Syllabus for B. Tech in Information Technology

Detailed Syllabus .

First Semester

MAT101: Engineering Mathematics

Unit 1:

Vector: Scalar triple product, vector triple product. Directional derivative, Gradient, divergence and curl of vector function and their properties. Green's theorem, Stocke's and divergence theorem (statement only with simple applications).

Unit 2:

Co-ordinate Geometry: Transformation of axes: Translation, rotation, rotation followed by translation, pair of straight lines, Homogeneous and non-homogeneous form, angle between two straight lines. Systems of circles, orthogonal circles, radical axis, co-axial circles, limiting points. Parabola, ellipse and hyperbola and their properties, condition of tangency in each case, diameter, conjugate diameter and their related properties for central conics. Director circle, auxiliary circle and eccentric angle, conjugate and rectangular hyperbola, tracing of conics.

Unit 3:

Real Analysis: Sequence, Limit of a sequence, Limit theorems, squeeze theorem, Monotone sequence, Monotone convergence theorem, cuchy convergence criterion, Infinite series, convergence of infinite series, comparison test, root test, Raabe's test, logarithmic test, uniform convergence, properties of uniform convergence, Fourier series.

Unit 4:

Differential calculus: Limits and continuity of a function, Boundedness of a function, Intermediate value theorem, Differentiability, Maxima and minima of a function, Rolles theorem and mean value theorem, increasing and decreasing functions, intermediate forms.

Unit 5:

Integral Calculus: Improper integral of first and second kind, comparison test, Absolute convergence, application of definite integral: Area between two curves. Curve tracing, area between curves when their equations are given in polar co-ordinates. Double integrations, triple integration (simple applications).

Text books:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. Thomas and Finney , Calculus and analytical geometry, Narosa
3. B. S. Grewal, Higher Engineering Mathematics

PHY102: Engineering Physics

Unit 1, Classical Physics:

Properties of areas: Moments of inertia and product of inertia of areas, polar moment of inertia, principal axes and principal moments of inertia.

Concept of stress and strain: Normal stress, shear stress, state of stress at a point, ultimate strength, allowable stress, factor of safety; normal strain, shear strain, Hooke's law, Poisson's ratio, generalized Hooke's law; analysis of axially loaded members.

Surface tension: Angle of contact, excess of pressure inside a spherical surface, capillary rise, determination of surface tension by Jaegers' method.

Viscosity: Stream line and turbulent motion, coeff. of viscosity, critical velocity, Poiseulle's equation for flow of liquid through a tube, viscometer.

Unit 2, Optics:

Optics : interference, thinfilms – testing of the optical planeness of surface, Young's double slit experiment – coherent sources – lasers, intensity in Young's experiment, interference in thin films, Newton's ring and Michelson interferometer.

Diffraction: Fraunhofer – diffraction at single slit, diffraction at a circular aperture, diffraction at double slit, diffraction gratings, resolving and dispersive power of a grating.

Polarisation : production and detection of circularly and elliptically polarized light, Quarter and half wave plates, optical activity, specific rotation, Lorentz half shade polarimeter, Determination of specific rotation and strength of sugar solution.

Unit 3, Heat and Thermodynamics:

Second law of thermodynamics (it's different formulations), entropy, rel;ation between entropy and probability, Kelvins absolute scale of temperature, thermodynamic relations and their applications

Maxwell's law of distribution of velocity and its experimental verification, most probable velocity, root mean square velocity, average velocity and their relations.

Basic features of black body radiation spectrum, Wien's displacement law, Rayleigh-Jean's law, ultraviolet catastrophy, Planck's law.

Unit 4, Solid State Physics:

Crystal structure: Seven systems of crystals, Bravais space, lattice, crystal structure (bee, fee and sc) lattice dimensions, lattice planes, and miller indices and their significance, X-rays-absorption of X-rays diffraction, Bragg's law. Bragg's X-ray spectrometer.

Unit 5, Modern Physics:

Lasers: Coherence – temporal and spatial, Einstien's spontaneous and stimulated emission, population inversion, laser gain (pumping), spectral narrowing in lasers coherence length, different types of laser source and their applications.

Quantum theory: Wave particle, duality and uncertainty principle, Schrodinger equation and its application to particle in a box and harmonic oscillator.

Text books:

1. D. S. Mathur, Elements of properties of matter, S. Chand & Co.
2. Jenkins and White, Fundamentals of Optics, McGraw Hill
3. B. B. Land, Lasers and Non-linear Optics, Wiley Eastern Ltd
4. Charks Kittle, Introduction to Solid State Physics, John Wiley & Sons
5. B. V. Narayana Rao, Modern Physics, Wiley Eastern Ltd
6. M.W. Zemansky, Heat & Thermodynamics, McGraw Hill
7. Chottopadhyay and Rakshit, Quantum Mechanics, Statistical Mechanics and Solid State Physics

ECO103: Economics and Human Development

Unit 1, Introduction to Economics:

What is Economics? Relationship of Economics and Engineering, Concept of Demand and Demand Function, Supply and Supply Function, Utility and Utility Function

Unit 2, Theory of Cost and Production:

Concepts and types of Costs, Derivation of Cost Function and Profit Maximization, Start-run and Long-run behaviour of Production, Analysis and Properties of ISO quant, Meaning and Types of Production Function.

Unit 3, Price output determination under different market structure:

Perfect competition, Monopoly, Monopolistic competition and oligopoly

Unit 4, Theory of Distribution:

Derived demand, Factor price determination: wage, rent, capital, service, profit

Unit 5, Human Development and Economic Development:

Meaning, difference between Human Development (HD) and Human Resource Development (HRD), Human Development Index (HDI) and its measurement, Human Development and sustainable Growth, Human Development and Governance, Millennium Development Goals (MDG).

Text books:

1. A. Koutsoyianis, Modern Micro-economics, McMillan
2. Henderson and Qnout, Microeconomic Theory: A Mathematical Approach, McGraw Hill
3. R. P. Barthwal, Microeconomic Analysis, Willey Eastern
4. Hahbub ul Haq, Reflections on Human Development, Oxford University Press
5. J. Field, Social Capital, Routledge

ENV104: Environmental Science

As prescribed in the Assam University undergraduate courses in PG departments

ENG105: Communication Skill in English

Unit 1, Phonetics and Phonology of English:

How speech organs work in English, Vowel sounds in the English language, Consonant sounds in the English language, Sound sequence: Diphthongs and Consonant clusters, Word accent in English, Stress and intonation in English, Accent and rhythm in connected speech

Unit 2, The basic grammatical structure of English:

Word order, Sentence types, Tense, Transformation of Sentences, Voice, Usage

Unit 3, Technical Communication:

Process of Communication; Process of letter writing; Resume, Social correspondence, Types of Reports, Structure of formal reports, Elements of Style, Use of illustrations, Making presentations

Unit 4 and 5, Group discussion.

Text books:

1. P. Balasubhramaniam, Phonetics for English Students
2. J. D. O'Connar, Better English Pronunciation
3. David Crystal, The Cambridge Encyclopedia of the English Language
4. John Selly, Oxford Guide to Writing & Speaking

CHE106: Engineering Chemistry

Unit 1:

Thermodynamics of Chemical Processes: Concept of entropy, Chemical potential, Equilibrium conditions for closed systems, Phase and reaction equilibria, Maxwell relations, Real gas and real solution. Electrochemical cells and EMF, Applications of EMF measurements:

Unit 2:

Thermodynamic data, activity coefficients, solubility product and pH, corrosion. Kinetics of Chemical Reactions: Reversible, consecutive and parallel reactions, Steady state approximation, Chain reactions, Photochemical kinetics.

Unit 3:

Bonding Models in Inorganic Chemistry: Molecular orbital theory, Valence-bond theory, Crystal field theory. Coordination Chemistry: Coordination numbers, Chelate effect, Coordination complexes and application, Bio-inorganic chemistry: Metal ions in Biological systems, environmental aspects of Metals, NO_x, CO, CO_2.

Unit 4:

Fundamentals of Microwave, IR and UV-VIS Spectroscopy: Basic concepts of spectroscopy, Selection rule, Determination of molecular structure.

Unit 5:

Organic Reaction Mechanism: Mechanisms of selected organic, bio-organic, polymerization and catalytic reactions. Stereochemistry of Carbon Compounds: Selected Organic Compounds: Natural products and Biomolecules (Amino acids/nucleic acids/proteins).

Text books:

1. J. D. Lee, Inorganic Chemistry
2. Lewis, Physical Chemistry
3. I. L. Finar, Organic Chemistry (Vol. 1 & 2), Pearson Education

SOT191: Engineering Drawing

Introduction to IS code of drawing; Conics and Engineering Curves – ellipse, parabola, hyperbola, cycloid, trochoid, involute; Projection of lines – traces, true length; Projection of planes and solids; sold objects – cube, prism, pyramid, cylinder, cone and sphere; Projection on Auxiliary planes; Isometric projection, isometric scale; Section of solids – true shape of section; Introduction to CAD tools – basics; Introduction of Development and Intersection of surfaces.

Text books:

1. N. D. Bhatt, Engineering Drawing

MAT201: Advanced Mathematics

Unit 1:

Ordinary Differential Equations: Solution of 1^{st} order and 1^{st} degree differential equations by exact method. Integrating factors, Leibnitz's linear equation, Bernoulli's equation, differential equation of 1^{st} order and of higher degree, Clairaut's equation, differential equations of 2^{nd} and higher order with constant co-efficients, method of variation of parameters for solving 2^{nd} order differential equations.

Unit 2:

Partial Differential Equations: formulation and classification of p.d.e.s, Lagranges's and Charpits method, characteristic curves and surfaces, four standard forms of non-linear equations, linear equations with constant co-efficient, canonical forms, wave equations and heat equations, Laplace equation in Cartesian, cylindrical and spherical co-ordinates, cylindrical and spherical co-ordinates, variable separable method.

Unit 3:

Laplace Transformations: Standard unit step functions, periodic functions-convolution theorem application to ordinary differential equation with constant coefficient. Fourier series solution of wave equation, Separation of variables method to solve heat equation, Laplace equation, Diffusion equation; Integral transform method to solve 2nd order p.d.e.

Unit 4:

Complex Variables: complex number and functions, limit, continuity, derivative of a complex function, analytic function. Cauchy-Riemann equations, harmonic function, complex integration, line integral in complex plane, Cauchy's integral theorem. Cauchy's Integral formula, power series, radius of convergence of a power series, Taylor series and Maclaurins series, Laurent series.

Unit 5:

Numerical Analysis: Error in numerical methods, round-off error, truncation error (definition only), interpolation, Lagrange interpolation formula, Newton Divided difference, Newton forward and backward interpolation formula, Numerical solution to non-linear equations, Bisection method, Newton-Raphson method, Sectant method, Fixed point iteration method, Numerical differentiation, Numerical Integration, rectangle rule, Mid-point rule, trapezoidal rule, Simpson's rule, Simpson's $3/8^{th}$ rule.

Textbooks:

1. E. Kreyszig, Advanced Engineering Mathematics, Wiley Eastern.
2. V. Krishnamurthy, V. P. Mainra. And J. L. Arora, An Introduction to Linear algebra, Affiliated East-West.
3. Boyce and R. C. Diprima, Elementary differential equations and Boundary Value Problems, Wiley.
4. Thomas and Finney, Calculus and Analytical Geometry, Narosa
5. B. S. Grewal, Higher Engineering Mathematics

SOT 202: Engineering Mechanics

Unit 1:
Force systems: Moment of a force about a point and about an axis; couple moment; reduction of a force system to a force and a couple.
Equilibrium: Free body diagram; equations of equilibrium; problems in two and three dimensions; plane frames and trusses.

Unit 2:
Friction: Laws of Coulomb friction, problems involving large and small contact surfaces; square threaded screws; belt friction; rolling resistance.
Kinematics and Kinetics of particles: Particle dynamics in rectangular coordinates cylindrical coordinates and in terms of path variables; central force motion.
Properties of areas: Moments of inertia and product of inertia of areas, polar moment of inertia, principal axes and principal moments of inertia.

Unit 3:
Concept of stress and strain: Normal stress, shear stress, state of stress at a point, ultimate strength, allowable stress, factor of safety; normal strain, shear strain, Hooke's law, Poisson's ratio, generalized Hooke's law; analysis of axially loaded members.
Torsion: Torsion of cylindrical bars, torsional stress, modulus of rigidity and deformation.

Unit 4:
Flexural loading: Shear and moment in beams; load, shear and moment relationship; shear and moment diagrams; flexure formula; shear stress in beams; differential equation of the elastic curve, deflection of beams.
Transformation of stress and strain: Transformation of stress and strain, principal stresses, principal strains, Mohr's circle for stress and strain.

Unit 5:
Combined loading: Axial and torsional; axial and bending; axial, torsional and bending.
Column: Buckling of slender columns, Euler bucking load for different end conditions.

Textbooks:

1. J. L. Meriam and L. G. Craige. Engineering Mechanics (Vol. 1 and 2) John Willey.
2. F. P. Beer and R. Johnston. Vector Mechanics for Engineers: Statics and Dynamics McGraw Hill
3. H. Shames. Engineering Mechanics. Prentice Hall.
4. Timoshenko and D. H. Young. Engineering Mechanics. McGraw Hill.

SOT203: Computer Systems and Programming

Unit I:

Introduction to Computer:
Overview of Computer organization and historical perspective of computer applications in various fields of science and management. Concepts of the finite storage, bits, bytes, kilo, mega and gigabytes.
Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions.
Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers.

Unit II:

Introduction to Programming:
Concept of algorithms, Flow Charts, Data Flow diagrams etc., Introduction to the Editing tools
Programming using C:
Concept of variables, program statements and function calls from the library,
data types, int, char, float etc., declarations and expressions, arithmetic operation, relational and logical operations, C assignment statements, extension of assignment of the operations. C primitive input output functions, C Statements,

Unit III:

Control Statements:
Branching: conditional execution using if, else. switch and break statements may be mentioned.
Looping: Concept of loops, example of loops in C using for, while and do-while. continue may be mentioned.
One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations.

Unit IV:

Functions:
Concept of Sub-programming, functions Example of functions. Argument passing, Recursion
Pointers: Pointers, relationship between arrays and pointers, Argument passing using pointers, Array of pointers, Passing arrays as arguments.

Unit V:
Structures and Unions: Defining C structures, passing strings as arguments Programming examples. Unions
Data Files: Concept of files, file operations – opening, closing, reading, writing and processing, Binary files

Textbooks:

1. Rajaraman, Fundamentals of Computers, Prentice Hall of India, 3rd Edition.
2. Venugopal & Prasad, Mastering C, TMH, 2006
3. Yashwant Kanetkar, Let us C, BPB Publications, 2nd Edition, 2001.

References:

1. Alexis Leon & Mathews Leon, Fundamentals of Computer Science & Communication Engineering, Leon Techworld, 1998.

2. Godfried, Computer Programming in C,
3. Kernighan & Ritchie, C Programming Language, The (Ansi C Version), PHI, 2nd Edition.

SOT204: Electrical Technology

Unit I:
Introduction:
Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables, Steam, Hydel, Gas and Nuclear power generation.

Unit II:
DC Circuits:
Kirchoff's laws, node voltage and mesh current methods, Delta-star and star-delta conversion, Superposition principle, Thevenin's and Norton's theorems.

Unit III:
Single phase AC Circuits:
Single phase EMF generation, average and effective values of sinusoids, solution of R,L,C series circuits.
The j operator, complex representation of impedances, phasor diagram, power factor, power in complex notation, solution of parallel and series – parallel circuits.

Unit IV:
Electrical Measuring Instruments:
DC PMMC instruments, shunt and multipliers, multimeters, Moving iron ammeters and voltmeters, dynamometer, wattmeter, AC watt-hour meter, extension of instrument ranges.

Unit V:
Electrical Machines:
Introduction to magnetic circuits, transformers, DC and AC motor principles,

Textbooks:
1. P.C. Sen, Principles of Electric Machines and Power Electronics, Wiley Eastern 2003.
2. Vincent DEL TORO, Electrical Engineering Fundamental's Prentice Hall India, Ed 2002.

PHI205:Values and Ethics

Unit I:
Facts and Values, Moral and non-moral values, Ethics and Morality. Moral frameworks: Utilitarianism, Rights/Duty Ethics, Virtue Ethics, Normative Ethics and Applied Ethics.

Unit II:

Science, Technology and Human values. Crisis of values in contemporary context, Need for values in global change, Trans-cultural human values, Technology and Personal and social values, Human centred technology. Problems of Technology transfer. Ethics on IPR.

Unit III:
Possibility of an ethics for the animate and inanimate. Animal ethics, Bio-ethics, Medical Ethics, Human Gene Therapy: Scientific and Ethical considerations. Cloning.

Unit IV:
Professional and Business Ethics. Ethical issues in Engineering practice. Codes of professional ethics. Conflicts between business demands and professional ideals: Case studies. Ethics in Corporate Sectors, Managerial Ethics

Unit V:
Environmental Ethics. Technological growth and its impact on Environment. Environmental degradation and pollution. Environmental Regulations. Concept of Sustainable Development. Eco-friendly technologies. Energy crisis and renewable energy resources. Ethics of the Eco-System.

Textbooks:

1. T. L. Beauchamp. Philosophical Ethics. An Introduction to Moral Philosophy. Georgetown University. McGraw Hill.
2. Peter Singer. Practical Ethics. Cambridge University Press.
3. Mike W. Martin. Ethics in Engineering. McGraw Hill.
4. Michael Bayles. Professional Ethics. Wadsworth.
5. Bruce O. Watkins and Meador Roy. Technology and Human Values: Collision and Solution. AnnArbor Science.
6. Dr. Subir Chowdhury. Blending the best of the East & West. EXCEL
7. Ghosh. Ethics & Mgmt. & Indian Ethos. VIKAS.
8. Pherwani. Business Ethics. EPH
9. Balachandran, Raja & Nair. Ethics, Indian Ethos & Mgmt., Shroff Publishers

SOT206: Basic Electronics

Unit I:

Junction Diode: p-n junction, V-I characteristics, diode resistance, capacitance, switching time, diode applications. Breakdown mechanism, Zener and avalanche, break down characteristics, Zener diode and its applications, rectifiers & voltage regulator.

Unit II:

Transistor: Bipolar junction transistor, CE, CB and CC configurations and characteristic curves, Fixed and Self Biasing Circuits. Junction field Effect Transistor, MOSFET, working of Depletion and Enhancement types of MOSFET, transfer characteristics.

Unit III:

Operational Amplifier (OPAMP): Ideal OPAMP, their characteristics, differential amplifier, Inverting and Non Inverting amplifier, Common mode rejection ratio (CMMR), slew rate, Application of OPAMP, Summer, Subtractor, Differentiator, and Integrator.

Unit IV:

Digital Electronics: Number systems, conversion of bases, Boolean Algebra, logic gates, Concept of universal gate, Karnaugh Maps, SR Flip-Flops, JK Flip-Flops D Flip-Flops, T Flip-Flops, Counter, Johnson Counter, Modulo 5 counter, Decade Counter.

Unit V:

Electronics Instruments: Electronic voltmeter, Ammeter, Function Generator Digital Multimeter and their applications, CRO and its applications, Transducer definition, Different types of transducers, resistive transducer, capacitive transducer, inductive transducer, LVDT, Strain Gauge.

Textbooks:

1. J. Millman and Halkias, Electronic devices and circuits TMH, 1999.
2. Salivahanan, Suresh Kumar, Vallavaraj, Electronic devices and circuits TMH, 1999

References:

1. J. Millman and Halkias, Integrated Electronics, Analog & Digital Circuits & Systems, TMH – 2000.
2. Boylestad & Nashelsky, Electronic Devices & Circuit Theory, PHI – VIth Edition.
3. Sedra & Smith, Micro Electronic Circuits Oxford, University Press, 2000
4. J.B.Gupta, Electronic Devices & Circuits, S. K. Kataria, IInd Edition.

SOT283: C Programming Lab.

Experiments should include but not limited to:

1. Write a program to produce ASCII equivalent of given number
2. Write a program to find divisor or factorial of a given number.
3. Write a program to evaluate the following algebraic expressions after reading necessary values from the user
   $(ax+b)/(ax-b)$
   $2.5 \log x-\cos 30+|x^2-y^2|+\text{sqrt}(2xy)$
   $(x^5+10x^4+8x^3+4x+2)$
4. Write a program to find sum of a geometric series
5. Write a program to cipher a string
6. Write a program to check whether a given string follows English capitalization rules
7. Write a program to find sum of the following series

$1+ ½ + {}^{1}/_{3} +$_____$+{}^{1}/_{20}$

8. Write a program to search whether a given substring exist in an input string or not and then delete this string from input string.
9. Write a recursive program for tower of Hanoi problem
10. The Fibonacci sequence of numbers is 1, 1, 2, 3, 5, 8……. Based on the recurrence relation F(n)=F(n-1)+F(n-2) for n>2
    Write a recursive program to print the first m Fibonacci number
11. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
    a) Addition of two matrices
    b) Subtraction of two matrices
    c) Finding upper and lower triangular matrices
    d) Trace of a matrix
    e) Transpose of a matrix
    f) Check of matrix symmetry
    g) Product of two matrices.
12. Write a program that takes two operands and one operator from the user perform the operation and then print the answer
13. Write a program to print the following outputs:

```
1                                                   1
2     2                                           2     2
3     3     3                                   3     3     3
4     4     4     4                             4     4     4     4
5     5     5     5     5                       5     5     5     5     5
```

14. Write functions to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib) Also write the main program.
15. Write a menu driven program for searching an sorting with following options:-
    a) Searching (1) Linear searching (2) Binary searching
    b) Sorting (1) Insertion sort (2) Selection sort
16. Write a program to copy one file to other, use command line arguments.
17. Write a program to mask some bit of a number (using bit operations)
18. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.

SOT284: Electrical and Electronics Lab

List of Electrical Experiments

1. Verification of Thevenin's theorem
2. Verification of Superposition theorem
3. Phasor Diagram and Power factor of LCR circuit.
4. Measurement of Power and Power factor in single phase Load using three ammeters/voltmeters.
5. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter
6. Two wattmeter method of measuring power in three phase circuit (resistive load only)
7. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer
8. Short Circuit/Open Circuit tests on Single Phase transformer
9. Measure the armature and field resistance of a D.C. Machine

10. Connection and starting of a Three Phase Induction Motor using direct on line or Star Delta Starter.
11. Starting and Speed Control of a D.C. shunt motor
12. Resonance

Electronic Experiments

Practical will be based on Analog Electronics.
Some lab experiments must be performed using any circuit simulation software e.g. PSPICE.

SOT291: Workshop Technology

Wood and Wood Working (Carpentry): Classification and conservation of wood, common varieties of Indian timber, defects in timber, carpentry tools, auxiliary materials used in carpentry.

Bench Work and Fitting: Operations commonly used in bench and fitting work, description and use of vices, hammers, chisels, files, scraper, hacksaw, punches, measuring and marking tools, reamers, punches, gauges.

Manufacturing Processes: Classification of manufacturing processes, manufacturing and basic definitions, industrial safety, ferrous and non-ferrous metals, steels and alloy steels, heat treatment of metals and alloys.

Smithing and Forging: introduction, forging materials, heating devices, hand tools and appliance, smith forging operations.

Welding and Related Processes: Introduction, weldability, types of welding, metallurgy of weld, gas welding, arc welding, resistance welding, solid state welding, soldering, brazing, welded joints and edge preparation, safety in welding.

Workshop Practices:

1. Sawing and simple joints, planning
2. Chipping marking and filing
3. Forging operation
4. Welding joint preparation
5. Metal arc welding and gas welding practice

IT301: Discrete Mathematics and Graph Theory

Part A: Discrete Mathematics

Unit I:

Sets and functions: Groups, Semigroups and monoids, Cyclic semigroups and submonoids, Subgroups and Cosets, Congruence relations on Semigroups. Morphisms, Normal subgroups. Structure of cyclic groups, permutation groups, dihedral groups. Elementary applications in coding theory.

Unit II:

Rings and Boolean Algebra: Rings, Subrings, morphism of rings, ideals and quotient rings. Euclidean domains. Integral domains and fields. Boolean Algebra - direct product, Morphisms. Boolean sub-algebra. Boolean Rings. Applications of Boolean algebra in logic circuits and switching functions.

Unit III:

Recursion and Recurrence Relation: Basic idea, Sequence and discrete function. Generating functions and applications.

Part B: Graph Theory

Unit IV:

Introduction to Graph Theory: Graphs, Digraphs, Isomorphism, Walks, Paths, Circuits, Shortest Path Problem, Dijkstra's Algorithm, Trees, Properties of Trees, Cotrees and Fundamental Circuits,

Unit V:

Graph Theoretic Algorithms and Applications:

Shortest Spanning Trees - Kruskal's Algorithm, Prims Algorithm, DFS, BFS, Cut Sets, Fundamental Cut Sets and Cut Vertices, Planar and Dual Graphs, Metric Representation of Graphs, Networks, Flow Augmenting Path, Ford-Fulkerson Algorithm for Maximum Flow.

Textbooks:

1. Liu C. L., Introduction to combinatorial mathematics, McGraw Hill, 1968.
2 Mott J. L., Kandel A. and Baker T. P., Discrete mathematics for Computer Scientists and Mathematicians, PH, 1986.
3 Deo N., Graph Theory with Applications to Engineering and Computer Science, PHI, 1980
4 Tremblay and Manohar, Discrete mathematical structures with applications to computer science, McGraw Hill, 1975
5 Kolamn, Busby and Ross, Discrete mathematical structures, 3/ed, PHI, 1996.

References:

1. Lipschutz, 2000 Solved Problems in Discrete Mathematics, TMH
2. Balakrishnan, Graph Theory (Schaum),MH
3. Hararay, Graph Theory
4. Rosen, Discrete Mathematics, 2/e,TMH
5. S.K. Mapa, Higher Algebra (Abstract & Modern)
6. Robert J. McElice , Robert B. Ash & Carol Ash, Introduction to discrete Mathematics, Tata McGraw Hill
7. Fraleigh J. B., A first course in abstract algebra, Narosa, 1990
8. Smullyan R. M., First Order Logic, Springer Verlag, 1968

SOT302: Operations Research and Industrial Management

Unit I:
System concepts, system approach, Linear programming problems, Mathematical formulation, Graphical solution, Simplex method; Degeneracy and Duality in linear programming;

Unit II:
Transportation problems, Assignment problems, Decision analysis.

Unit 3:
Waiting line problems, Project Management by PERT/CPM; Inventory control.

Unit 4:
Mathematical models of physical systems. Modeling of systems and Computer Simulation.

Unit 5:
Advanced Computer Programming Techniques: Integer Programming, Dynamic Programming

Textbooks:
1. L.C. Jhamb, Industrial Management, Vol.1, EPH
2. Sinha, Industrial Relations, Trade Unions & Labour Legislation, Pearson Education Asia
3. S.P. Robbins, Organizational Behaviour, Prentice Hall
4. S. N. Chary, Productions and Operations Management, TMH

References:
1. Phillip Kotler, Marketing Management, Prentice Hall/Pearson Education.
2. Joseph Monks, Productions and Operations Management, TMH

IT303: Numerical Methods and Programming

Unit I:
Approximation in numerical computation, Truncation and rounding errors;
Algebraic Equation: Bisection method, Secant method, Regular-Falsi method, Newton-Raphson method.

Unit II:
Interpolation: Lagrange's Interpolation, Newton forward & backward differences Interpolation, Newton divided difference.

Unit III:
Numerical Solution of a system of linear equation: Gauss elimination method, Matrix Inversion, LU Factorization method, Gauss Jacobi method, Gauss Seidal method;

Unit IV:
Numerical solution of ordinary differential equation: Taylor's series method, Euler's method, Runge-kutta method, Predictor-Corrector method;

Unit V:
Numerical Integration: Trapezoidal, Rule, Simson's 1/3 Rule, Weddle' Rule;

Textbooks:

1. Pradeep Niyogi, Numerical Analysis and Algorithms, TMH
2. J.B.Scarborough, Numerical Mathematical Analysis
3. C.Xavier, C Language and Numerical Methods
4. Dutta & Jana, Introductory Numerical Analysis
5. Balagurusamy, Numerical Methods

References:

1. Jain, Iyengar , & Jain Numerical Methods (Problems and Solution)
2. P.U.Wayse, Numerical Methods In Computer Applications, EPH
3. Dutta- Computer Oriented Numerical Methods, Vikas

IT304: Data Structures

Unit I:
Time and Space analysis of Algorithms: Time Complexity, Space complexity, Order Notations.
Recursion - Design of recursive algorithms, Tail Recursion, When not to use recursion, Removal of recursion.

Unit II:
Linear Data Structures: Sequential representations- Arrays and Lists, Stacks, Queues and Dequeues, strings, Application.
Link Representation, Linear linked lists, circularly linked lists. Doubly linked lists, application.

Unit III:
Non-linear Data Structure: Trees- Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height-balanced and weight-balanced trees, B trees, B+ trees, AVL trees, Application of trees; Graphs Representations, Breadth-first and Depth-first Search.

Unit IV:
Sorting algorithms: Bubble sort, Selection Sort, Insertion Sort, Quick sort, Merge Sort, Heap sort, Radix Sort.
Search Techniques: Linear Search, Binary Search.

Unit V:
File Structures: Sequential and Direct Access. Relative Files, Indexed Files, Multi-indexed Files, Inverted Files, Hashed Files, Hashing: Hashing Functions, collision Resolution Techniques.

Textbooks:

1. O.G. Kakde and U.A. Deshpandey, Data Structures and Algorithms, ISTE/EXCEL BOOKS
2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", Addison Wesley
3. Drozdek, Data Structures and Algorithms, Vikas

4. Ajoy Agarwal, Data Structures Through C, Cybertech.
5. Lipschutz, Data Structures TMH

References:

1. Heileman, Datastructure Algorithims & OOP
2. M.Radhakrishnan, V.Srinivasan, Data Structure Using C, ISTE/EXCEL BOOKS
3. Weiss Mark Allen, Algorithms, Data Structures, and Problem Solving with C++, Addison Wesley.
4. Horowitz Ellis & Sartaj Sahni, Fundamentals of Data Structures, Galgotria Pub.
5. Tanenbaum A. S. , Data Structures using 'C'

IT305: Digital Electronics

Unit I:
Data and number systems, Binary representation, Codes and their conversions: BCD, Octal, Hexadecimal, ASCII, EBDIC, Gray, Signed binary number representation with 1's and 2's complement methods, Binary arithmetic.

Unit II:
Boolean algebra, Venn diagram, logic gates and circuits, Minimization of logic expressions by algebraic method, K-map method and Quine Mc Clauskey method.

Unit III:
Combinational circuits- adder, subtract or, encoder, decoder, comparator, multiplexer, de-multiplexer, parity generator, etc.
Design of combinational circuits-Programming logic devices and gate arrays.

Unit IV:
Sequential Circuits- Flip Flops, various types of Registers and counters and their design, Irregular counter, State table and state transition diagram, sequential circuits design methodology

Unit V:
Different types of A/D and D/A converters and conversion techniques.
Different Logic families- TTL, ECL, MOS, CMOS etc. and their operation, design and specifications.
Memory devices- RAM, ROM, PROM, EPROM, EEPROM, basic principles etc.

Text books:

1. Givone, Digital Principles & design, Tata McGraw Hill.
2. Morries Mano, Digital Logic Design, PHI
3. Dr. Saroj Rangnekar, Digital Electronics, ISTE/EXCEL BOOKS.
4. Malvino, Digital principles & Application.
5. Jain, Modern digital Electronics, TMH.

References:

1. H.Taub & D.Shilling, Digital Integrated Electronics, Mc Graw Hill.

2. Virendra Kumar, Digital Technology, New Age.
3. Marcovitz, Introduction to Logic design, Mcgraw-Hill .
4. Digital Circuits and Design, Vikas.

IT383: Numerical Methods Lab

1. Assignments on Algebric Equation: Bisection, Secant, Regular-falsi, Newton Raphson
2. Assignments on Interpolation: Newton forward & backward, Lagrange
3. Assignments on Numerical solution of a system of linear equation: Gauss elimination, Gauss Jacobi, Matrix Inversion, Gauss Seidal
4. Assignments on Statistical Problem: Mean, Median, Mode, Standard deviation (for simple & frequency type data), Correlation & Regression
5. Assignments on Ordinary Differential Equation: Taylor Series, Euler's method, Runga-Kutta
6. Assignments on Numerical Integration: Trapezoidal Rule, Simson's 1/3 Rule, Weddle's Rule

IT 384: Data Structure Lab

Experiments should include but not limited to:

Implementation of array operations

Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem: Evaluation of expressions operations on Multiple stacks & queues :

Implementation of linked lists: inserting, deleting, and inverting linked list. Implementation of stacks & queues using linked lists

Polynomial addition, Polynomial multiplication

Sparse Matrices: Multiplication, addition.

Recursive and Non-recursive traversal of Trees

Threaded binary tree traversal. AVL tree implementation.

Application of Trees, Application of sorting and searching algorithms

Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

IT385: Digital Electronics Lab

1. Realization of NOT, OR, AND, XOR, XNOR gates using universal gates
   A. Gray to Binary conversion & vice-versa.
   B. Code conversion between BCD and EXCESS-3
2.
   A. ODD and even parity generation and checking.
   B. 4-bit comparator circuit

3. Design of combinational circuit to drive seven-segment display
4. Design of combinational circuits using multiplexer
5.
    A. Adder/Subtractor circuits using Full-Adder using IC and/ or logic gates.
    B. BCD Adder circuit using IC and/ or logic gates
6. Realization of RS , JK, and D flip flops using Universal logic gates
7. Realization of Asynchronous up/down counter
8. Realization of Synchronous Mod-N counter
9. Digital to Analog conversion

IT401: Database Management System

Unit I:
Introduction: File & Data Base Concept, Overview of DBMS, Data Models, Database Administrator, Database Users, Schema, Data Independence.
Entity-Relationship Model: Basic concepts , Keys, Entity-Relationship Diagram, Cardinality ratios, Strong & Weak Entity Sets, Specialization, Generalization, Aggregation.
Relational Model: Procedural & Non Procedural Languages, Relational Algebra, Extended Relational Algebra Operations, Views, Modifications Of the Database, Relational Calculus.

Unit II:
SQL: Basic Concepts, Set operations, Aggregate Functions, Null Values, assertions, views, Nested Sub-queries, Cursors, Stored procedures and triggers.
Integrity Constraints & Introduction to RDBMS: Domain Constraints, Referential Integrity Constraints, Codd's rule.
Functional Dependencies and Normalization: Functional Dependency, Armstrong's axioms, Canonical Cover, Closure, Full and Partial Functional dependencies, Prime & Non Prime attribute, 1NF, 2NF, 3NF, BCNF, Multi valued Dependency, 4NF, 5NF, DKNF.

Unit III:
Storage Strategies: Single-Level Index (primary, secondary, clustering), Multi-level Indexes, Dynamic Multi-level Indexes, Hashing Techniques, B tree and B+ tree .
Query Optimization: Full Table scan, Indexed-based scan, Merge join, Nested loop join , Equivalence rules , Heuristic Optimization , Cost Based Optimization.

Unit IV:
Transaction & Concurrency Control: Transaction concept, ACID properties, Conflict & View serializabilty, Test for Conflict serializability, Concurrency Control, Lock base protocols, Two phase locking.
Backup & Recovery: Physical & Logical Backup, Transaction logs, Causes of failures , Recovery techniques.

Unit V:
Distributed Databases: Basic Concepts, Data Fragmentation, Replication and Allocation Techniques, Types of Distributed Database Systems, Query Processing, Overview of Client-Server Architecture and Its relationship to Distributed Databases.

Textbooks:
1. Henry F. Korth and Silberschatz Abraham, Database System Concepts, Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, Fundamentals of Database Systems, Benjamin Cummings Publishing. Company.
3. Date C. J., Introduction to Database Management, Vol. I, II, III, Pearson
4. Ramakrishnan, Database Management System, McGraw-Hill
5. Kroenke, Database Processing, PHI

References:
1. Alexis Leon & Mathews Leon, Database Management Systems, Leon Vikas .
2. Bipin C Desai, An Introduction to Database Systems, Galgotia .
3. Arun K.Majumdar, Pritimay Bhattacharya, Database Management Systems, Tata McGraw Hill

IT402: System Software

Unit I:
Introduction: Machine structure; System Software and Application Software; components of a programming system- Assemblers, Loaders, Macros, Compilers; Evolution of Operating Systems.
Machine Structure, Machine Language, and Assembly Language: General Approach to a New Machine, Machine Language- No looping, Address Modification using Instructions as Data and Index Registers, Looping. Assembly Language- Assembly Language programs, examples using Literals.

Unit II:
Assemblers: General design procedures, Design of Assemblers- problem statement, data structures, format of databases, algorithms. Design of two pass assemblers, Cross Assemblers.
Macro Processors: Macro Instructions, Features of a macro facility- macro instruction arguments, conditional macro expansion, macro calls within macros, macro instruction defining macros. Implementation- Two-pass algorithm, Single pass algorithm, Macro calls within Macros. Macro Assemblers.

Unit III:
Loader schemes: Compile and go loaders, general loader schemes, absolute loaders, relocating loaders- static & dynamic linking, Direct linking loaders, Binders, Overlays, dynamic binders; Working principle of Editors, Debuggers.

Unit IV:
Compilers: General model of a compiler. Phases of a compiler- Lexical phase, Syntax phase, Interpretation phase, Optimization phase, Storage assignment, Code generation, Assembly phase. Passes of a Compiler. Compiler Design Options.

Unit V:
Operating System: Basic Operating System Functions, Machine-Dependent and Independent Operating System Features, Operating System Design Options. Other System Software: Text Editors, Debuggers.

Textbooks:
1. J. J. Donvan, Systems Programming, TMH
2. Dhamdhere, System Programming and Operating Systems, TMH

References:
1. L.L. Beck, System Software (3rd Ed.), Pearson Education
2. Michel Ticher, PC System Programming, Abacus.

IT403: Computer Organization & Architecture

Unit I:
Concepts & Terminology: Digital computer concepts; Von-Neumann concept; Hardware & Software and their nature; structure & functions of a computer system, Role of operating system.

Unit II:

CPU Design: The ALU- ALU organization, Integer representation, 1s and 2s complement arithmetic; Serial & Parallel Address; implementation of high speed Address Carry Look Ahead & carry Save Address; Multiplication of signed binary numbers-Booth's algorithm; Divide algorithms- Restoring & Non-Restoring; Floating point number arithmetic; Overflow detection, status flags.
Instruction Set Architecture- Choice of instruction set; Instruction word formats; addressing modes.

Unit III:
Control Design: Timing diagrams; T-States, Controlling arithmetic & logic instruction, control structures; Hardwired & Micro programmed, CISC & RISC characteristics.
Input/output Organization: Introduction to Bus architecture, effect of bus widths, Programmed & Interrupt I/O, DMA.

Unit IV:
Memory Unit: Memory classification, characteristics; Organization of RAM, address decoding ROM/PROM/EEPROM; Magnetic memories, recording formats & methods, Disk & tape units; Concept of memory map, memory hierarchy, Associative memory organization; Cache introduction, techniques to reduce cache misses, concept of virtual memory & paging.

Unit V:
Pipelining-general concept, speed up, instruction & arithmetic pipeline; Examples of some pipeline in modern processors, pipeline hazards; Flynn's classification –SISD, SIMD, MISD, MIMD architectures-Vector and Array processors & their comparison, Concept of Multiprocessor; Centralized & distributed architectures.

Textbooks:
1. Hayes, Computer Architecture & Organization, 3/e, MH
2. Hamacher, Computer Organization, 5/e, MH
3. Mano, M. M, Computer System Architecture
4. Chaudhury, P. Pal, Computer Organization & Design, PHI

References:
1. Carter, Computer Architecture (Schaum Series), TMH
2. Stallings, W, Computer Organization & Architecture, MH

IT404: Object Oriented Programming & UML

Unit I:
Introduction: Need of OOP, History, Development, Concepts, and Benefits of OOP.
Programming in C++: Structure of a C++ program, tokens, keywords, identifiers, data types, expressions, control structures, declaration and initialization of variables, operators, expressions and implicit conversions. Functions in C++.

Unit II:
OOP in C++: Classes and objects, member functions, constructors and destructors, operator overloading and type conversions, Inheritance, virtual functions and polymorphism.

Unit III:
Managing console I/O operations: C++ streams, C++ Stream classes, formatted and unformatted I/O operations.
File handling in C++: classes for file stream operations, Opening, closing, and updating files, file pointers and their manipulations.
Templates and exception handling: class and function templates,

Unit IV:
Fundamentals of Object Oriented design in UML: Static and dynamic models, why modeling, UML diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram, UML extensibility- model constraints and comments, Note, Stereotype.

Unit V:
Case studies and representation in UML.

Textbooks:

1. Rajaraman, Object Oriented Programming and C++, New Age International
2. Ali Bahrami, Object Oriented System Development, Mc Graw Hill.
3. Rambaugh, James Michael, Blaha, Object Oriented Modelling and Design, Prentice Hall India
4. Page Jones, Meiler, Fundamentals of object oriented design in UML
5. E. Balaguruswamy, OOP using C++,

References:

1. Priestley, Practical Object Oriented Design using UML, TMH
2. Roff, UML, A Beginner's Guide, TMH
3. Mahapatra, Introduction to System Dynamic Modeling, Universities Press

MAT405: Probability and Statistics

Unit I:
Sample spaces, events as subsets, probability axioms, sample theorems, finite sample spaces and equiprobable measure as special cases, binomial coefficients and counting techniques applied to probability problems, conditional probability, independent events, Bayes' formula.

Unit II:
Moment-expectation, mean, variance, regression
Random variables (discrete and continuous), probability functions, density and distribution functions, special distributions (binomial, hypergeometric, Poisson, uniform exponential, normal...) mean and variance, Chebychev inequality, independent random variables, functions of random variables their distributions.

Unit III:
Poisson and normal approximation to the binomial, central limit theorem, law of large numbers, some statistical applications

Unit IV:
Theory of sampling – sampling distribution and standard error
Theory of estimation – point estimation and interval estimation

Unit V:
Transition probabilities and matrix, Classification of states Ergodic properties, Random walks problem. Examples from physical, biological and behavioral sciences

Types of processes, Markov process, Application to the theory of queues.

Textbooks:

1. Spiegel M R : Theory and Problems of Probability and Statistics (Schaum's Outline Series) - McGraw Hill Book Co.
2. Veerarajan :Probability &statistics 2/e TMH
3. Goon A. M., Gupta M K and Dasgupta B: An Outline of Statistical Theory-Vol.I - The World Press Pvt. Ltd.
4. Goon A.M., Gupta M K and Dasgupta B: Fundamental of Statistics - The World Press Pvt. Ltd.
5. Spiegel M R: Theory and Problems of Complex Variables (Schaum's Outline Series) - McGraw Hill Book Co.

References:

1. Bronson R: Differential Equations (Schaum's Outline Series) - McGraw Hill Book Co.
2. Ross S L : Differential Equations - John Willey & Sons.
3. Sneddon I. N. : Elements of Partial Differential Equations - McGraw Hill Book Co.
4. Grewal B S : Higher Engineering Mathematics (thirty fifth edn.) - Khanna Pub.
5. Kreyzig E: Advanced Engineering Mathematics - John Wiley and Sons.
6. Jana-Undergraduate Engg. Math ,Vikas
7. Lakshminarayn- Engg. Math Vol1,2,3, Vikas
8. Gupta- Matehmatical Physics,Vikas
9. D. P. Das, Advanced Engg. Mathematics, Cyber Tech

IT482: System Software Lab

With reference to the theory syllabus.

IT484: Object Oriented Programming Lab (USING C++)

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, vectors, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming, handling errors and exceptions, applet programming and graphics programming
6. UML based design using Rational Rose

IT481: Database Management System Lab

Structured Query Language

1. **Creating Database**
   - Creating a Database
   - Creating a Table
   - Specifying Relational Data Types
   - Specifying Constraints

- Creating Indexes

2. **Table and Record Handling**
   - INSERT statement
   - Using SELECT and INSERT together
   - DELETE, UPDATE, TRUNCATE statements
   - DROP, ALTER statements
3. **Retrieving Data from a Database**
   - The SELECT statement
   - Using the WHERE clause
   - Using Logical Operators in the WHERE clause
   - Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING clause
   - Using Aggregate Functions
   - Combining Tables Using JOINS
   - Subqueries
4. **Database Management**

- Creating Views
- Creating Column Aliases
- Creating Database Users
- Using GRANT and REVOKE

Cursors in Oracle PL / SQL
Writing Oracle PL / SQL Stored Procedures

IT501: Operating System

Unit I:

Introduction: Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management:

Processes: Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication.

Threads: overview, benefits of threads, user and kernel threads.

Unit II:

CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management:

Unit III:

Memory Management: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

Unit IV:

I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks.

Unit V:

File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

Protection & Security: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Textbooks:

1. Tanenbaum A.S., Operating System Design & Implementation, Practice Hall NJ.
2. Milenkovie M., Operating System: Concept & Design, McGraw Hill.
3. Silbersehatz A. and Peterson J. L., Operating System Concepts, Wiley.

References:

1. Dhamdhere, Operating System, TMH

2. Stalling, William, Operating Systems, Maxwell McMillan International Editions, 1992.
3. Dietel H. N., An Introduction to Operating Systems, Addison Wesley.

IT502: Information and Coding Theory

Unit I:
Elements of information theory
Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenonfano theorem, entropy

Unit II:
Sampling Process
Base band and band pass sampling theorems reconstruction from samples, Practical aspects of sampling and signal recovery TDM

Unit III:
Waveform Coding Techniques
PCM Channel noise and error probability DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion ISI and eye pattern Equalization.

Unit IV:
Digital Modulation Techniques
Binary and M-ary modulation techniques, Coherent and non-coherent detection, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signaling

Unit V:
Error Control Coding
Rationale for coding Linear block codes, cyclic codes and convolution codes Viterbi decoding algorithm and trellis codes.

Books Recommended:

1. Principles of digitals communication: J. Dass. , S.K. Malik & P.K. Chatterjee
2. Introduction to the theory of Error correcting codes: Vera Press
3. Information Theory and Reliable Communication: Robert G. Gallanger Mc Graw Hill
4. Related IEEE/IEE publications

IT503: Embedded Systems

Unit I:
Introduction to 8085A CPU architecture-register organization, addressing modes and their features. Software instruction set and Assembly Language Programming. Pin description and features.

Unit II:
Instruction cycle, machine cycle, Timing diagram.

Hardware Interfacing: Interfacing memory, peripheral chips (IO mapped IO & Memory mapped IO).

Unit III:
Interrupts and DMA.
Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same.
Typical applications of a microprocessor.

Unit IV:
Introduction to embedded systems design & RTOS: Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

Unit V:
Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

Textbooks:

1. Raj Kamal, Embedded Systems, TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, The 8051 Microcontroller and Embedded Systems, PHI, 2004.
3. Ramesh S. Gaonkar, Microprocessor architecture, programming and applications with 8085/8085A, Wiley Eastern Ltd.
4. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communication, Wiley inter science publications.
5. Adam Osborne and J. Kane, An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New Delhi

References:

1. David E. Simon, An Embedded Software Primer, Pearson Education, 1999.
2. K.J. Ayala, The 8051 Microcontroller, Penram International, 1991.
3. Dr. Rajiv Kapadia, 8051 Microcontroller & Embedded Systems, Jaico Press
4. Dr. Prasad, Embedded Real Time System, Wiley Dreamtech, 2004.
5. Ray and Bhurchandi, Advanced Microprocessors, TMH
6. Intel Corp. Micro Controller Handbook – Intel Publications.
7. Douglas V. Hall, Microprocessors and Interfacing, McGraw Hill International Ed.
8. Alan R. Miller, Assembly Language Programming the IBM PC, Subex Inc, 1987
9. Bary B. Brey, The Intel Microprocessors: 8086/8088, 80186, 80286, 80386 & 80486, Prentice Hall, India.

IT504: Multimedia

Unit I:
Introduction: Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications.

Text and Audio: Text- Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption. Audio- Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI.

Unit II:
Image and Video: Image- Formats, Image Color Scheme, Image Enhancement. Video- Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.

Unit III:
Synchronization: Temporal relationships, synchronization accuracy specification factors, quality of service.
Storage models and Access Techniques: Magnetic media, optical media, file systems (traditional, multimedia). Multimedia devices- Output devices, CD-ROM, DVD, Scanner, CCD.

Unit IV:
Image and Video Database: Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- k-d trees, R-trees, quad trees; Case studies- QBIC, Virage. Video Content, querying, video segmentation, indexing.

Unit V:
Multimedia Applications: Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Textbooks:
1. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing, Communications & Applications, Pearson Ed.
2. Ranjan Parekh, Principles of multimedia, TMH
3. Nalin K. Sharda, Multimedia Information System, PHI.
4. Fred Halsall, Multimedia Communications, Pearson Ed.
5. Koegel Buford, Multimedia Systems, Pearson Ed.
6. Fred Hoffstetter, Multimedia Literacy, McGraw Hill.

References:
1. Ralf Steinmetz and Klara Nahrstedt, Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing, PHI.
2. J. Jeffcoate, Multimedia in Practice: Technology and Application, PHI.
3. Prabhat K. Andleigh & Kiran Thakrar, Multimedia Systems Design, PHI.

IT505: Software Engineering

Unit I:

Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model, Function Point Analysis(FPA).

Unit II:
System Requirement Specification, System analysis- DFD, Data Dictionary, ER diagram, Process Organization & Interactions.
System Design- Problem Partitioning, Top-Down & Bottom-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.

Unit III:
Coding & Documentation- Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation.

Unit IV:
Testing- Levels of Testing, White & Black box testing, Integration Testing, structural testing Test case Specification, Reliability Assessment. , Validation & Verification Metrics, Monitoring & Control.

Unit V:
Software Project Management- Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring.
CASE TOOLS: Concepts, use and application.

Textbooks:

1. R. G. Pressman, Software Engineering, TMH
2. Behforooz, Software Engineering Fundamentals, OUP
3. Ghezzi, Software Engineering, PHI
4. Pankaj Jalote, An Integrated Approach to Software Engineering, NAROSA.
5. Object Oriented & Classical Software Engineering(Fifth Edition), SCHACH,TMH
6. Vans Vlet, Software Engineering, SPD

References:

1. IEEE Standards on Software Engineering.
2. Kane, Software Defect Prevention, SPD
3. Uma, Essentials of Software Engineering, Jaico
4. Sommerville, Ian, Software Engineering, Pearson Education
5. Benmenachen, Software Quality, Vikas

IT506: IT applications in Bio-sciences

Unit I: Cell and Molecular Biology
Concept of Life and Living Systems, Cell and Cellular components, Chromosomes and heredity, Nucleic Acids (DNA & RNA), Central Dogma, Replication, Transcription, Translation, Gene, Genetic Engineering, Cloning and DNA Sequencing.

Unit II: Ecology and Evolution
Population and population dynamics, Competition, Prey-Predator interaction, Ecosystem stability, Darwinism, Hardy-Weinberg Law, Evolutionary forces, Molecular Evolution

Unit III: Physiology, Biochemistry and Biophysics
Blood, Respiration, Reproduction, Hormones, Nervous System, Thermodynamics of Living system, Concept of pH and water balance in cell, Amino acids and Structure of Protein, Photosynthesis and respiration (cellular)

Unit IV: Research Methodologies
Basic techniques in Biological Research, Spectroscopic methods, Gel Electrophoresis, Polymerase Chain Reaction (PCR), Role of digital image processing in Biological research: Remote sensing and microarray, Systems biology and Functional Genomics

Unit V: Computational Biology
Biological Database searching: NCBI, EMBL, PIR, PDB, Swiss-Prot, Concept of Molecular docking, QSAR, Protein Structure Prediction, Role of Graph Theory and Neural Networks in biological and pharmaceutical research.

Textbooks:

1. Bruce Alberts et al.(2006), Molecular Biology of the Cell, W. Saunders Publ.(USA)
2. Lodish and Baltimore, Cell and Molecular Biology
3. Conn, E. and Stumf, Outlines of Biochemistry, P. K. Wiley & Sons, India

Reference:

1. Nelson & Cox, Lehninger Biochemistry, CBS Publishers, India
2. Daniel Harlt, Basic Genetics, W. Saunders, USA

IT583: Embedded Systems Lab

1) Familiarization with 8085 register level architecture and trainer kit components, including the memory map. Familiarization with the process of storing and viewing the contents of memory as well as registers.

2) Study of prewritten programs on trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical)
3) Assignments based on above.

4) Familiarization with 8085 simulator on PC.
5) Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator.
6) Assignments based on above

7) Programming using kit/simulator for
   a) table look up
   b) Copying a block of memory
   c) Shifting a block of memory
   d) Packing and unpacking of BCD numbers
   e) Addition of BCD numbers
   f) Binary to ASCII conversion
   g) String Matching
   h) Multiplication using Booth's Algorithm

8) Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg, subroutine for delay, reading switch state & glowing LEDs accordingly, finding out the frequency of a pulse train etc

9) Interfacing any 8-bit Latch (eg, 74LS373) with trainer kit as a peripheral mapped output port with absolute address decoding

10) Interfacing with I/O modules:

a) ADC

Speed control of mini DC mot **Unit IV:**

b) or using DAC
c) Keyboard
d) Multi-digit Display with multiplexing
e) Stepper motor

11) Writing programs for 'Wait Loop (busy waiting)' and ISR for vectored interrupts (eg, counting number of pulses within specified time period)

IT585: Software Engineering Lab

Case studies using any or similar of the following items including relevant form design with the help of visual programming aids.

1. Payroll accounting system.
2. Library circulation management system.
3. Inventory control system.
4. University examination & grading system.
5. Patient information system.
6. Tourist information system.
7. Judiciary information system.
8. Flight reservation system.
9. Bookshop automation software.
10. Time management software.

IT584: Multimedia Lab

1. Sound capturing & editing using tools like SOUNDFORGE.
2. Image editing using tools, like Adobe Photoshop.
3. Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier).
4. Creation of Content using HTML (basic tags, table form, frame, link to other Image).
5. Creating stylesheet using DHTML
6. Homepage creation using HTML, DHTML.

Textbooks:

1. Adobe, Adobe Photoshop 6.0: Classroom in a book, Pearson Ed.
2. Anushka Wirasinha, Flash in a Flash- Web Development , PHI
3. Macromedia Flash5 fast and easy Web Development, Design, PHI
4. Castro, HTML4 for the World Wide Web, Pearson Ed.

5. Schurman & Purdi, Dynamic HTML in Action, Second Edition , PHI
6. Lozano, Multimedia- Sound & Video , PHI

IT601: Design & Analysis of Algorithm

Unit I:
Models of computation: RAM, TM etc. time and space complexity
Asymptotic Notation: Big-O, omega, theta etc.; finding time complexity of well known algorithms like- heap sort, search algorithm etc.
Algorithm Design techniques: Recursion- Definition, Use, Limitations, Examples: Hanoi problem. Tail Recursion

Unit II:
Divide and Conquer: Basic method, use, Examples: Merge sort, Quick Sort, Binary Search
Dynamic Programming: Basic method, use, Examples: matrix-chain multiplication, All pair shortest paths, single-source shortest path, Traveling Salesman problem
Branch and Bound: Basic method, use, Examples: The 15-puzzle problem

Unit III:
Backtracking: Basic method, use, Examples: Eight queens problem, Graph coloring problem, Hamiltonian problem
Greedy Method: Basic method, use, Examples: Knapsack problem, Job sequencing with deadlines, minimum spanning tree (Prim's and Kruskal's algorithms)
Lower Bound Theory: Bounds on sorting and sorting techniques using partial and total orders.

Unit IV:
Disjoint Set Manipulation: Set manipulation algorithm like UNION-FIND, union by rank, Path compression.
Properties of graphs and graph traversal algorithms: BFS and DFS
Matrix manipulation algorithms: Different types of algorithms and solution of simultaneous equations, DFT & FFT algorithm; integer multiplication schemes

Unit V:
Notion of NP-completeness: P class, NP-hard class, NP-complete class, Circuit Satisfiability problem, Clique Decision Problem.
Approximation algorithms: Necessity of approximation scheme, performance guarantee, Polynomial time approximation schemes: 0/1 knapsack problem

Textbooks:
1. A.Aho, J.Hopcroft and J.Ullman, The Design and Analysis of algorithms
2. D.E.Knuth, The Art of Computer Programming, Vol. I & Vol.2
3. Horowitz Ellis, Sahani Sartaz, R. Sanguthevar, Fundamentals of Computer Algorithms
4. Goodman: Introduction to Design and Analysis Of Algorithms, TMH

References:
1. K.Mehlhorn , Data Structures and algorithms- Vol. I & Vol. 2
2. S.Baase, Computer algorithms
3. E.M.Reingold, J.Nievergelt and N.Deo, Combinational algorithms- Theory and Practice, Prentice Hall , 1997
4. A.Borodin and I.Munro, The computational complexity of Algebraic and Numeric problems

IT602: Web Technology

Unit I:
Internet basics: History and basic idea of Internet; Internet services: telnet, e-mail, ftp, WWW.
Web page design: Designing web pages with HTML- use of tags, hyperlinks, URLs, tables, text formatting, graphics & multimedia, imagemap, frames and forms in web pages. Use of Cascading Style Sheet in web pages.
Dynamic Web Pages: Creating interactive and dynamic web pages with JavaScript- JavaScript overview; constants, variables, operators, expressions & statements; user-defined & built-in functions; client-side form validation; using properties and methods of built-in objects.

Unit II:
Markup language basics: Standard Generalized Markup Language (SGML)- structures, elements, Content models, DTD, attributes, entities. Extensible Markup Language (XML)- Introduction: using user-defined tags in web pages; displaying XML contents using HTML and JavaScript; XML Document Type Definitions; Extensible Stylesheet Language (XSL) and its use to display XML contents; XSL and basic database queries; brief introduction to other markup languages: VML, MathML, VRML, RELML, HRMML, VoxML, etc.

Unit III:
Java environments for Web Technology

Unit IV:
Introduction to Client/Server Computing: client-server computing basics
Web Browsers: functions and working principle of web browsers; plug-ins & helper applications; conceptual architecture of typical web browsers (like Mozilla).
Web Servers: Web services and web server functionality; web server composition; registration; HTTP, IP address, DNS & ports; conceptual architecture of a typical web server (like Apache).

Unit V:
Introduction to Advanced web technologies.
Web Security: Firewalls- definition and uses, network layer firewalls and application layer firewalls; Proxy servers.

Textbooks:
1. Godbole A. S. & Kahate A., Web Technologies, TMH.
2. Xavier C., Web Technology & Design, New Age Publication.
3. Java Server Programming, J2EE edition. (VOL I and VOL II); WROX publishers.

References:
1. Dick Oliver, SAMS Teach Yourself Html 4 in 24 Hours, Techmedia.
2. Charles Ashbacher, SAMS Teach Yourself XML in 24 Hours, Techmedia.
3. SAMS Teach Yourself JavaScript in 24 Hours, Techmedia.
4. SAMS Teach Yourself PHP4 in 24 Hours, Techmedia.
5. Wendy. G. Lehnert, Web 101 making the Net for you, Pearson Education.
6. Scott Mitchell, James Atkinson, SAMS Teach Yourself Active Server Pages 3.0 in 24 Hours, Techmedia.
7. Robert Sebesta, World Wide Web Programming

IT603: Computer Graphics

Unit I:

Introduction: Computer graphics and its applications, input and output devices

Output primitives: line-drawing algorithms- DDA algorithm and Bresenham's algorithm; Midpoint algorithms for circle & ellipse generation; area-filling algorithms-scan-line polygon-fill, nonzero-winding number rule; scan-line curve filling, boundary-fill algorithm, flood-fill algorithm; Character generation techniques- generation of bitmap and outlined font.

Interactive picture construction techniques: basic-positioning methods; constraints; grids; gravity fields; rubber-band methods; dragging; painting & drawing.

Unit II:

2-D geometric transformations: Basic transformations- translation, rotation and scaling; matrix representations and Homogeneous co-ordinate representations; Composite transformations among translation, rotation and scaling; General pivot-point rotation; General fixed-point scaling; General scaling directions; Other transformations- reflection and shear; Transformation between co-ordinate systems; Definition of Affine transformations.

2-D viewing: definition; viewing transformation pipeline; window-to-viewport co-ordinate transformation.

Unit III:

Clipping operations: definition; point clipping; line clipping- Cohen-Sutherland algorithm; polygon clipping- Sutherland-Hodgeman algorithm; curve clipping, text clipping.

3-D concepts: display methods- Parallel projection, perspective projection, depth visible line & surface identification, surface rendering, exploded & cutaway views, 3-D & stereoscopic views.

3-D geometric transformations: Translation; Rotation- rotations about co-ordinate axes, general 3-D rotation; Scaling; Reflection; Shear.

3-D viewing: viewing transformation pipeline; world co-ordinate to viewing co-ordinate transformation.

Unit IV:

Projections: Parallel projection techniques- orthographic & oblique projections and their transformation equations; Perspective projection and transformation equations.

Visible surface detection: definition; classification of algorithms- object-space methods & Image-space methods; algorithms for visible surface detection- Depth-buffer method, A-buffer method, Ray-casting method; curved-surface detection; wireframe displays.

Unit V:

Illumination and Surface rendering: definition and importance; light sources; Definition of basic illumination models- Ambient light, Diffuse reflection, Specula reflector and Phong model, combined diffuse and secular reflections for multiple light sources, Warn model, Intensity attenuation, Color considerations, Transparency, Shadows; Ray-tracing methods- The basic ray-tracing algorithm.

Color models and applications: properties of light; standard preliminaries- XYZ model, CIE chromaticity diagram; color models- RGB, YIQ, CMY, HSV, HLS; conversion between color models.

Overview of Graphics softwares: classifications, graphics functions for various operations, software standards- PHIGS, PHIGS+, GKS.

Textbooks:

1. Hearn, Baker, Computer Graphics (C version 2nd Ed.), Pearson education
2. Z. Xiang, R. Plastock, Schaum's outlines Computer Graphics (2nd Ed.), TMH
3. D. F. Rogers, J. A. Adams, Mathematical Elements for Computer Graphics (2nd Ed.), TMH

References:

1. Foley, Vandam, Feiner, Hughes, Computer Graphics principles (2nd Ed.), Pearson Education.
2. W. M. Newman, R. F. Sproull, Principles of Interactive computer Graphics, TMH.
3. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI
4. Mukherjee Arup, Introduction to Computer Graphics, Vikas
5. Hill, Computer Graphics using open GL, Pearson Education

IT604: Data Communication

Unit I:

Concepts on Amplitude Modulation & Angle Modulation

Amplitude (Linear) Modulation: Baseband and Carrier Communication, Amplitude Modulation: Double Sideband (DSB), Amplitude Modulation (AM), Quadrature Amplitude Modulation (QAM), Amplitude Modulation: Single Sideband (SSB), Amplitude Modulation: Vestigial Sideband (VSB), Carrier Acquisition, Superheterodyne AM Receiver, Television.

Angle (Exponential) Modulation: Concept of Instantaneous Frequency, Bandwidth of Angle Modulated Waves, Generation of FM Waves, Demodulation of FM, Interference in Angle-Modulation Systems, FM Receiver.

Sampling and Sampling Theorem.

Unit II:

Principles of Digital Data Transmission: A Digital Communication System, Line Coding

Pulse Shaping, Scrambling, Regenerative Repeater, Detection-error probability, M-ary Communication, Digital Carrier Systems, Digital Multiplexing.

Unit III:

Emerging Digital Communications Technologies: The North American Hierarchy, Digital Services, Broadband Digital Communication: SONET, M-ary Communication, Synchronization, Digital Switching Technologies, Broadband Services for Entertainment and Home Office Applications, Video Compression, High-Definition Television (HDTV).

Unit IV:

Behavior of Digital Communication Systems in The Presence of Noise: Optimum Threshold Detection, General Analysis: Optimum Binary Receiver, Carrier Systems: ASK, FSK, PSK, and DPSK, Performance of Spread Spectrum Systems.

Unit V:

Recent Developments: Cellular Telephone (Mobil Radio) System. Spread Spectrum Systems, Transmission Media

Introduction to CDMA, TDMA, FDMA

Textbooks:

1. B. P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press
2. Simon Haykin, An Introduction to Analog & Digital Communications
3. Leon W. Couch, Digital and Analog Communication Systems, Fourth Edition.

References:

1. R, E. Ziemer and W. H. Tranter, Principles of Communications, Systems, Modulation, and Noise Fourth Edition.
2. J. W. Goodman, Introduction to Fourier Optics, McGraw Hill.
3. E. A. Lee and D. G. Messerschmitt, Digital Communication
4. R. E. Blahut, Digital Transmission of Information
5. Oppenheim and Schafer, Discrete-Time Signal Processing
6. Simon Haykin, Digital Communication Systems

IT605: Formal Language and Automata Theory

Unit I:

Alphabet, languages and grammars. Production rules and derivation of languages. Chomsky hierarchy of languages. Regular grammars, regular expressions and finite automata (deterministic and nondeterministic). Closure and decision properties of regular sets. Pumping lemma of regular sets. Minimization of finite automata.

Unit II:

Left and right linear grammars. Context free grammars and pushdown automata. Chomsky and Griebach normal forms. Parse trees, Ambiguity and properties of context free languages. Pumping lemma, Ogden's lemma.

Unit III:

Deterministic pushdown automata, closure properties of deterministic context free languages.

Unit IV:

Turing machines and variation of Turing machine model, Turing computability, Type 0 languages.

Unit V:

Church Turing hypothesis. Recursive and recursively enumerable sets. Universal Turing machine and undecidable problems. Undecidability of Post correspondence problem.

Textbooks:

1. J. E. Hopcroft and J. D Ullman: Introduction to Automata Theory, Languages and Computation, Addison Wesley Publ., New York..
2. H. R. Lewis and C. H. Papadimitriou: Elements of the Theory of Computation,
3. Prentice Hall, Englewood Cliffs.
4. F. Hennie: Introduction to Computability, Addison Wesley Publ., New York.

IT691: Linux and OS Lab

1. Cell and Socket Programming
2. Packet Monitoring software (**tcpdump, snort, ethereal**)
3. Trace route, Ping, Finger, Nmap
4. Server configuration (FTP, SMTP, DNS)
5. NFS Configuration
6. Firewall Configuration using **iptables/ipchains** (Linux only)

IT682: Web Technology Lab

1. Case studies and Assignments based on the theory

IT701: Software Quality & Project Management

Unit I:
Concepts of Quality Control, Quality Assurance, Quality Management - Total Quality Management; Cost of Quality; QC tools - 7 QC Tools and Modern Tools; Business Process Re-engineering -Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.

Unit II:
Concepts of Project Management: The Nature of Software Production, Key Objectives of Effective Management, Productivity, Risk Reduction, The Role of the Software Project Manager
Planning the Project: Business Planning, Determining Objectives, Forecasting demand for the Product, Proposal Writing, Requirements analysis, Legal issues (patent, copyright, liability, and warranty).

Unit III:
Technical Planning: Types of Plans, Plan documentation methods, Work breakdown structures, PERT and CPM, Gantt Charts, Standards, Planning for Risk Management and Control, Entry and Exit criteria, Intermediate checkpoints, Performance prediction and analysis People, Prototyping and modeling, Inspections and reviews, Process and process assessment, Development Methods, Metrics, Configuration management, Testing and quality assurance, Capacity Planning, Estimating – what it takes to do the job, Cost (direct and indirect), Resources, Time, Size and complexity of the product, Risk determination, Role of requirements and design in estimating, Financial planning – budgeting, Resource Allocation, Organizational considerations, (teams, hierarchies, etc.), Technology, Human factors and usability, Tools and environments, Transition of the Product to the user.

Unit IV:
Quality Assurance Models:
Models for Quality Assurance-ISO-9000 - Series, CMM, SPICE, Malcolm Baldrige Award.
Software Process - Definition and implementation; internal Auditing and Assessments;

Unit V:
Software Quality Assurance Related Topics:
Software testing: Concepts, Tools, Reviews, Inspections & Walkthroughts; P-CMM.
PSP and TSP, CMMI, OO Methodology, Clean-room software engineering, Defect injection and prevention.

Textbooks:

1. Tom Gilb, Finzi Susannah, Principles of Software Engineering Management, Addison-Wesley, England.
2. Philip Metzger, Managing A Programming Project, Prentice Hall, New Jersey.

References:

1. Watt.S. Humphery, Managing Software Process , Addison - Wesley.
2. Philip B Crosby, Quality is Free: The Art of Making Quality Certain , Mass Market.
3. Roger Pressman, Software Engineering, McGraw Hill
4. James A Senn, Software Analysis and Design, McGraw Hill

5. Tom Demarco, Controlling Software Project Management, Measurement, Prentice Hall, New
6. Barbee Mynatt, Software Engineering with Student Project Guidance, Prentice Hall, New Jersey.
7. Richard Thayer, Tutorial: Software Engineering Project Management, IEEE Inc, CA
8. Mark Norris, Peter Rigby, Malcolm Payne, The Healthy Software Project – A Guide to Successful Development & Management, John Wiley & Sons
9. Dennis Lock, Handbook of Project Management, Jaico Publishing House
10. Neal Whitten, Managing Software Development Projects, John Wiley
11. Sanjiv Purba, David Sawh & Bharat Shah, How to Management a Successful Software Project – Methodologies, Techniques, Tools, John Wiley

IT702: Computer Network

Unit I:

Overview of data communication and Networking: Introduction; Data communications: components, data representation (ASCII,ISO etc.),direction of data flow(simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

Unit II:

Physical level: Overview of data(analog & digital), signal(analog & digital), transmission (analog & digital)& transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network;

Data link layer: Types of errors, framing(character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

Medium access sub layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet;

Unit III:

Network layer: Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting; Routing : techniques, static vs. dynamic routing , routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

Unit IV:

Transport layer: Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve Qos.

Application layer: DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

Unit V:

Modern topics: ISDN services & ATM ; DSL technology, Cable modem, Sonet. Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

Text Books:

1. B. A. Forouzan, Data Communications and Networking, (3rd Ed.), TMH
2. A. S. Tanenbaum, Computer Networks (4th Ed.), Pearson Education/PHI
3. W. Stallings, Data and Computer Communications (5th Ed.), PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI
6. Miller, Data Communication & Network, Vikas
7. Miller, Digital & Data Communication, Jaico
8. Shay, Understanding Data Communication & Network, Vikas

References*:*

1. Kurose and Rose, Computer Networking -A top down approach featuring the internet, Pearson Education
2. Leon, Garica, Widjaja, Communication Networks, TMH
3. Walrand, Communication Networks, TMH.
4. Comer, Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.), Pearson Education/PHI

IT703: E–Commerce

Unit I:

Electronic Commerce : Overview, Definitions, Advantages & Disadvantages of E–Commerce, Threats of E–Commerce, Managerial Prospective, Rules & Regulations For Controlling E–Commerce, Cyber Laws.

Technologies : Relationship Between E–Commerce & Networking, Different Types of Networking For E–Commerce, Internet, Intranet & Extranet, EDI Systems

Unit II:

Wireless Application Protocol : Definition, Hand Held Devices, Mobility & Commerce, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement For E–Commerce .

Business Models of e–commerce : Model Based On Transaction Type, Model Based On Transaction Party - B2B, B2C, C2B, C2C, E–Governance

E – strategy : Overview, Strategic Methods for developing E–commerce

Unit III:

Four C's : (Convergence, Collaborative Computing, Content Management & Call Center).

Convergence : Technological Advances in Convergence – Types, Convergence and its implications, Convergence & Electronic Commerce.

Collaborative Computing : Collaborative product development, contract as per CAD, Simultaneous Collaboration, Security.

Content Management : Definition of content, Authoring Tools & Content Management, Content – partnership, repositories, convergence, providers, Web Traffic & Traffic Management ; Content Marketing.

Call Center : Definition, Need, Tasks Handled, Mode of Operation, Equipment , Strength & Weaknesses of Call Center, Customer Premises Equipment (CPE

Unit IV:
Supply Chain Management : E–logistics, Supply Chain Portal, Supply Chain Planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE - Framework, Internet's effect on Supply Chain Power.
E – Payment Mechanism : Payment through card system, E – Cheque, E – Cash, E–Payment Threats & Protections.
E – Marketing :. Home –shopping, E-Marketing, Tele-

Unit V:
Electronic Data Interchange (EDI) : Meaning, Benefits, Concepts, Application, EDI Model, Protocols (UN EDI FACT / GTDI, ANSI X – 12), Data Encryption (DES / RSA).
Risk of E – Commerce : Overview, Security for E – Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital certificates, Digital signatures

Textbooks:
1. M.M. Oka, E-Commerce, EPH
2. Kalakotia, Whinston, Frontiers of Electronic Commerce, Pearson Education.
3. Bhaskar Bharat, Electronic Commerce - Technologies & Applications, TMH
4. Loshin Pete, Murphy P.A, Electronic Commerce, Jaico Publishing Housing.

References:
1. Murthy, E–Commerce, Himalaya Publishing.
2. J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press
3. Reynolds, Beginning E-Commerce, SPD
4. Krishnamurthy, E-Commerce Management, Vikas

IT704A: Image Processing

Unit I:
Introduction: Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.
Digital Image Formation : A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.

Unit II:
Mathematical Preliminaries: Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform.

Unit III:
Image Enhancement : Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image

Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.

Unit IV:
Image Restoration: Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.

Unit V:
Image Segmentation: Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection - Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

Textbooks:
1. Gonzalves, Digital Image Processing, Pearson
2. Jahne, Digital Image Processing, Springer India
3. Chanda & Majumder, Digital Image Processing & Analysis, PHI

References:
1. Jain, Fundamentals of Digital Image Processing, PHI
2. Sonka, Image Processing, Analysis & Machine Vision, VIKAS

IT704B: Soft Computing

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

Unit II:
Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.
Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

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

Unit IV:
Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.

Application of Fuzzy Logic: Medicine, Economics etc.
Genetic algorithms(GAs), Evolution strategies(ESs), Evolutionary programming(EP), Genetic Programming(GP), Selecting, crossover, mutation, schema analysis, analysis of selection algorithms; convergence; Markov & other stochastic models**.**

Unit V:
Other Soft computing approaches:
Simulated Annealing, Tabu Search, Ant colony based optimisation, etc.

Textbooks:

1. Jang, Sun, Mizutani, Neuro-Fuzzy and Soft computing: *A Computational Approach to Learning and Machine Intelligence*, Pearson Education
2. Haykin, Neural networks: *A Comprehensive Foundation*, 2E, Pearson Education
3. Goldberg, Genetic Algorithms, Pearson Education
4. G.J. Klir & B. Yuan, Fuzzy Sets & Fuzzy Logic, PHI.
5. Anderson J.A., An Introduction to Neural Networks, PHI, 1999.

References:

1. Hertz J. Krogh, R.G. Palmer, Introduction to the Theory of Neural Computation, Addison-Wesley, California, 1991.
2. Melanie Mitchell, An Introduction to Genetic Algorithm, PHI, 1998.
3. Freeman J.A. & D.M. Skapura, Neural Networks: Algorithms, Applications and Programming Techniques, Addison Wesley, Reading, Mass, (1992).

IT704C: Distributed Computing

Unit I:
Fundamentals: Introduction, Models and Features, Concept of distributed operating system, Issues in design of a distributed operating system.
Message Passing: Good message passing system, IPC, Synchronization, Buffering, Multi datagram messages, Encoding & decoding techniques, Process addressing, Failure handling, Group communication; Remote procedure calls **(**RPC) - Models, Communication protocols, RPC, Lightweight RPC.

Unit II:
Distributed Shared Memory: Architecture, Thrashing, Granularity, Advantages.
Synchronization: Introduction, Clock Synchronization, Event handling, Mutual Exclusion; Deadlock – Conditions, Avoidance, Prevention, Recovery.

Unit III:
Resource & process Management: Features of a good scheduling algorithm, Task assignment approach, Load balancing & load sharing approach, Introduction to process management, Process migration, Threads.

Unit IV:

Distributed Files Systems: Introduction, Features, Models, Accessing models; sharing Semantics & caching schemes, replication, Fault Tolerance, Atomic transactions.

Unit V:
Naming: Introduction, Features, Fundamental Terminologies & concepts, System oriented names, Human oriented names, Name caches.
Security: Potential attacks to computer system, Cryptography, Authentication, digital signatures, Access Control.

Textbooks:
1. Sinha Pradeep K., Distributed operating Systems, Concepts & design, PHI.
2. Tanenbaum Andrews S., Distributed Operating System, Pearson.

References:
1. Coulouris George, Dollimore Jean, Kindberg Tim, Distributed Systems, Concepts & design, Pearson.
2. Silberschatz Galvin, Operating System Concepts, John Wiley, 5th Edition.

IT704D: Bio Informatics

Unit I:
Introduction to Genomic data and Data Organization: Sequence Data Banks - Introduction to sequence date banks - protein sequence data bank. NBFR-PIR, SWISSPROT, Signal peptide data bank, Nucleic acid sequence data bank - GenBank, EMBL nucleotide sequence data bank, AIDS virus sequence data bank. RRNA data bank, structural data banks - protein Data Bank (PDB), The Cambridge Structural Database (CSD) : Genome data bank - Metabolic pathway data : Microbial and Cellular Data Banks.

Unit II:
Introduction to MSDN (Microbial Strain Data Network): Numerical Coding Systems of Microbes, Hibridoma Data Bank Structure, Virus Information System Cell line information system; other important Data banks in the area of Biotechnology/life sciences/biodiversity.

Unit III & IV:
Sequence analysis: Analysis Tools for Sequence Data Banks; Pair wise alignment - NEEDLEMAN and Wunsch algorithm, Smith Waterman, BLAST, FASTA algorithms to analyze sequence data: Sequence patterns motifs and profiles.
Secondary Structure predictions; prediction algorithms; Chao-Fasman algorithm, Hidden-Markov model, Neural Networking.
Tertiary Structure predictions; prediction algorithms; Chao-Fasman algorithm, Hidden-Markov model, Neural Networking.

Unit V:
Applications in Biotechnology: Protein classifications, Fold libraries, Protein structure prediction: Fold recognition (threading), Protein structure predictions : Comparative modeling (Homology), Advanced topics: Protein folding, Protein-ligand interactions, Molecular Modeling & Dynamics, Drug Designing.

Textbooks:

1. Lesk, Introduction to Bio Informatics, OUP
2. Atwood, Introduction to Bioinformatics, Pearson Education
3. Cynthia Gibas and Per Jambeck, Developing Bioinformatics Computer Skills, 2001 SPD

References:

1. Statistical Methods in Bioinformatics, Springer India
2. Tisdall, Beginning Perl for Bio-informatics, SPD
3. Smith, D.W., Biocomputing: Informatics and Genome Project, 1994, Academic Press, NY
4. Baxevanis, A.D., Quellette, B.F.F., Bioinformatics: A practical Guide to the Analysis of Genes and Proteins, John Wiely & Sons.
5. Murty CSV, Bioinfornmatics, Himalaya

IT704E: Enterprise Resource Planning

Unit I;

Enterprise Resource Planning (ERP) : Features, capabilities and Overview of Commercial Software, re-engineering work processes for IT applications, Business Process Redesign, Knowledge engineering and data warehouse .

Unit II & III & IV;

Business Modules:

1. Finance, Manufacturing (Production),
2. Human Resources, Plant Maintenance,
3. Materials Management, Quality Management, Sales & Distribution ERP Package,

Unit V;

ERP Market: ERP Market Place, SAP AG, PeopleSoft, BAAN, JD Edwards, Oracle Corporation

ERP-Present and Future: Enterprise Application Integration (EAI), ERP and E-Commerce, ERP and Internet, Future Directions in ERP

Textbooks:

1. S. Sadagopan, Enterprise Resource Planning, Tata McGraw Hill, 1999.
2. Alexis Leon, Enterprise Resource Planning, Tata McGraw Hill, 2000.

IT704F: Management Information Systems

Unit I:

Introduction: Definition of management, its definition, purpose, elements of science, patterns of management analysis, Functions of managers.

People & organization: People: psychological factors, worker's skill & abilities.

Organization:Organizational characteristics, Organizational behavior, corporate culture, power inter-group conflict, intra-group dynamics, the MIS function organization, MIS personal, computer operation personal, MIS management.

Unit II:
System & models: System: components of a system, environment, open Vs Closed systems. Models: modeling systems general vs specific models, levels of models, types of models. Models of organizational systems. A general model of organization and its internal environment. Strategic planning models.

Unit III:
Management & decision making: Management: labels of management, managerial role, planning & control, Managerial styles, Managerial decision making: characteristics of types of decision
Decision making process: Intelligence, design, sol^{n} evaluation & choice.
Evaluating decision making: Effectiveness vs efficiency

Unit IV:
Transaction processing & management reporting systems: A management information systems frame work:Transaction processing framework, Management reporting system, Decision support system., Knowledge based systems, Office systems
Transaction processing: Nature, function, role of IT in transaction processing, processing cycles, Transaction processing subsystem.
Management reporting system: Evaluation of management reporting system, types of reports, structuring report content.
Decision support system (DSS): Component of DSS, DSS development, DSS products, DSS development tools, User interfaces, Executive information system (EIS), Executive roles & decision making, Executive decision making environment

Unit V:
MIS in the functional areas of business: Financial information system, Marketing MIS, Manufacturing MIS
Enterprise resource planning: Materials Requirement planning (MRP), Closed loop MRP, Manufacturing Resource Planning (MRP – II)
ENTERPRISE RESOURCE PLANNING
- Functional architecture of ERP
- Benefits of ERP
- Business Process Reengineering and ERP
- ERP implementation

Supply chain management: Introduction, Definition of SCM, Features of SCM, SCM Stages,
Cases in MIS: Case study method
- Analytical Case
- Issue Case
- Written Case Analysis

Illustrations

Textbooks:
1. Davis, MIS, TMH
2. Rles Parker, Thomas Cage, MIS strategy & action (Management Info System) – McGraw-Hill.
3. Kelkar, Management Information Systems- A concise study, PHI.
4. Post & Anderson, Management Information System, TMH.

5. Dr. Milind M.Okha, Management Information Systems, Everest Publishing House

References:

1. Laudon & Laudon, Management Information Systems, Managing the digital firm, PHI.
2. Leon, Enterprise Resource Planning, TMH.

IT705A: Distributed Database

Unit I:
Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, replication. Distributed database design - fragmentation, allocation criteria.

Unit II:
Storage mechanisms. Translation of global queries. / Global query optimisation. Query execution and access plan. Concurrency control - 2 phases locks. Distributed deadlocks. Time based and quorum based protocols. Comparison. Reliability- non-blocking commitment protocols.

Unit III:
Partitioned networks. Checkpoints and cold starts. Management of distributed transactions- 2 phase unit protocols. Architectural aspects. Node and link failure recoveries.

Unit IV:
Distributed data dictionary management. Distributed database administration. Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled.

Unit V:
Alternative architecture. Development tasks, Operation- global task management. Client server databases-SQL server, open database connectivity. Constructing an application.

Textbooks:

1. Silberschatz Korth, Sudarshan, Database System Concepts, MH
2. Ceri & Pelagatti, Distributed Databases: *Principles and Concepts*, TMH
3. Ozsu & Sridhar, Principles of Distributed Database Systems, Pearson

References:

4. amakrishnan, Database Management Systems, RMH
5. Vieira, Beginning SQL Server 2005 programming, SPD/WROX
6. Leon, Database Management Systems, VIKAS

IT705B: Parallel Computing

Unit I:
Introduction : Computational demands on modern science, advent of practical parallel processing, parallel processing terminology.
PRAM algorithms : model of serial computation, PRAM model of parallel computation, PRAM algorithms, reducing the number of processors.

Unit II:
Processes and processors. Processor organizations, Processor arrays, Multiprocessors, Multicomputers, FLYNN's taxonomy, Shared memory. Fork. Join constructs. Basic parallel programming techniques- loop splitting, spin locks, contention barriers and row conditions.

Unit III:
Variations in splitting, self and indirect scheduling. Data dependency-forward and backward block scheduling. Linear recurrence relations. Backward dependency. Performance tuning overhead with number of processes, effective use of cache.

Unit IV:
Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, Matrix multiplication, sorting, travelling salesman problem, Gaussian elimination. Discrete event time simulation.

Unit V:
Parallel Programming Languages :Fortran 90, C*,Sequent C, OCCAM,C- Linda,
Parallel programming under Unix.

Textbooks:
1. Quinn, Parallel Computing: *Theory and Practice*, TMH
2. Sashi Kumar, Introduction to Parallel Processing , PHI
3. Wilkinson, Parallel Programming: *Techniques and Applications*, Pearson

References:
1. Rajaraman, Elements of Parallel Computing, PHI
2. Jordan, Fundamentals of Parallel Processing, PHI
3. Advanced Computer Architecture: *Parallelism, Scalability, Programmability*, Hwang, TMH

IT705C: Advanced Operating System

Unit I:
Process Synchronization: Concepts of processes, Concurrent processes, Threads, Overview of different classical synchronization problems, Monitors, Communicating Sequential processes(CSP)
Process deadlocks: Introduction, causes of deadlocks, Deadlock handling strategies, Models of deadlock

Unit II:
Distributed operating system: Architectures, Issues in Distributed operating systems, Limitations of Distributed Systems, Lamport's logical clock, Global states, Chandy-Lampert's global state recording algorithm,Basic concepts of Distributed Mutual Exclusion ,Lamport's Algorithm, Ricart -Agrawala Algorithm;Basic concepts of Distributed deadlock detection, Distributed File system, Architecture, Design issues, SUN Network File system
Basic concepts of Distributed shared memory, Basic concepts of Distrubuted Scheduling, Load balancing, Load sharing

Unit III:
Distributed OS Implementation: Models, Naming, Process migration, Remote Procedure Calls.
Multiprocessor System: Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements; Design & Implementation Issue; Introduction to parallel programming; Multiprocessor Synchronization.

Unit IV:
Performance, Coprocessors, RISC & data flow : Introduction, Necessity, Measures, Techniques, Bottlenecks & Saturation, Feedback loops, Coprocessors, RISC.
Analytic Modeling: Introductions, Queing Theory, Markov Process

Unit V:
Security & Protection: Security-threats & goals, Penetration attempts, Security Policies & mechanisms, Authentication, Protections & access control Formal models of protection, Cryptography, worms & viruses.

Textbooks:
1. Milan Milenkovic, Operating Systems: *Concepts & design*, TMH
2. H.M. Deitel, Operating System, Pearsons .
3. Mukesh Singhal and Niranjan G. Shivaratri, Advanced Concepts in operating Systems, TMH

IT705D: Computational Geometry

Unit I:
Introduction: historical perspective, algorithmic background, geometric preliminaries, initial forays
Convex hulls, problem statement and lower bounds, convex hull algorithms, convex hulls in >2 dimensions, extensions and applications

Unit II:
Polygon approximation: triangular approximations, k-gonal approximations, restricted approximations, other criteria of approximation

Unit III:
Geometric searching : point-location problems, range-searching problems

Unit IV:
Proximity :Typical problems and lower bounds, Closest pair problem, Voronoi diagrams, Minimum spanning trees, Triangulations

Unit V:
Miscellaneous problems : (More) Art gallery problems, Intersections, Pattern recognition, Parallel computational geometry

Textbooks:
1. Laszlo, Computational Geometry, PHI
2. M.de Berg, Computational Geometry-algorithms & applications,Springer India

IT705F: Artificial Intelligence

Unit I:

Introduction : Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem.

Intelligent Agents : Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

Problem Solving : Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.

Search techniques : Solving problems by searching :problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.

Unit II:

Heuristic search strategies: Greedy best-first search, A* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.

Adversarial search: Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

Unit III:

Knowledge & reasoning: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.

Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

Representing knowledge using rules: Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

Unit IV:

Probabilistic reasoning : Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.

Planning : Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques.

Natural Language processing : Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing.

Learning : Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.

Unit V:

Expert Systems : Representing and using domain knowledge, expert system shells, knowledge acquisition.

Basic knowledge of programming language like Prolog & Lisp.

Textbooks:

1. Ritch & Knight, Artificial Intelligence, TMH
2. Stuart Russel Peter Norvig, Artificial Intelligence A Modern Approach, Pearson

3. Patterson, Introduction to Artificial Intelligence & Expert Systems, PHI

References:

1. Poole, Computational Intelligence, OUP
2. Saroj Kaushik, Logic & Prolog Programming, New Age International
3. Giarranto, Expert Systems, VIKAS
4. Russel, Artificial Intelligence, Pearson

IT705H: Network Programming

Unit I:

Introduction to common network protocols: ARP, RARP, Ethernet, IPv4, IPv6, ICMP, TCP, UDP, DNS, HTTP, FTP, SNMP, SMTP, HTTPS, SSH, IPsec, etc.

The client server model; an introduction to TCP socket function calls: socket(), connect(), bind(), listen() and accept().

Constructing messages for computer communication; byte manipulation functions; an example of a client-server program.

Unit II:

Introduction to multiple access in wireless networks; CDMA; 802.11 Wireless LANs; the 802.11 MAC protocol; the use of RTS/CTS frames.

The 802.11 frame format; addressing in 802.11; handling mobility within the same IP subnet; Bluetooth.

Using the Domain Name Service in programs; A review of SMTP and an example SMTP dialogue.

Writing a concurrent server program; using fork(), pipe() and wait() functions in C; using signals (asynchronous software interrupts); zombie processes.

Unit III:

Managing mobility in networks; addressing and routing under mobility; mobile IP; implications of wireless to higher layers.

Introduction to multimedia networking; the network service requirements of multimedia applications; RTSP; QoS on top of a best-effort service network; understanding jitter and playout delay; forward error correction and interleaving.

I/O multiplexing; using the select() and poll() functions; blocking and non-blocking sockets; socket options.

Unit IV:

Review of HTTP; software architecture of web servers; event-driven, process-driven and hybrid servers; the Apache server as a case study.

Protocols for multimedia transmissions: RTP and RTCP; Session Initiation Protocol (SIP); communicating between circuit-switched telephone network and the Internet; H.323.

Unit V:

Scheduling and policing mechanisms for quality-of-service; fair queueing; leaky bucket.

Issues in buffering and TCP; understanding the TCP socket life cycle.

Content distribution networks; Integrated Services and Differentiated services for quality of service in the Internet; Resource reservation protocol.

Cellular Internet access and managing mobility in cellular networks.

Textbooks:

1. James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet, 3rd edition, Addison Wesley, 2005, ISBN: 0-321-22735-2.
2. W. Richard Stevens, Bill Fenner and Andrew M. Rudoff, UNIX Network Programming: Volume 1 (The Sockets Networking API), 3rd edition, Addison Wesley, 2004, ISBN: 0-13-141155-1.
3. D. E. Comer, Computer Networks and Internets, Prentice Hall, Englewood Cliffs, NJ, USA, 2nd Edition, 1999

References:

1. L. L. Peterson and B. S. Davie, *Computer Networks: A Systems Approach*, Morgan Kaufmann Publishers, 2nd Edition, 1999
2. M. J. Donahoo and K. L. Calvert, TCP/IP Sockets in C: Practical Guide for Programmers (The Practical Guides Series), Morgan Kaufmann Publishers, January 2000
3. K. L. Calvert and M. J. Donahoo, TCP/IP Sockets in Java: Practical Guide for Programmers (The Practical Guides Series), Morgan Kaufmann Publishers, October 2001
4. Hugues, Shoffner, and Hamner, Java Network Programming, 2'nd ed., read chapters 1-5, 10, 11.1-11.4, 11.7, 14-21 and Appendix A.
5. Northcutt and Novak, Network Intrusion Detection, (3rd edition)
6. W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, Addison-Wesley, Boston, MA, 1994.
7. Merlin Hughes, Michael Shoffner, and Derek Hamner, Java Network Programming, 2nd edition, Manning Publications, Greenwich, CT, 1999
8. Charlotte, a web server for Windows © 2000, Stuart Patterson, ACM Crossroads, May 2000.

IT705I: Clustering and Grid Computing

Unit I:

Introduction: Motivation, Definitions of Grid Computing, Evolution of the Grid, Differences with similar efforts (Meta, cluster, heterogeneous, Internet), Examples of usage, scope of Grid Computing.

Unit II:

The Earliest Grid Motivations: High Performance computing across installation sites - the PACX-MPI example, High Throughput computing using non-dedicated workstations – Condor.

Unit III:

The Building Blocks of Grid: The Globus toolkit, Security - Kherberos vs Globus GSI, Information Services – NWS, Projects over Globus - e.g. Condor-G.

Unit IV:

HPC and Grids: Scheduling HPC applications in Grids- AppLeS, Scheduling Parameter sweep applications, Metascheduling; Grid RPC mechanisms; Rescheduling.

Unit V:

Advanced Topics: Data Management in Grids, Grid simulation – MicroGrid, Grid Applications, Grid economy, Grid standards and forums - OGSA, GGF and Other topics.

Textbooks:

1. The Grid: Blueprint for a New Computing Infrastructure (2nd edition) by Ian Foster (Editor), Carl Kesselman (Editor) Publisher: Morgan Kaufmann; 2nd edition (November 2003) ISBN: 1-558-60933-4.
2. Grid Computing: Making the Global Infrastructure a Reality by Francine Berman (Editor), Geoffrey Fox (Editor), Tony Hey (Editor) Publisher: John Wiley & Sons; (April 8, 2003) ISBN: 0-470-85319-0.

References:

1. Grid Resource Management: State of the Art and Future Trends by Jarek Nabrzyski (Editor), Jennifer M. Schopf (Editor), Jon Weglarz (Editor) Publisher: Kluwer Academic Publishers; (September 2003) ISBN: 1-402-07575-8.
2. The Grid 2: Blueprint for a New Computing Infrastructure by Ian Foster and Carl Kesselman, Morgan Kaufmann Nov 2003, ISBN: 1558609334.

IT801A: Robotic Systems

Unit I & II:
Robot Anatomy Arm Geometry-Direct & Inverse Kinematics Problem. Arm Dynamics, D Alembert Equations of Motion, Synthesis of elements with movalulity constraints, manipulations-trajectory planning, joint interpolated trajectories.

Unit III:
Control of Robot Manipulation-computed torque technique sequencing & adaptive control, resolved motion control Moluie Robots.

Unit IV:
Robot sensing-Range & Proximity & Higher-Level vision, illumination techniques, Imaging Geometry, Segmentation Recognition & Interpretation.

Unit V:
Robot Programming Language Characteristics of Robot Level & Task Level languages. Robot intelligence-State Space search, Robot learning, Robot Task Planning, Knowledge Engineering.

Textbooks:

1. K.S Fu R.C. CSG Lee, Robotics Control, Sensing, Vision & Intelligence, McGraw-Hill.
2. M.P. Groover, M.Weins, R.N. Nagel, N.C. Odrey , Robotics, McGraw Hill

References:

1. Andrew C. Straugard, Robotics & AI, PHI
2. S. Sitharama Iyengar, Alberto Elefes, Autonomous Mobile Robots Control, Planning & Achitecture, IEEE Computer Society Press

IT801B: Computer Vision

Unit I:
Introduction: What is computer vision? The Marr paradigm and scene reconstruction. Other paradigms for image analysis. Image Formation. Image Geometry. Radiometry. Digitization

Unit II:
Binary Image Analysis and Segmentation: Properties. Digital geometry. Segmentation.

Unit III:
Image Processing for Feature: Detection and Image Synthesis. Edge detection, corner detection, Line and curve detection, SIFT operator, Image-based modeling and rendering, Mosaics, snakes

Unit IV:
Stereo. Shape from X. Shape from shading. Photometric stereo. Texture. Occluding contour detection.
Motion Analysis: Motion detection and optical flow. Structure from motion.

Unit V:
Object Recognition: Model-based methods, Appearance-based methods, Invariants

Textbooks:

D. A. Forsyth and J. Ponce, Computer Vision: A Modern Approach, Prentice Hall, 2003.

References:

1. Shapiro, L. & Stockman, Computer Vision, G. Prentice Hall.
2. Trucco& verri, Introductory technique for 3D computer vision, Prentice-Hall

IT801C: Pattern Recognition

Unit I:

Introduction: Examples; The nature of statistical pattern recognition; Three learning paradigms; The sub-problems of pattern recognition; The basic structure of a pattern recognition system; Comparing classifiers.

Bayes Decision Theory: General framework; Optimal decisions; Classification; Simple performance bounds.

Unit II:

Learning - Parametric Approaches: Basic statistical issues; Sources of classification error; Bias and variance; Three approaches to classification: density estimation, regression and discriminant analysis; Empirical error criteria; Optimization methods; Failure of MLE;

Parametric Discriminant Functions : Linear and quadratic discriminants; Shrinkage; Logistic classification; Generalized linear classifiers; Perceptrons; Maximum Margin; Error Correcting Codes;

Unit III:

Error Assessment: Sample error and true error; Error rate estimation; Confidence intervals; Resampling methods; Regularization; Model selection; Minimum description length; Comparing classifiers

Nonparametric Classification: Histograms rules; Nearest neighbor methods; Kernel approaches; Local polynomial fitting; Flexible metrics; Automatic kernels methods

Unit IV:

Feature Extraction: Optimal features; Optimal linear transformations; Linear and nonlinear principal components; Feature subset selection; Feature Extraction and classification stages, Unsupervised learning and clustering, Syntactic pattern recognition, Fuzzy set Theoretic approach to PR,

Unit V:

Margins and Kernel Based Algorithms: Advanced algorithms based on the notions of margins and kernels

Applications of PR: Speech and speaker recognition, Character recognition, Scene analysis.

Textbooks:

1. Theodoridis & Koutroumbas, Pattern Recognition, Academic Press

IT801D: Digital Signal Processing

Unit I:
Introduction, Overview of digital signal processing
Review of : Discrete – Time linear system, Sequences, arbitrary sequences, linear time invariant system, causality, stability. Difference equation, relation between continuous and discrete system. Classifications of sequence, recursive and non-recursive system.
Review of : Mathematical operations on sequences: Convolution, graphical and analytical techniques, overlap and add methods, matrix method, some examples and solutions of LTI systems, MATLAB examples.

Unit II:
Z-transform: Definition, relation between Z transform and Fourier transform of a sequence, properties of Z transform, mapping between S-plane and Z-plane. Unit circle, convergence and ROC, Inverse Z-transform, solution of difference equation using the one sided Z-transform MATLAB examples.

Unit III:
Discrete Fourier transform: Definition, inverse discrete Fourier transform (IDFT) Twiddle factor, linear transformation, basic properties, circular convolution, multiplication of DFT, linear filtering using DFT, filtering of long data sequences, overlap add and save method. Computation of DFT, Fast Fourier transform (FFT), FFT algorithm, Radix 2 algorithm. Decimation-in-time and decimation-in- frequency algorithm, signal flow graph, butterflies, Chirp z-transform algorithm, MATLAB examples.

Unit IV & V:
Digital filter realization: Principle of digital filter realization, structures of All-zero filters. Design of FIR (Finite impulse response) filters, linear phase, windows-rectangular, Berlitt, Hanning, Hamming and Blackman. Design of infinite impulse response filters (IIR) from analog filters. Bilinear transformation, Butterworth, Chebyshev, Elliptic filters. Optimisation method of IIR filters. Some example of practical filter design. Computer aided filter design, MATLAB examples .

Textbooks:

1. Ifeachor, Digital Signal Processing, Pearson
2. R. G. Lyons, Understanding Digital Signal Processing, Pearson
3. L.R. Rabiner & B.Gold, Theory and Application of Digital Signal Processing, PHI
4. J.G. Proakis & D.G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, PHI
5. S. Salivahanan et al, Digital Signal Processing, TMH

References:

1. Chen, Digital Signal Processing, OUP
2. Meyer-Basse U, Digital Signal Processing with FPGA, Spriger India
3. Ingle, Digital Signal Processing using MATLAB, Vikas
4. Babu R, Digital Signal Processing, Scitech
5. S.K.Mitra, Digital Signal Processing - A Computer based approach, TMH
6. Xavier, Digital Signal Processing, S. Chand
7. Pradhan, Digital Signal Processing Applications, Jaico

IT801F: Data Warehousing

Unit I:

The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined.

Data warehouse: The building Blocks- Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse

Defining the business requirements: Dimensional analysis, information packages- a new concept, requirements gathering methods, requirements definition: scope and content.

Unit II:

Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Schema Keys, Advantages of the STAR Schema.

Unit III:

Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS.

Unit IV:

OLAP in the Data Warehouse: Demand for Online analytical processing, need for multidimensional analysis, fast access and powerful calculations, limitations of other analysis methods, OLAP is the answer, OLAP definitions and rules, OLAP characteristics, major features and functions, general features, dimensional analysis, hypercubes, Drill-down and roll-up, slice-and-dice or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, ROLAP versus MOLAP, OLAP implementation considerations.

Unit V:

Data Mining Basics: What is Data Mining, Data Mining Defined, The knowledge discovery process, OLAP versus data mining, data mining and the data warehouse, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining, applications in retail industry, applications in telecommunications industry, applications in banking and finance.

Textbooks:

1. Paul Raj Poonia, Fundamentals of Data Warehousing, John Wiley & Sons, 2004.
2. Sam Anahony, Data Warehousing in the real world: A practical guide for building decision support systems, John Wiley, 2004

References:

1. W. H. Inmon, Building the operational data store, 2nd Ed., John Wiley, 1999.
2. Kamber and Han, Data Mining Concepts and Techniques, Hartcourt India P. Ltd., 2001
3. Data Warehousing, BPB Publications, 2004.

IT802A: Mobile Computing

Unit I:

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Unit II:
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML). Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

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

Unit IV:
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Unit V:
Server-side programming in Java, Pervasive web application architecture, Device independent example application.

Textbooks:

1. Burkhardt, Pervasive Computing, Pearson
2. J. Schiller, Mobile Communication, Pearson
3. Yi-Bing Lin & Imrich Chlamtac, Wireless and Mobile Networks Architectures, John Wiley & Sons, 2001
4. Raj Pandya, Mobile and Personal Communication systems and services, Prentice Hall of India, 2001.

References:

1. Mark Ciampa, Guide to Designing and Implementing wireless LANs, Thomson learning, Vikas Publishing House, 2001.
2. Ray Rischpater, Wireless Web Development, Springer Publishing,
3. Sandeep Singhal, The Wireless Application Protocol, Pearson .
4. P.Stavronlakis, Third Generation Mobile Telecommunication systems, Springer Publishers,

IT802B: Natural Language Processing:

Unit I&II:
Introduction to NLP:
Definition, issues and strategies, application domain, tools for NLP, Linguistic organisation of NLP, NLP vs PLP.
Word Classes:
Review of Regular Expressions, CFG and different parsing techniques

Morphology: Inflectional, derivational, parsing and parsing with FST, Combinational Rules
Phonology: Speech sounds, phonetic transcription, phoneme and phonological rules, optimality theory, machine learning of phonological rules, phonological aspects of prosody and speech synthesis.
Pronunciation, Spelling and N-grams: Spelling errors, detection and elimination using probabilistic models, pronunciation variation (lexical, allophonic, dialect), decision tree model, counting words in Corpora, simple N-grams, smoothing (Add One, Written-Bell, Good-Turing), N-grams for spelling and pronunciation.

Unit III:
Syntax:
POS Tagging: Tagsets, concept of HMM tagger, rule based and stochastic POST, algorithm for HMM tagging, transformation based tagging
Sentence level construction & unification: Noun phrase, co-ordination, sub-categorization, concept of feature structure and unification.

Unit IV:
Semantics:
Representing Meaning: Unambiguous representation, canonical form, expressiveness, meaning structure of language, basics of FOPC
Semantic Analysis: Syntax driven, attachment & integration, robustness
Lexical Semantics: Lexemes (homonymy, polysemy, synonymy, hyponymy), WordNet, internal structure of words, metaphor and metonymy and their computational approaches
Word Sense Disambiguation: Selectional restriction based, machine learning based and dictionary based approaches.

Unit V:
Pragmatics:
Discourse: Reference resolution and phenomena, syntactic and semantic constraints on Coreference, pronoun resolution algorithm, text coherence, discourse structure.
Dialogues: Turns and utterances, grounding, dialogue acts and structures.
Natural Language Generation: Introduction to language generation, architecture, dicourse planning (text schemata, rhetorical relations).

Textbooks:

1. D. Jurafsky & J. H. Martin, Speech and Language Processing – An introduction to Language processing, Computational Linguistics, and Speech Recognition, Pearson Education

References:

1. Allen, James, Natural Language Understanding, Benjamin/Cummings, 2ed.
2. Bharathi, A., Vineet Chaitanya and Rajeev Sangal, Natural Language Processing- A Pananian Perspective, Prentice Hll India, Eastern Economy Edition.
3. Eugene Cherniak, Statistical Language Learning, MIT Press, 1993.
4. Manning, Christopher and Heinrich Schütze, Foundations of Statistical Natural Language Processing, MIT Press.

IT802C: GIS & Remote Sensing

Unit I:

Introduction and Overview of Geographic Information Systems
Definition of a GIS, features and functions; why GIS is important; how GIS is applied; GIS as an Information System; GIS and cartography; contributing and allied disciplines; GIS data feeds; historical development of GIS.
GIS and Maps, Map Projections and Coordinate Systems
Maps and their characteristics (selection, abstraction, scale, etc.); automated cartography versus GIS; map projections; coordinate systems; precision and error.

Unit II:
Data Sources, Data Input , Data Quality and Database Concepts
Major data feeds to GIS and their characteristics: maps, GPS, images, databases, commercial data; locating and evaluating data; data formats; data quality; metadata. Database concepts and components; flat files; relational database systems; data modeling; views of the database; normalization; databases and GIS.
Spatial Analysis
Questions a GIS can answer; GIS analytical functions; vector analysis including topological overlay; raster analysis; statistics; integrated spatial analysis.

Unit III:
Making Maps
Parts of a map; map functions in GIS; map design and map elements; choosing a map type; producing a map formats, plotters and media; online and CD-ROM distribution; interactive maps and the Web.
Implementing a GIS
Planning a GIS; requirements; pilot projects; case studies; data management; personnel and skill sets; costs and benefits; selecting a GIS package; professional GIS packages; desktop GIS; embedded GIS; public domain and low-cost packages.

Unit IV:
Technology & Instruments involved in GIS & Remote Sensing
GIS applications; GIS application areas and user segments; creating custom GIS software applications; user interfaces; case studies. Future data; future hardware; future software; Object-oriented concepts and GIS; future issues – data ownership, privacy, education; GIS career options and how to pursue them.

Unit V:
Remote Sensing
Remote sensing of environment, E.M. Principle, Thermal infrared remote sensing, Remote sensing of Vegetation, Remote sensing of water, urban landscape

Textbooks:

1. P. A. Burrough and R. A. Mcdonnel, Principles of geographical information systems, Oxford.
2. J. R. Jensen, Remote sensing of the environment, Pearson

References:

1. Nicholas Chrismas, Exploring Geographic Information Systems, John Wiley & Sons.
2. Keith Clarke, Getting Started with Geographic Information Systems, PHI.
3. Ian Heywood, Sarah Cornelius, and Steve Carver, An Introduction to Geographical Information Systems, Addison-Wesley Longman.

IT802D: Cryptography

Unit I:
Foundations of Cryptography and Security: Ciphers and Secret Messages, Security Attacks and Services.
Mathematical Tools for Cryptography: Substitutions and Permutations, Modular Arithmetic, Euclid's Algorithm, Finite Fields, Polynomial Arithmetic, Discrete Logarithms.

Unit II:
Conventional Symmetric Encryption Algorithms: Theory of Block Cipher Design, Feistel Cipher Network Structures, DES and Triple DES, Modes of Operation (ECB, CBC, OFB, CFB), Strength (or Not) of DES.

Unit III:
Modern Symmetric Encryption Algorithms: IDEA, CAST, Blowfish, Twofish, RC2, RC5, Rijndael (AES), Key Distribution.
Stream Ciphers and Pseudo Random Numbers: Pseudo random sequences, Linear Congruential Generators, Cryptographic Generators, Design of Stream Cipher, One Time Pad.

Unit IV:
Public Key Cryptography: Prime Numbers and Testing for Primality, Factoring Large Numbers, RSA, Diffie-Hellman, ElGamal, Key Exchange Algorithms, Public-Key Cryptography Standards.
Hashes and Message Digests: Message Authentication, MD5, SHA, RIPEMD, HMAC.

Unit V:
Digital Signatures, Certificates, User Authentication: Digital Signature Standard (DSS and DSA), Security Handshake Pitfalls, Elliptic Curve Cryptosystems.
Authentication of Systems: Kerberos V4 and V5, X.509 Authentication Service.
Digital Watermarking and Steganography.

Textbooks:
1. William Stallings, Cryptography and Network Security: Principles and Practice (ISBN 0131873164), 4/e
2. Bruce Schneier, Applied Cryptography (ISBN 0471128457), 2/e
3. Alfred J. Menezes , Handbook of Applied Cryptography
4. Michael Welschenbach , Cryptography in C and C++ (ISBN 1590595025), 2/e
5. Douglas R. Stinson, Chapman & Hall, Cryptography: Theory and Practice, Third Edition CRC (November 1, 2005), (ISBN: 1584885084)

References:
1. William Stallings, Cryptography and Network Security, 4th.Ed, Prentice Hall PTR, Upper Saddle River, NJ, 2006
2. Wenbo Mao, Modern Cryptography: Theory and Practice, Prentice Hall, 2004
3. Richard A. Mollin, An Introduction to Cryptography, Chapman and Hall/CRC, 2001.
4. B. Schneier, Applied Cryptography, John Wiley and Sons, NY, 1996.
5. A. Menezes, P. Oorshcot, and S. Vanstone, Handbook of Applied Cryptography, CRC Press, Boca Raton, FL, 1997.
6. Thomas H. Barr, Invitation to Cryptography, Prentice Hall, 2002.
7. Richard J. Spillman, Classical and Contemporary Cryptology, Prentice Hall, 2005.

IT802E: Advanced Java Programming

Unit I:
Client & server side programming.
Enterprise architecture styles: Single tier , 2-tier , 3-tier, n-tier; Relative comparison of the different layers of architectures.
MVC Architecture: Explanation, Need, Drawbacks, J2EE WEB SERVICES, Different components & containers.
Servlet: Introduction, Advantages over CGI, How it works?, Servlet life cycle, Servlet API (Different interfaces & classes of generic servlet & HTTP servlet), Accessing user information by means of Request & Response, Servlet session management techniques and relative comparison.

Unit II:
JSP: Introduction, Comparison between JSP & servlet., Architecture/Life cycle, Different types of JSP architectures and relative comparison.; JSP tags ,Directives, Scripting elements, Actions; JSP implicit objects, Accessing user information using implicit objects.
EJB :Introduction, Comparison of EJB & Java Beans , Applications, Drawbacks, Different types of enterprise beans ,Services provided by EJB container.

Unit III:
RMI: Introduction and applications, Architecture ,Use of RMI Registry.
JNDI: Introduction and applications, Comparison between LDAP and JNDI
JDO (Java Data Objects): Introduction, Integration of EJB and JDO, JDO & RMI
JINI: Introduction, Applications.

Unit IV:
JDBC: Introduction, Database driver ,Different approaches to connect an application to a database server, Establishing a database connection and executing SQL statements, JDBC prepared statements, JDBC data sources.

Unit V:
XML: Java & XML, XML syntax, Document type definition., Parsers, SAX parsers, DOM parsers, SAX vs. Dom, JAXP and JAXB.

Textbooks:

1. Allamaraju and Buest, Professional JAVA Server Programming, SPD Publication
2. Ivor Horton, Beginning J2EE 1.4, SPD Publication.
3. Austin and Pawlan, Advanced Programming for JAVA 2 Platform, Pearson

References:

1. Krishnamoorthy & S. Prabhu, Internet & Java Programming, New Age Publication