Capabilities; Relationship with other parts of the system; User – Interface Criteria

**Text Book:**

Leland L.Beck, 'System Software : An Introduction to System Programming' 3<sup>rd</sup> edition.Pearson Education Asia

**Reference Books:**

John J.Donovan, 'System Programming' Tata McGraw-Hill, Edition 1991.

DM Dhamdhere, 'Systems Programming and Operating Systems', Tata McGraw Hill Publishing Co.Ltd., 1999,1996,1993.

**UNIT-I**

Preliminaries : Reasons, Programming Domains, Language: Evolution Criteria, Categories, Design Trade-offs, Implementation, Programming Environments, Evolution of Programming Languages.

Describing syntax and Semantics : General Problems, Describing Syntax, Recursive Descent Parsing, Attribute Grammar, Dynamic Semantics.

Primitive data types and variables : Names, variables, Concept of Binding, Type checking, Strong typing, Type compatibility, Named Constants, Variable Initialization.

**UNIT-II**

Data Types : Primitive, character string, User-defined, Array, Associative Arrays, Record, Union, Set, Pointer.

Expression and the Assignment Statement : Arithmetic Expressions, Overloading, Type Conventions, Relational and Boolean, Short Circuit, Assignment, Mixed mode Assignment.

Statement level Control Structures : Compound, Selection, Iterative Statements, Unconditional Branching, Guarded Commands.

**UNIT-III**

Scope and Extent : Scope, Scope and Life Time, Referencing Environments.

Subprograms : Fundamentals, Design Issue, Local Referencing Environment, Parameter Passing, Parameters that are sub-program names, Overloaded Sub-programs, Generic, Separate and Independent Compilation, Design Issues for functions, Non-local environments, User Defined Overloaded Operators, Coroutines.

Implementing Subprograms : Fortran 77, Algol-like languages, Blocks, Dynamic Scoping, Implementing Parameters that are sub-program names.

Data Abstraction : Concepts, Encapsulation, Data, Introduction, Design Issues, Examples, Parameterized Abstract Data Types.

**UNIT-IV**

Symmetric and Concurrent Subprograms : Support for Object Oriented Programming, Design Issues, Smalltalk, Support for Object Oriented Programming in ; C++, Java, ADA 95, Eiffel, Implementation, Concurrency : Sub-program level, Semaphores, Monitors, Message Passing, Concurrency in ADA 95, Java Threads, Statement level concurrency.

Exception handling : Introduction, Exception Handling in : PL1, ADA, C++, Java.

**Textbook:**

Robert W. Sebesta, 'Concepts of Programming Languages', Addison Wesley Longman Inc., 199.

**Reference Books:**

Ellis Horowitz, 'Fundamentals of Programming Languages', Galgotia Publications (P) Ltd., 1994.

Pratt Terrence.W, 'Programming Languages, Design & Implemented' Prentice Hall of India, 1993.

**UNIT-I**

Basic Concepts of OOP:

Classes: Introduction, Class scope and accessing class members, Controlling access to members, Constructors and Destructors, Friend functions, Static class members, Data abstraction and Information hiding, Dynamic memory allocation, Container classes and Iterators, Proxy classes.

**UNIT-II**

Operator Overloading: Introduction, Fundamentals of & restrictions and operator overloading, Overloading, Unary and Binary operators, Stream insertion and extraction operators, Conversion between types.

Inheritance: Introduction, Visibility modes, Types of Inheritances, Virtual functions and Polymorphism.

**UNIT-III**

Stream Input/Output: Introduction, Streams, Stream Input, Stream Output, Stream manipulators.

Templates: Introduction, Function templates, Class templates

**UNIT-IV**

Exception Handling: Introduction, Basics, Try, Throw, Catch, Exception Specifications and handling of other exceptions.

File Processing: Introduction, Creating sequential and random access files.

**Text Book:**

Deitel & Deitel, 'C++ How to Program', Prentice Hall, Inc. 1994.

**Reference Books:**

Robert Lafore, 'Object Oriented Programming in Turbo C++' Galgotia Publications Pvt. Ltd., 1991 (Reprinted 2001).

Herbert Schildt, 'Teach Yourself in C++', Tata McGraw Hill Publishing Co., 1998.

**UNIT-I**

Introduction, The Greedy Method - Knapsack Problem, True vertex splitting, Job sequencing, Minimum-cost spanning trees, Kruskal's algorithm, Optimal storage on tapes, Optimal merge pattern, Single source shortest paths.

**UNIT-II**

Dynamic Programming - General method, Multistage graph, All pairs shortest path, Single-source shortest path, Optimal Binary search trees, String Editing, 0/1 Knapsack, Reliability design, The traveling salesman problem, Flow shop scheduling.

**UNIT-III**

Basic traversal & search techniques - Techniques for binary trees, techniques for graphs, connected components & spanning trees, Bi-connected components & DFS.

Back tracking - The General Method, The 8-Queens Problem, Sum of subsets, Graph coloring, Hamiltonian cycle, Knapsack problem.

**UNIT-IV**

Branch and Bound - The method, 0/1 Knapsack problem, Traveling salesperson, Efficiency considerations.

NP hard and NP Complete Problems - Basic concepts, Cook's Theorem, NP-Hard Graph problems, NP-Hard Scheduling problem, Some simplified NP-Hard problems.

**Textbook:**

L Ellis Horwitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Pubs.

**Reference Books:**

Aho, Hopcroft & Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley.  
Thomas H. Corman et al, 'Introduction to Algorithms', PHI.

**UNIT-I**

Databases and Database users.  
Database systems concepts and Architecture.  
Data Modeling using the Entity-Relationship model.

**UNIT-II**

The Relational Data Model, Relational constraints, and the Relational Algebra.  
SQL-The Relational Database Standard.  
ER and EER – to – Relational mappings, and other Relational languages.

**UNIT-III**

Functional Dependencies and Normalizations for Relational Databases.  
Relational Database Design Algorithms and Further Dependencies.  
Database system Architectures and the system catalog.

**UNIT-IV**

Transactions Processing Concepts.  
Concurrency Control Techniques.

**Textbook:**

Elmasri and Navathe, 'Fundamentals of Database Systems', 3<sup>rd</sup> edition, Addison Wesley, Pearson Education, Inc.2000.

**Reference Books:**

Bipin C.Desai, 'An Introduction to Database Systems', West Publishing Company,2000.  
CJ Date, 'An Introduction to Database Systems', 6<sup>th</sup> Edition, Addison Wesley Longman Inc-1999.

**UNIT-I**

Geometry and line Generation : Introduction – Lines – Line segments – Perpendicular lines – Distance between a point and a line – vectors – Pixels and Frame buffers – vector generation – Bresenham's Algorithms – Antialiasing of lines – Thickline segments – character generation – Displaying the frame buffer – Exercises – Programming problem.

Graphic Primitives : Graphics primitives – Introduction – Display devices – primitive operations – The display – File interpreter – Normalized device co-ordinates – Display file structure – Display file algorithms – Display control – Text – The line style primitive – Exercises – Programming problems.

**UNIT-II**

Point Plotting Techniques : Co-ordinate systems – Incremental Methods Line drawing algorithms – The symmetrical DDA – The simple DDA – Bresenham's Algorithms – Circle generators – Exercises.

Line drawing displays : Display devices and controllers – Display devices – CRT – Inherent memory devices – Storage tube display – Refresh line drawing display.

**UNIT-III**

Polygons : Introduction – Polygons – Polygons representation – entering polygons – Inside test – Polygon interfacing algorithms – Filling polygons – Exercises – Programming problems.

Segments : Introduction – segment table – segment creation – closing a segment – Deleting a segment – Renaming a segment – Visibility – Image transformation – Other display file structure.

**UNIT-IV**

Transformation : Introduction – Matrices – Scaling transformations – Sine and Cos – Rotations – Homogeneous coordinates and translation – Co-ordinate transformations – Rotation about an Arbitrary point – Other transformations – Inverse transformations – Transformation routines – Exercises – Programming Problems.

Windowing and Clipping : Introduction – The viewing transformations – viewing transformation implementations – clipping – the Cohen – Sutherland outcode algorithm – the Sutherland – Hodgman algorithm – the clipping of polygons – adding clipping to the system – generalized clipping – position relative to an arbitrary line – multiple windowing – exercises – Programming problems.

**Textbooks:**

Steven Harrington, 'Computer Graphics – A Programming Approach', 2<sup>nd</sup> edition. Tata McGraw Hill Co.

W.M. Newman & R.F. Sproull, 'Principles of Interactive Computer Graphics', 2<sup>nd</sup> edition. (Unit: II, 3 & 4 chapters), Tata McGraw Hill Co.

**Reference Books:**

Foley & Van Dam et al, 'Computer Graphics', 2<sup>nd</sup> edition in C, Pearson Education Asia.

Donald Hearn & M. Pauline Baker, 'Computer Graphics', 2<sup>nd</sup> edition, PHI.

**UNIT-I**

Introduction : Definition, Simple Batch System, Multi-programmed Batched Systems, Time Sharing Systems, Personal Computer System, Parallel System, Distributed System, Real-time System.

Computer-System Structure : Operation, I/O Structure, Storage Structure, Storage Hierarchy, Hardware Protection, General System Architecture.

Process : Concept, Process Scheduling, Operation on Processes, Co-operating Processes, Threads, Inter-process Communication.

**UNIT-II**

CPU Scheduling : Concepts, Scheduling Criteria, Algorithm, Multiple-Process scheduling, Real time Scheduling, Inter-process communication.

Process Synchronization : Background, Critical-Section Problem, Synchronization Hardware, Semaphores, Classical problem of synchronization, Critical Region, Monitors, Synchronization in Solaris, Atomic transaction.

**UNIT-III**

Deadlock : Model, Characterization, Methods for Handling Deadlocks, Prevention, Avoidance, Detection, Recovery, Combined Approach to Deadlock Handling.

Memory Management : Background, Logical Vs. Physical Address space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with paging.

**UNIT-IV**

Virtual Memory : Background, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithm, Allocation of frames, Thrashing, Other Consideration, Demand Segmentation.

File Systems Interface : Concept, Access methods, Direct Structure Protection, Consistency, Semantics.

File-System Structure, Allocation Methods, Free Space Management, Directory Implementation, Efficiency & Performance, Recovery.

**Textbook:**

Silberschatz & Galvin, 'Operating System Concepts', 5<sup>th</sup> edition, John Wiley & Sons (Asia) Pvt.Ltd.,2001.

**Reference Books:**

Charless Crowley, 'Operating Systems : A Design-Oriented Approach', Tata McGraw Hill Co.,1998 edition.

Andrew S.Tanenbaum, 'Modern Operating Systems', 2<sup>nd</sup> edition,1995, PHI.

**UNIT-I**

Data Communication Networks and open system standards.  
The electrical Interface.

Data transmission : Data transmission basics, Asynchronous transmissions synchronous transmission, Error detection methods, communication control devices.

**UNIT-II**

Protocol basics,  
Data link control protocols.

**UNIT-III**

Local area Networks

**UNIT-IV**

High speed and bridged local area Network.

**Textbook:**

Fred Halsall, 'Data Communications : Computer Networks and Open Systems', 4<sup>th</sup> Edition, Pearson Education, Asia.

**Reference Books:**

William Stallings, 'Data Communication and Computer Networks', PHI,1999.

Behrouz A.Forouzan, 'Data Communications and Networking', 2<sup>nd</sup> edition, Tata McGraw Hill Co.

**UNIT-I**

The Product : Evolving Role of Software, Software Characteristics & Applications.

The Process : Introduction, Software Process, Process Models, Evolutionary Software Models, Component based Development, Formal Methods Model, 4G Techniques, Process Technology.

Software Process and Project Metrics : Introduction, Metrics Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics with Process, Statistical Quality Control, Metrics for Small Organizations, Establishing a Software Metrics Programming.

Software Quality assurance : Quality Concepts, Quality Movement, SQA, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Reliability, ISO 9000 Quality Standards, SQA Plan.

**UNIT-II**

System Engineering : Introduction, System Engineering Hierarchy, Business Process Engineering, Product Engineering, Requirements in Engineering, System Modeling.

Analysis concepts and principles : Requirements Analysis, Elicitation for Software, Analysis Principles, Software Prototyping, Specification.

Analysis modeling : Data Modeling, Function Modeling, Behaviour Modeling, Mechanics Structured Analysis, Data Dictionary.

**UNIT-III**

Design concepts and principles : Design Process, Design Principles and Concepts, Effective Model of Design, Design Heuristics for Effective Modularity, Design Model, Design Documentation.

Architectural design : Software Architecture, Data Design, Architectural Styles, Analyzing Alternatives, Mapping requirements, Transaction Mapping, Refinement.

User interface design : Golden Rules, UI Design, Task Analysis and Modeling, Interface Design Activities, Implementation Tools, Design Evaluation.

Component-level design : Structured Programming, Comparisons of Design Notation.

**UNIT-IV**

Software testing techniques : Fundamentals, Text Case Design, White Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing, Testing for Specialized environments, Architectures & Applications.

Software Testing Strategies : Strategic Approach, Strategic Issues, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging.

Technical Metrics for Software : Software Quality, Frame Work, Metrics for the Analysis Model, Design Model, Source Code, Testing & Maintenance.

**Textbook:**

Roger S.Pressman, 'Software Engineering – A Practitioner's Approach', Fifth Edition, McGraw-Hill International.

**Reference Book:**

Ian Sommerville, 'Software Engineering', 5<sup>th</sup> edition, Addison Wesley, 1996.

Shari Lawrence Fleeger, 'Software Engineering – Theory & Practice', Pearson Education Asia.

**UNIT-I**

FINITE AUTOMATA & REGULAR EXPRESSIONS :

Finite State Systems; Basic Definitions; Non-Deterministic Finite Automata; Finite Automata with E-Moves; Regular Expressions; Finite Automata with output

**UNIT-II**

PROPERTIES OF REGULAR SETS

The Pumping Lemma for regular sets; Closure Properties of Regular Sets;

Design Algorithms for regular sets; The MYHILL – NERODE Theorem and minimization of Finite Automata

CONTEXT FREE GRAMMARS : Context Free Grammars; Derivation Trees; Simplification of context free grammars

**UNIT-III**

Chomsky Normal Form; Greibach Normal Form; Pushdown Automata;

Informal Description; Definitions; Pushdown Automata Context Free Languages; Properties of Context Free Languages; The Pumping Lemma For CFL's

**UNIT-IV**

Closure Properties of CFL's; Decision Algorithms for CFL's

TURING MACHINES : Introduction; The Turing Machine Model; Computable Languages and functions; Techniques of Turing Machine Construction;

UNDECIDABILITY: Properties of Recursive and Recursively Enumerable Languages; Universal Turing Machines (without any reference to undecidable problems)

**Textbook:**

John E Hopcroft & Jeffery D Ullman' 'Introduction to Automata Theory & Languages and Computation', Narosa Publishing House.

**Reference Books:**

Cohen, 'Computer Theory',  
KLP Mishra & N.Chandrasekharan, 'Theory of Computation', PHI.

**UNIT-I**

PROBLEMS, PROBLEM SPACES AND SEARCH: Defining the Problem as a State space Search, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

HEURISTIC SEARCH TECHNIQUES: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

**UNIT-II**

KNOWLEDGE REPRESENTATION USING PREDICATE LOGIC: Representing Simple Facts in logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

**UNIT-III**

REPRESENTING KNOWLEDGE USING RULES - Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

Semantic Nets, Conceptual dependency, Scripts.

**UNIT-IV**

PROLOG Language: Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, Fail, Recursion, Lists, string operations, Dynamic databases.

**Textbooks:**

Ellaine Rich & Kevin Knight, 'Artificial Intelligence', 2<sup>nd</sup> Edition, Tata McGraw Hill Co.  
Carl Townsend, 'Introduction to TURBO PROLOG', BPB Publications.

**Reference Books:**

Patrick Henry Winston, 'Artificial Intelligence', Pearson Education Asia.  
Russel and Norvig, 'Artificial Intelligence',

**UNIT-I**

Project Management Concepts : The Management Spectrum, People, Products, Process, Project, The W<sup>5</sup>HH Principle, Critical Practices.

S/W Project Planning : Observation on Estimating, Project Planning Objectives, Software Scope, Resources, Estimation, Decomposition Techniques, Empirical Estimation Models, Make/Buy Decision, Automated Estimation Tools.

Risk Analysis & Management : Reactive, Pro-active Risk Strategies, Software Risks Identification, Projection, Refinement, Mitigation, Monitoring and Management. Software Risks and Hazards, The RMMM Plan.

**UNIT-II**

Project Scheduling and Tracking : Basic Concepts, Relationship between People and Effort, Defining a Task Set for the Software Project, Selecting Software Engineering Task and Refining, Task Network, Scheduling, Earned Value Analysis, Error Tracking, Project Plan.

Software Configuration Management : SCM, SCM Process, Identification of objects, Version Control, Change Control, Configuration Audit, Status Reporting, SCM Standards.

Object-Oriented Testing : Testing OOA & OOD Models, OO Testing Strategies, Test Case Design for OO Software, Testing Methods at the class level, Interclass test case Design.

Technical Metrics for O-O Systems : The Intent & Characteristics of OO Metrics, Metrics for OO Design Model, Class Oriented, Operation Oriented Metrics, Metrics for OO testing and OO Projects.

**UNIT-III**

Formal Methods : Basic Concepts, Mathematics Preliminaries, Applying Mathematical Notation, Formal Specification Languages, Using Z, The Ten Commandments of Formal Methods, Review.

Clean Room Software Engineering : Cleanroom Approach, Functional Specification, Cleanroom Design and Testing.

Component-Based Engineering : Introduction, CBSE Process, Domain Engineering, Component Based Development, Classification and Retrieval, Economics of CBSE.

**UNIT-IV**

Client/Server Software Engineering : The Structure of C/S Systems, Software Engineering C/S Systems, Analysis Modeling and Design C/S Systems, Testing Issues.

Web-Engineering : Attributes of Web Based Applications, Web E Process, Framework for Web E, Formulation Analysis, Design for Web Based Applications.

Reengineering : Business Process & Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics.

Computer-Aided Software Engineering : Introduction, Building Blocks, Taxonomi, Integrated CASE Environments, Integration Architecture, CASE Repository.

**Textbook:**

Roger S.Pressman, 'Software Engineering – A Practitioner's Approach', Fifth Edition, McGraw-Hill International Edition.

**Reference Books:**

Stephen R.Schach, 'Classical and O-O Software Engineering', Fifth Edition; Pearson Education Asia.

Ian Sommerville, 'Software Engineering' Fifth Edition; Pearson Education Asia.

**UNIT-I**

METHODOLOGY, MODELING, AND UNIFIED MODELING LANGUAGE: Object-oriented Methodologies; Rumbaugh et al.'s Object Modeling Technique; The Booch Methodology; The Jacobson et al. Methodologies; Patterns; Frameworks; The Unified Approach.

UNIFIED MODELING LANGUAGE: Introduction; Static and Dynamic Models; Why Modeling? ; Introduction to the Unified Modelling Language; UML Diagrams; UML Class Diagram; Use-Case Diagram; UML Dynamic Modeling; Model Management: Packages and Model Organization; UML Extensibility; UML Meta-Model.

**UNIT-II**

OBJECT-ORIENTED ANALYSIS: USE-CASE DRIVEN: Object-Oriented Analysis Process: Identifying use cases: Introduction; Why Analysis is a Difficult Activity; Business Object Analysis: Understanding the Business Layer; Use-Case Driven Object-Oriented Analysis: The Unified Approach; Business Process Modeling; Use-Case Model; Developing Effective Documentation; Case-Study: Analyzing the ViaNet Bank ATM-The Use-Case Driven Process.

OBJECT ANALYSIS: CLASSIFICATION: Introduction; classifications Theory; Approaches for Identifying Classes; Noun Phrase Approach; Common Class Patterns Approach; Use-Case Driven Approach: Identifying Classes and Their Behaviors through Sequence/Collaboration Modeling; Classes, Responsibilities, and Collaborators.

**UNIT-III**

IDENTIFYING OBJECT RELATIONSHIPS, ATTRIBUTES, AND METHODS: Introduction; Associations; Super-Sub Class Relationships; A-Part-of Relationships-Aggregation; Case Study: Relationship Analysis for the ViaNet Bank ATM System; Class Responsibility: Identifying Attributes and Methods; Class Responsibility: Defining Attributes by Analyzing Use Cases and Other UML Diagrams; Defining Attributes for ViaNet Bank Objects; Object Responsibility: Methods and Messages; Defining Methods for ViaNet Bank Objects.

THE OBJECT-ORIENTED DESIGN PROCESS AND DESIGN AXIOMS: Introduction; The Object-Oriented Design Process; Object-Oriented Design Axioms; Corollaries.

**UNIT-IV**

DESIGNING CLASSES: Introduction; The Object-Oriented Design Philosophy; UML Object Constraint Language; Designing Classes: The Process; Class Visibility: Designing Well-Defined Public, Private, and Protected Protocols; Designing Classes: Refining Attributes; Refining Attributes for the ViaNet Bank Objects; Designing Methods and Protocols; Designing Methods for the ViaNet Bank Objects; Packages and Managing Classes.

VIEW LAYER: DESIGNING INTERFACE OBJECTS: Introduction; User Interface Design as a Creative Process; Designing View Layer Classes; Macro-Level Process: Identifying View Classes by Analyzing Use Cases; Micro-Level Process.

**Textbook:**

Ali Bahrami, 'Object Oriented Systems Development – Using the Unified Modeling Language', Tata McGraw Hill International Editions, Computer Science Series.

**Reference Books:**

James Rumbaugh, Jacobson, Booch, 'Unified Modeling Language Reference Manual', PHI.

Jacobson et al., 'The Unified Software Development Process', AW,1999.

**UNIT-I**

Introduction to compilers; Lexical Analysis :- the role of lexical analyzer, A simple approach to the design of lexical analyzer, lex tool; Parsing :- Top – down parsing.

**UNIT-II**

Predictive parser; Automatic Construction of efficient parsers; YAAC tool.

**UNIT-III**

Syntax – Directed Translation, Record Structures & Procedure calls, Symbol tables.

**UNIT-IV**

Run – time storage administration – Implementation of simple stack allocation scheme, Implementation of block – structured languages; Error detection and recovery, Code Generation: A simple code generator.

**Textbook:**

Alfred V.Aho, Jeffrey D. Ullman, 'Principles of Compiler Design', Narosa Publishing.

**Reference Books:**

Allen I.Holub, 'Compiler Design in C', PHI.

Aho, Ravi Sethi, JD Ullman, 'Compilers Principles, Techniques and Tools', Addison-Wesley Publishing Co.

UNIT-I

NETWORK LAYER: Design issues, routing algorithms, congestion control algorithms, quality of service, internet working, network layer in the internet.

UNIT-II

TRANSPORT LAYER: Transport service, elements of transport protocols, simple transport protocol, internet transport protocols: TCP & UDP, performance issues.

UNIT-III

APPLICATION LAYER: DNS, E-Mail, WWW, Multimedia.

UNIT-IV

NETWORK SECURITY: Cryptography, symmetric – key algorithms, public – key algorithms, digital signatures, management of public keys, communication security. Authentication protocols, E-Mail security, web security.

**Text book:**

Tanenbaum, 'Computer networks' 4<sup>th</sup> edition

**Reference Books:**

Kurose & Ross, 'Computer networks – A Top-down Approach Featuring the Internet', Pearson Education.

Stallings, 'Cryptography and Network Security – Principles and Practice' 2<sup>nd</sup> edition, Pearson Education.

## **SYLLABUS DRAFTED FOR APPROVAL**

**IT 321/CS 415 A**

**MULTIMEDIA SYSTEMS**

### **UNIT – I**

Introduction  
Multimedia: Media and data streams  
Sound and Audio  
Images and Graphics  
Video and Animation

### **UNIT – II**

Data Compression  
Multimedia Communication Systems

### **UNIT – III**

User Interfaces  
Synchronization

### **UNIT – IV**

Abstractions for programming  
Multimedia applications

### **TEXT BOOK:**

Multimedia: Computing, Communications and Applications  
By Ralf Steinmetz and Klara Nahrstedt, Pearson Education, Asia  
Publishers.

### **REFERENCE:**

"Multimedia Producer's bible"  
By Ron Goldberg, Comdex Computer Publications.  
Multimedia – Making it work :  
By Tay Vaughan, Tata McGraw Hill edition fourth edition.

## CS 415(B)

## DISTRIBUTED SYSTEMS

### UNIT-I

Introduction  
Communication

### UNIT-II

Processes  
Naming

### UNIT-III

Synchronization  
Consistency and Replication

### UNIT-IV

Fault Tolerance  
Distributed file system.

#### **Textbook:**

Tanenbaum, 'Distributed systems : Principles and Paradigms', 2002, Pearson Education, PHI.

#### **Reference Books:**

Sinha, 'Distributed Operating System - Concepts and Design', PHI.

Coulouris, Dollimore, Kindberg, 'Distributed Systems - Concepts and Design', 3<sup>rd</sup> edition, Pearson Education.

**UNIT-I**

Introduction: Knowledge-based information processing. A general view of knowledge based algorithm. Neural information processing. Hybrid intelligence. Artificial Neuran.

**UNIT-II**

Basic Neural Computation Models

Basic concepts of Neural Networks - Network properties, node properties, sigmoid functions. Systems dynamics, Inference and learning algorithm. Data representation. Functional classification models - single layer perceptions. Multilayer perceptions.

**UNIT-III**

Learning Supervised and unsupervised statistical learning. AI learning. Neural Netowrk Learning-Back propagation algorithm and derivation. Stopping criteria. Complexity of Learning Generalization.

**UNIT-IV**

Self-organizing Networks

Introduction, The Kohonen algorithm, weight initialization. Weight training, associative memories, bi-directional associative memories. Neural Network applications.

**Textbooks:**

Limin Fu., 'Networks in Computer intelligence', Mc-Graw Hill, 1995.

Bart Kosko., 'Neural Networks and Fuzzy systems', Prentice Hall of India, 1994.

**Reference Book:**

James A.Freeman., 'Simulating Neural Networks', Addison Wesley Pub, 1995.

**UNIT-I**

INTRODUCTION: Digital image representation, Fundamental steps in IP, Elements of DIP, Image processing systems, Digital Image fundamentals, Simple Image model, sampling and quantization, Basic relationships between pixels, Image Geometry.

**UNIT-II**

Introduction to Fourier Transforms, properties of Fourier transforms, Discrete Fourier transforms, and a property of 2D Fourier transforms, Problems, Fast Fourier transforms implementation of FFT.

**UNIT-III**

Image Enhancement: Enhancement by point processing, spatial filtering Enhancement in frequency domain, generation of spatial masks, implementation

Image restoration: Degradation model, algebraic approach to restoration, Inverse filtering, LMS filtering.

**UNIT-IV**

Image compression: Image compression models types of compression techniques, compression standards.

Image segmentation: Detection of discontinuities, Edge linking, Boundary detection, thresholding, Region analysis

**Textbook:**

Refacl C.Gonzalezq Richard E.woods, 'Digital Image Processing' Addison Wesley Pubs.

**Reference Books:**

1. Jain, 'Image Processing Fundamentals' BPB publications.
2. Philips, 'Image Processing in C', BPP publications.

**UNIT-I**

Review of micro electronics and introduction to MOS technology.  
Basic electrical properties of MOS and B1CMOS circuits.  
MOS and B1CMOS circuit design processes.  
Basic circuit concepts.  
Scaling of MOS circuit.

**UNIT-II**

Combinational logic N/Ws.  
Sequential machines.  
Subsystem design.

**UNIT-III**

Floor planning.  
Architecture Design.  
Chip Design

**UNIT-IV**

CAD Tools for design and simulation.  
Ultra fast VLSI circuits and systems – Introduction to Ga As Technology.

**Textbooks:**

Wayne wolf, 'Modern VLSI Design-system on Chip Design', 3<sup>rd</sup> edition, Pearson Education Asia.  
Douglas A Pucknell, Kamran Eshraghian, 'Basic VLSI Design' 3<sup>rd</sup> edition, PHI.

**Reference Book:**

Geigee RL., Allen.DE, Stradeer NR, 'VLSI Design Techniques for Analog and Digital Circuits' Mc Graw Hill Inc, 1990.

**UNIT-I**

GENERAL MANAGEMENT: Principles of Scientific Management; Brief Treatment of Managerial Functions.

FORMS OF BUSINESS ORGANISATION: Salient features of sole proprietorship, Partnership, Joint Stock Company – Private limited and public limited companies.

**UNIT-II**

FINANCIAL MANAGEMENT: Concept of interest, Compound interest, Equivalent cash flow diagram.

ECONOMIC EVALUATION OF ALTERNATIVES: The annual equivalent method, Present worth method, Future worth method.

DEPRECIATION – purpose, Types of Depreciation; Common methods of depreciation; The straight line method, Declining balance method, the sum of the years digits method.

**UNIT-III**

PRODUCTION MANAGEMENT: Types of production systems, Product analysis, brief treatment of functions of production, Planning and Control, Value analysis.

INSPECTION & QUALITY CONTROL: Concept and Types of Inspection, Control Charts – X, R, P & C charts. Acceptance sampling, OC curve, Single and double sampling.

PERSONNEL MANAGEMENT: The Personnel function, Job analysis, Job design, Leadership and motivation.

**UNIT-IV**

MATERIAL MANAGEMENT: Purchasing, Objective, Source Selection, Procurement Methods, Inventory Management – EOQ, EPQ, ABC Analysis.

MARKETING MANAGEMENT: Functions of Marketing, Product life cycle, Channels of distribution, Advertising & sales promotion, Market Research.

**Textbooks:**

K.K.Ahuja, 'Industrial Management' Vol. I & II,  
E.Paul Degarmo, John R.Chanda, William G.Sullivan, 'Engineering Economy'.

**Reference Books:**

Philip Kotler, 'Principles of Marketing Management'  
Gopalkrishna, 'Materials Management'  
Koontz & Weirich, 'Management'

**UNIT-I**

PARALLEL COMPUTER MODELS:

- The State of Computing
- Multiprocessors and Multicomputers
- Multivector and SIMD Supercomputers
- PRAM and VLSI Models

PROGRAM AND NETWORK PROPERTIES:

- Conditions of Parallelism
- Program Partitioning and Scheduling
- Program Flow Mechanisms
- System Interconnect Architectures

**UNIT-II**

PRINCIPLES OF SCALABLE PERFORMANCE:

- Performance Metrics and Measures
- Parallel Processing Applications
- Speedup performance Laws

**UNIT-III**

MULTIPROCESSORS AND MULTICOMPUTERS:

- Multiprocessor System Interconnects
- Cache Coherence and Synchronization Mechanisms
- Message -Passing Mechanisms

**UNIT-IV**

SCALABLE, MULTITHREADED, AND DATAFLOW ARCHITECTURES:

- Latency - Hiding Techniques
- Principles of Multithreading
- Scalable and Multithreaded Architectures
- Dataflow Computers

**Textbook:**

Hwang, 'Advanced Computer Architecture', Mc Graw Hill.

**Reference Book:**

Hwang & Brings, 'Computer Architecture & Parallel Processing'.

## **CS/IT 423    ADVANCED DATABASE MANAGEMENT SYSTEMS**

### **UNIT-I**

Query processing & optimization  
Database Recovery Techniques.  
Database security and Authorizations.

### **UNIT-II**

Distributed DBMS - Concepts and Design.  
Distributed DBMS - Advanced Concepts.

### **UNIT-III**

Introduction to Object DBMS.  
Object - Oriented DBMS.  
Object - Relational DBMS.

### **UNIT-IV**

Web Technology and DBMS.  
Data ware housing  
OLAP and Data mining.

#### **Textbooks:**

1. Elmasri & Navathe, 'Fundamentals of Database Systems', 3<sup>rd</sup> edition, Unit-I, Addison Wesley Pubs.
2. Connolly, Begg, Strachan, 'Database Systems – A Practical Approach to Design, Implementation and Management' , 2<sup>nd</sup> edition. UNIT-II, III & IV, Addison Wesley Pubs.

#### **Reference Books:**

Fred R. McFadden, Jeffrey A. Hoffer, Jeffrey B. Prescott, 'Modern Database Management', 5<sup>th</sup> edition, Addison Wesley Pubs.  
Raghuramakrishnan, 'Database Systems', PHI.

**UNIT-I**

The Software Engineers Job.  
Time Management  
Tracking Time  
Period and Product Planning  
Product Planning

**UNIT-II**

Product size  
Managing your Time  
Managing commitments  
Managing schedules  
The Project Plan

**UNIT-III**

The Software Development Process  
Defects  
Finding Defects  
The code Review checklist  
Projecting Defects

**UNIT-IV**

The Economics of Defects Removal  
Design Defects  
Product Quality  
Process Quality  
A personal Commitment to Quality.

**Textbooks:**

Watts S.Humphrey, 'Introduction to the Personal Software Process', 1997, Addison - Wesley.  
Watts S.Humphrey, 'Introduction to the Team Software Process', 1997, Addison - Wesley.

**UNIT-I**

Electronic Commerce Environment and Opportunities: Background, The Electronic Commerce Environment, Electronic Marketplace Technologies.

Modes of Electronic Commerce: Overview, Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.

Approaches to Safe Electronic Commerce: Overview, Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol(SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

**UNIT - II**

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash.

Internet/Intranet Security Issues and Solutions: The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

**UNIT - III**

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing.

E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, How Does E-mail work? MIME: Multipurpose Internet Mail Extensions, MOSS: Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

**UNIT- IV**

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet.

Advertising on Internet: Issues and Technologies: Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.

**Textbook:**

Daniel Minoli, Emma Minoli, 'Web Commerce Technology Handbook', Tata McGraw-Hill Pubs.

**Reference Books:**

Ravi Kalakotar, Andrew B. Whinston, 'Frontiers of Electronic Commerce', 1999, Addison Wesley.

**UNIT-I**

J Script : Introduction to scripting  
J Script : Control Structures-I  
J Script : Control Structures-II  
          : Functions  
          : Arrays  
          : Objects

**UNIT-II**

Dynamic HTML : cascading style sheets (CSS)  
Dynamic HTML : object model and collections  
Dynamic HTML : Event model  
Dynamic HTML : Filters and transitions

**UNIT-III**

DHTML: Data Binding with Tabular Data control  
          : Structured Graphics Activex control  
          : Sequence and sprite active control  
          : Client side scripting with VB Script

**UNIT-IV**

Web servers  
Active server pages  
XML

**Textbook:**

Deitel & Deitel & Nieto, 'Internet & World Wide Web – How to Program', Pearson Education, Asia.

**Reference Book:**

Daniel Minoli, 'Internet and Intranet Engineering Technologies - Protocols and Applications', Tata McGraw Hill Co.

Patrick Naughton, Herbert Schildt, 'The Complete Reference Java', 3<sup>rd</sup> edition, Tata McGraw Hill Co.

Scan Mc Grath, 'XML by example', PHI.

**UNIT-I**

Typical Real – Time Applications, Hard versus soft Real-Time Systems, A reference model of Real-Time Systems, Commonly used Approaches to Real Time scheduling.

**UNIT-II**

Clock-driver scheduling, Priority – driven scheduling of periodic tasks, scheduling a periodic & sporadic jobs in priority – driven systems.

**UNIT-III**

Resources and Resource Access control, Multiprocessor scheduling, Resource Access control and Synchronisation.

**UNIT-IV**

Scheduling flexible computation and tasks with temporal distance constraints, Real-Time communications, Operating systems.

**Textbook:**

Jane W.S.Liu, 'Real-Time Systems', Pearson Education Asia.

**Reference Book:**

C.M.Krishna and Kang G.Shin, 'Real-Time Systems', Tata McGraw Hill Co. Inc.,1997.

## **CS 424(E)**

## **EMBEDDED SYSTEMS**

### **UNIT-1**

A first look at embedded systems, Hardware fundamentals Advanced Hard ware fundamentals, interrupts

### **UNIT-II**

Survey of software Architectures, Introduction to Real-Time operating systems

### **UNIT-III**

More operating system services, Basic design using a Real-Time operating system.

### **UNIT-IV**

Embedded software development tools, debugging techniques.

#### **Textbook:**

David E.Siman, 'An Embedded Software Primer', Pearson Education Asia.

#### **Reference Book:**

D.Gajski, F.Vahid, S.Narayan, J.Gong, 'Specification and Design of Embedded Systems', Prentice Hall of India Pvt.Ltd.