**B.E**

**Computer Science and Engineering**

**VISVESVARAYA TECHNOLOGICAL**

**UNIVERSITY, BELGAUM**

**I SEMISTER**

**ENGINEERING MATHEMATICS – I**

**Code: 10MAT11 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART-A**

**UNIT – 1: Differential Calculus - 1**

Determination of nth derivative of standard functions-illustrative examples\*. Leibnitz’s theorem (without proof) and problems. Rolle’s Theorem – Geometrical interpretation. Lagrange’s and Cauchy’s mean value theorems. Taylor’s and Maclaurin’s series expansions of function of one variable (without proof). **6 Hours**

**UNIT – 2: Differential Calculus - 2**

Indeterminate forms – L’Hospital’s rule (without proof), Polar curves: Angle between polar curves, Pedal equation for polar curves. Derivative of arc length – concept and formulae without proof. Radius of curvature - Cartesian, parametric, polar and pedal forms. **7 Hours**

**UNIT – 3: Differential Calculus - 3**

Partial differentiation: Partial derivatives, total derivative and chain rule, Jacobians-direct evaluation.  
Taylor’s expansion of a function of two variables-illustrative examples\*. Maxima and Minima for function of two variables. Applications – Errors and approximations. **6 Hours**

**UNIT – 4: Vector Calculus**

Scalar and vector point functions – Gradient, Divergence, Curl, Laplacian, Solenoidal and Irrotational vectors.  
Vector Identities: div (ø*A),*Curl (ø*A)*Curl (grad ø ) div (Curl*A)*div (*A x B*) & Curl (Curl *A*) .  
Orthogonal Curvilinear Coordinates – Definition, unit vectors, scale factors, orthogonality of Cylindrical and Spherical Systems. Expression for Gradient, Divergence, Curl, Laplacian in an orthogonal system and also in Cartesian, Cylindrical and Spherical System as particular cases – No problems. **7 Hours**

**PART-B**

**UNIT – V: Integral Calculus**

Differentiation under the integral sign – simple problems with constant limits. Reduction formulae for the integrals of sin*n x*, cos*n x*, s i n *m x*c o s *n x*and evaluation of these integrals with standard limits-Problems. Tracing of curves in Cartesian, Parametric and polar forms – illustrative examples\*. Applications – Area, Perimeter, surface area and volume.  
Computation of these in respect of the curves(i)Astroid: 2 2 2  
*x*3+*y*3=*a*3(ii) Cycloid: *x*=*a*(q -sinq ), *y*=*a*(1 - cosq ) and (iii) Cardioid: *r*=*a*(1+ cosq ) **6 Hours**

**UNIT – VI: Differential Equations**

Solution of first order and first degree equations: Recapitulation of the method of separation of variables with illustrative examples\*. Homogeneous, Exact, Linear equations and reducible to these forms. Applications -orthogonal trajectories. **7 Hours**

**UNIT – VII: Linear Algebra-1**

Recapitulation of Matrix theory. Elementary transformations, Reduction of the given matrix to echelon and normal forms, Rank of a matrix, consistency of a system of linear equations and solution. Solution of a system of linear  
homogeneous equations (trivial and non-trivial solutions). Solution of a system of non-homogeneous equations by Gauss elimination and Gauss – Jordan methods. **6 Hours**

**UNIT – VIII: Linear Algebra -2**

Linear transformations, Eigen values and eigen vectors of a square matrix, Similarity of matrices, Reduction to diagonal form, Quadratic forms, Reduction of quadratic form into canonical form, Nature of quadratic forms. **7 Hours**

**Note: \* In the case of illustrative examples, questions are not to be set. 7**

**Text Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers  
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

**Reference Books:**

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.  
2. Peter V. O’Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers

**ENGINEERING CHEMISTRY**

**Sub Code: 10CHE12/ 10CHE 22 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART – A**

**UNIT – 1: Electrode Potential and Cells**

Introduction, Differences between galvanic and electrolytic cells, Construction of galvanic cell, EMF of a cell , Origin of single electrode potential, Sign convention and cell notation, Standard electrode potential, Derivation of Nernst equation for single electrode potential.  
Types of electrodes: Reference electrodes – Primary and secondary, Limitations of standard hydrogen electrode, Construction and working of calomel electrode and Ag – AgCl electrode, Measurement of single electrode potential, Numerical problems on electrode potential and EMF of a cell, Ion selective electrode: Glass electrode – Construction , Determination of pH of a solution using glass electrode, concentration cells, numerical problems. **7 Hours**

**UNIT – 2: Batteries and Fuel Cells**

Basic concepts, Battery characteristics – primary, secondary and reserve batteries with examples , super capacitors  
Classical batteries: Construction, working and applications of Zn – MnO2, Lead acid storage andNi – Cd batteries.  
Modern batteries: Construction , working and applications of Zn – air, Ni – metal hydride and Li – MnO2 batteries.  
Fuel cells – Differences between battery and fuel cell, construction and working of H2 – O2 and CH3OH– O2 fuel  cells. **6 Hours**

**UNIT – 3: Corrosion and its control**

Electrochemical theory of corrosion, Galvanic series, Types of corrosion- Differential metal corrosion, Differential aeration corrosion (Pitting and water line corrosion), Stress corrosion (caustic embrittlement in boilers), Factors affecting the rate of corrosion.  
Corrosion control: Inorganic coatings – Anodizing and phosphating, Metal coatings – Galvanizing and Tinning, Corrosion inhibitors, cathodic protection. **7 Hours**

**UNIT – 4: Metal Finishing**

Technological importance, Significance of Polarization, Decomposition potential and Overvoltage in electroplating, Theory of electroplating. Effect of plating variables on the nature of electrodeposit- Electroplating process, Electroplating of gold and Chromium.  
Distinction between electroplating and electrolessplating, Electolessplating of copper and nickel. **6 Hours**

**PART – B**

**UNIT – 5: Chemical fuels and Photovoltaic cells**

Introduction, Classification of chemical fuels Calorific value – High and Low calorific values, Determination of calorific value –solid or liquid fuel using Bomb calorimeter - numerical problems .  
Petroleum – Cracking by fluidized catalytic cracking process, Reformation of petrol, Octane and Cetane numbers. Knocking – mechanism and harmful effects. Antiknocking agents – TEL, Catalytic converters – Principle and  
working, Unleaded petrol, Power alcohol and Biodiesel.  
Photovoltaic cells – Production of solar grade silicon, Doping of silicon, Construction and working of photovoltaic cell, Advantages. **7 Hours**

**UNIT – 6: The Phase rule and Instrumental methods of analysis**

Statement of Gibb’s phase rule and explanation of the terms involved, Phase diagram of one component system – water system, Condensed phase rule , Phase diagram of two component system- Eutectic Pb – Ag system and Fe –  
C system. Application – Desilverization of lead.  
Instrumental methods of analysis- Theory , Instrumentation and applications of Colorimetry, Potentiometry , Conductometry and Flame photometry. **6 Hours**

**UNIT – 7: Polymers**

Types of polymerization – Addition and Condensation, Mechanism of polymerization – Free radical mechanism taking ethylene as example. Glass transition temperature ( Tg) , Structure – property relationship. Types of plastics – Thermosetting and thermoplastics. Manufacture of plastics by compression ,injection and extrusion moulding.  
Synthesis and applications of Teflon, PMMA, Polyurethane and Phenol – formaldehyde resins.  
Elastomers: Deficiencies of natural rubber, Vulcanization of rubber. Synthesis and applications of Neoprene and Butyl rubber, Silicone rubbers.  
Adhesives: Synthesis and applications of epoxy resins. Polymer composites - Synthesis and applications of Kevlar and Carbon fibers.  
Conducting polymers – Definition, Mechanism of conduction in Polyacetylene, applications. **7 Hours**

**UNIT – 8: Water Chemistry**

Impurities in water ,Water analysis – Determination of different constituents in water – Hardness, alkalinity, chloride , fluoride , nitrate , sulphate and dissolved oxygen. Numerical problems on hardness and alkalinity. Sewage – BOD and COD, Numerical problems, Sewage treatment. Desalination of water – Reverse Osmosis and Electrodialysis. **6 Hours**

**Text Books:**

1. Chemistry for Engineering students by B.S. Jai Prakash, R.Venugopal, Sivakumaraiah and Pushpa Iyengar  
2. Engineering Chemistry by O.G. Palanna, Tata McGraw Hill Publishing Pvt.Ltd. New Delhi 2009

**Reference Books:**

1. Principles of Physical Chemistry B.R. Puri , L.R.Sharma & M.S. Pathania, S. Nagin chand and Co.  
2. A text book of Engineering Chemistry P.C. Jain and Monica Jain Dhanpatrai Publications , New Delhi.  
3. Corrosion Engineering M.G. Fontana Mc. Graw Hill Publications.  
4. Chemistry in Engineering and Technology (Vol. 1 &2) J.C. Kuriacose and J. Rajaram.  
5.  Polymer Science V.R. Gowariker , Wiley Eastern Ltd.

**ENGINEERING PHYSICS**

**Sub Code: 10PHY12/10PHY22 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART – A**

**UNIT-1: Modern Physics**

Introduction to Blackbody radiation spectrum, Photo-electric effect, Compton effect. Wave particle Dualism. de Broglie hypothesis – de Broglie wavelength, extension to electron particle. – Davisson and Germer Experiment.  
Matter waves and their Characteristic properties. Phase velocity, group velocity and Particle velocity. Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Expression  
for deBroglie wavelength using group velocity. **7 Hours**

**UNIT-2: Quantum Mechanics**

Heisenberg’s uncertainity principle and its physical significance. Application of uncertainty principle (Non-existence of electron in the nucleus, Explanation for β-decay and kinetic energy of electron in an atom). Wave  
function. Properties and Physical significance of a wave function.   
Probability density and Normalization of wave function. Setting up of a one dimensional, time independent Schrödinger wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation – Energy Eigen values for a free particle. Energy Eigen values of a particle in a potential well ofinfinite depth. **6 Hours**

**UNIT-3: Electrical Conductivity in Metals**

Free-electron concept. Classical free-electron theory - Assumptions. Drift velocity. Mean collision time and mean free path. Relaxation time.  
Expression for drift velocity. Expression for electrical conductivity in metals. Effect of impurity and temperature on electrical resistivity of metals. Failures of classical free-electron theory.  
Quantum free-electron theory - Assumptions. Fermi - Dirac Statistics. Fermi energy – Fermi factor. Density of states (No derivation). Expression for electrical resistivity / conductivity. Temperature dependence of resistivity of metals. Merits of Quantum free – electron theory. **7 Hours**

**UNIT-4: Dielectric & Magnetic Properties of Materials**

Dielectric constant and polarisation of dielectric materials. Types of polarization. Equation for internal field in liquids and solids (one dimensional). Classius – Mussoti equation. Ferro and Piezo – electricity (qualitative). Frequency dependence of dielectric constant. Important applications of dielectric materials. Classification of dia, para and ferromagnetic materials. Hysterisis in ferromagnetic materials. Soft and Hard magnetic materials. Applications. **7 Hours**

**PART – B**

**UNIT – 5: Lasers**

Principle and production. Einstein’s coefficients (expression for energy density). Requisites of a Laser system. Condition for Laser action. Principle, Construction and working of He-Ne and semiconductor Laser.  
Applications of Laser – Laser welding, cutting and drilling. Measurement of atmospheric pollutants. Holography – Principle of Recording and reconstruction of 3-D images. Selected applications of holography. **6 Hours**

**UNIT-6: Optical Fibers & Superconductivity**

Propagation mechanism in optical fibers. Angle of acceptance. Numerical aperture. Types of optical fibers and modes of propagation. Attenuation. Applications – block diagram discussion of point to point communication.  
Temperature dependence of resistivity in superconducting materials. Effect of magnetic field (Meissner effect). Type I and Type II superconductors - Temperature dependence of critical field. BCS theory (qualitative). High temperature superconductors. Applications of superconductors– Superconducting magnets, Maglev vehicles and squids. **7 Hours**

**UNIT-7: Crystal Structure**

Space lattice, Bravais lattice - unit cell, primitive cell. Lattice parameters. Crystal systems. Direction and planes in a crystal. Miller indices. Expression for inter-planar spacing. Co-ordination number. Atomic packing factor. Bragg’s Law. Determination of crystal structure by Bragg’s x-ray spectrometer. Crystal structures of NaCl, and diamond. **6 Hours**

**UNIT-8: Material Science**

Introduction to Nanoscience and Nanotechnology. Nanomaterials: Shapes of nanomaterials, Methods of preparation of nanomaterials, Wonders of nanotechnology: Discovery of Fullerene and carbon nanotubes, Applications.  
Ultrasonic non-destructive testing of materials. Measurements of velocity in solids and liquids, Elastic constants. **6 Hours**

**Text Books:**

**1 Solid State Physics –**Sixth Edition,S.O. Pillai - New Age International  
**2 Engineering Physics -**V. Rajendran - Tata Mc-Graw Hill Company Ltd., New Delhi

**Reference Books**

**1 Nanosystems- Molecular Machinery, Manufacturing and Computation -**K.Eric Drexler - John Wiely &  
Sons 2005 Ed.  
**2 Fundamentals and Applications of Ultrasonic Waves -**J David N Cheeke and Cheeke N Cheeke - CRC Press  
**3 Nano Materials -**Vishwanathan – Narosa Publications  
**4 Engineering Physics -**G.K Shivakumar - Prism Books

**ELEMENTS OF CIVIL ENGINEERING & ENGINEERING MECHANICS**

**Sub Code: 10CIV13/10CIV23 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks : 100**

**PART - A**

**UNIT-1**

1. Introduction to Civil Engineering, Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering. Infrastructure: Types of infrastructure, Role of Civil Engineer in the Infrastructural Development, Effect of the infrastructural facilities on socio-economic development of a country. **4 Hours**  
2. Roads: Type of roads, Components and their functions. **2 Hours**  
3. Bridges and Dams: Different types with simple sketches. **1 Hour**

**UNIT -2**

4. Introduction to Engineering mechanics: Basic idealisations - Particle, Continuum and Rigid body; Force and its characteristics, types of forces, Classification of force systems; Principle of physical independence of forces, Principle of superposition of forces, Principle of transmissibility of forces; Newton's laws of motion, Introduction to SI units, Moment of a force, couple, moment of a couple, characteristics of couple, Equivalent force - couple system; Resolution of forces, composition of forces; Numerical problems on moment of forces and couples, on equivalent force - couple system. **7 Hours**

**UNIT -3**

5. Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Principle of resolved parts; Numerical problems on composition of coplanar concurrent force systems. **3 Hours**  
6. Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent force systems. **5 Hours**

**UNIT -4**

7. Centroid of plane figures; Locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle using method of integration, Centroid of simple built up sections; Numerical problems. **6 Hours**

**PART - B**

**UNIT -5**

8. Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar – concurrent and non concurrent force systems. **6 Hours**

**UNIT -6**

9. Types of supports, statically determinate beams, Numerical problems on support reactions for statically determinate beams and analysis of simple trusses (Method of joints and method of sections). **6 Hours**

**UNIT -7**

10. Friction - Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Wedge friction; Ladder friction; Numerical problems. **6 Hours**

**UNIT -8**

11. Moment of inertia of an area, polar moment of inertia, Radius of gyration,  Perpendicular axis theorem and Parallel axis theorem; Moment of Inertia of rectangular, circular and triangular areas from method of integration; Moment of inertia of composite areas; Numerical problems. **6 Hours**

**Text Books:**

1. Engineering Mechanics by S.Timoshenko,D.H.Young, and J.V.Rao TATA McGraw-Hill Book Company, New Delhi  
2. Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, New Age International Publisher, New Delhi, 3rd edition 2009.  
3. Elements of Civil Engineering and Engineering Mechanics by M.N.Sheshaprakash amd G.B.Mogaveer PHI Learning (2009)

**Reference Books:**

1. Engineering Mechanics B.Bhattacharryya, Oxford University Press 2008  
2. Engineering Mechanics by K.L. Kumar, Tata McGraw-Hill Publishing Company, New Delhi.  
3. Engineering Mechanics by MVS Rao and D.R.Durgaiah. University Press (2005)  
4. Engineering Mechanics by Nelson, Tata McGraw Hill Edn. India Pvt Ltd.  
5. Foundamentals of Engineering Mechanics, Ali Hassan and Khan , Acme Learning Pvt Ltd.

**COMPUTER CONCEPTS AND C PROGRAMMING**

**Subject Code: 10CCP13/10CCP23 IA Marks: 25**  
**Hrs/Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART – A**

**UNIT-1: Introduction to Computer Systems, Interacting with the Computer, Computer Organization**

The Computer defined, Early history, Basic parts and structure of a computer, Categorizing Computers, Information Processing life cycle, Essential computer hardware, Essential computer software.  
Keyboard, Mouse, Inputting data in other ways: Pen-based systems, Data scanning devices, Game controllers, Voice recognition devices, Microphone, Visual input devices, Video and sound, Monitors, Printers, Plotters, Data projectors, Sound systems. Number systems, ASCII, BCD, CPU, Buses, Mother Board, Chip sets, Microprocessors.  **7 Hours**

**UNIT-2: Storage Device Concepts, Operating Systems, Networking**

Storage media, Floppy drive, Hard disks, Optical media, CD-ROM, CD-R, CD-RW, DVD-ROM, Recordable DVD.  
Software, Custom-made Software, Shrunk-wrapped software, Types of operating systems, Computer processing techniques, Functions of Operating Systems, Management of processor, Memory, Virtual storage, devices, and information. Networking, Convergence of computing with communications, Networking basics, Need for networking, Basic components of a network.  **7 Hours**

**UNIT-3: Fundamentals of Problem Solving, Introduction to C Language**

Creating and running programs, System development, Software Engineering. Introduction to C Language: Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Programming example, Software Engineering, Tips and common programming errors. **6 Hours**

**UNIT-4: Structure of a C Program**

Expressions, Precedence and associativity, Side effects, Evaluating expressions, Type conversion, Statements, Programming examples, Software Engineering, Tips and common programming errors. **6 Hours**

**PART - B**

**UNIT-5: Functions**

Designing structured programs, Functions in C, User-defined Functions, Inter-function communication, Standard functions, Scope, Programming examples, Software Engineering, Tips and common programming errors. **6 Hours**

**UNIT-6: Selection – Making Decisions, Repetition**

Logical data and operators, Two-way selection, Multi way-selection, Concept of a loop, pre-test and post-test loops, Initialization and updating, Event controlled and count controlled loops, Loops in C, Other statements related to looping, looping applications, Recursion, Programming examples, Software Engineering, Tips and common programming errors. **7 Hours**

**UNIT-7: Arrays, Strings**

Concepts, Using arrays in C, Inter-function communication, Array applications, Bubble Sort, Binary search, Two-dimensional Arrays, Multidimensional arrays, String concepts, C strings, String input/output, Programming examples, Software Engineering, Tips and common programming errors. **7 Hours**

**UNIT-8: Basic Concepts of Parallel Programming**

Motivating parallelism, Scope for parallel computing, Thread basics, Why threads? OpenMP: A standard for directive – based parallel programming, The OpenMP programming model, Specifying concurrent tasks in OpenMP, Synchronization constructs in OpenMP, Data handling in OpenMP, OpenMP library functions, Environment variables in OpenMP. **6 Hours**

**Text Books:**

1. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press/Wiley India, 2009.  
2. Behrouz A. Forouzan, Richard F. Gilberg: Computer Science – A Structured Approach Using C, 3rd Edition, Cengage Learning, 2007.  
3. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar: Introduction to Parallel Computing, 2nd Edition, Pearson Education, 2003.

**Reference Books:**

1. Peter Norton: Introduction to Computers, 7th Edition, Tata McGraw Hill, 2010.  
2. E. Balagurusamy: Programming in ANSI C, 4th Edition, Tata McGraw Hill, 2008.  
3. Brian W. Kernighan and Dennis Ritchie: The C Programming Language, 2nd Edition, PHI, 1998.

**Web Reference:**

[http://elearning.vtu.ac.in](http://elearning.vtu.ac.in/)

**ELEMENTS OF MECHANICAL ENGINEERING**

**Sub Code: 10EME14 / 10EME24 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART – A**

**UNIT-1: Energy and Steam**

Forms, Sources and Classification of energy. Utilization of energy with simple block diagrams. Steam formation. Types of steam. Steam properties – Specific Volume, Enthalpy and Internal energy. (simple numerical problems)  
Steam boilers – classification, Lancashire boiler, Babcock and Wilcox boiler, Boiler mountings, Accessories, their locations and applications. (No sketches for mountings and accessories). **7 Hours**

**UNIT-2: Turbines**

**Steam turbines**– Classification, Principle of operation of Impulse and reaction. Delaval’s turbine, Parson’s turbine. Compounding of Impulse turbines.  
**Gas turbines**– Classification, Working principles and Operations of Open cycle and Closed cycle gas turbines.  
**Water turbines**–Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine. **7 Hours**

**UNIT-3: Internal Combustion Engines**

Classification, I.C. Engines parts, 2/4 – Stroke Petrol and 4-stroke diesel engines. P-V diagrams of Otto and Diesel cycles. Simple problems on indicated power, Brake power, Indicated thermal efficiency, Brake thermal efficiency, Mechanical efficiency and specific fuel consumption. **6 Hours**

**UNIT-4: Refrigeration and Air conditioning**

Refrigerants, Properties of refrigerants, List of commonly used refrigerants. Refrigeration - Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, Unit of Refrigeration. Principle and working of vapor compression refrigeration and vapor absorption refrigeration. Principles and applications of air conditioners, Room air conditioner. **6 Hours**

**PART – B**

**UNIT-5: Lathe and Drilling Machines**

**Lathe**- Principle of working of a centre lathe. Parts of a lathe. Operations on lathe - Turning, Facing, Knurling, Thread Cutting, Drilling, Taper turning by Tailstock offset method and Compound slide swiveling method, Specification of Lathe.  
**Drilling Machine –**Principle of working and classification of drilling machines. bench drilling Machine, Radial drilling machine. Operations on drilling machine -Drilling, Boring, Reaming, Tapping, Counter sinking, Counter boring and Spot facing. Specification of radial drilling machine.**7 Hours**

**UNIT-6: Milling and Grinding Machines**

**Milling Machine –**Principle of milling, Types of milling machines. Principle & working of horizontal and vertical milling machines. Milling Processes - Plane milling, End milling, Slot milling, Angular milling, Form milling, Straddle milling and Gang milling. Specification of universal milling machine.  
**Grinding Machine –**Principle and classification of Grinding Machines. Abrasives- Definition, Types and applications. Bonding materials. Type of Grinding machines, Principle and working of surface grinding, Cylindrical  
grinding and Centerless grinding. **7 Hours**

**UNIT-7: Joining Processes, Lubrication and Bearings Soldering, Brazing and Welding**

Definitions. Classification and method of Soldering, Brazing and welding and differences. Brief description of arc welding and Oxy-Acetylene welding.  
**Lubrication and Bearings**  
Lubricants-Classification and properties. Screwcap, Tell-Tale, Drop feed, Wick feed and Needle lubricators. Ring, Splash and Full pressure lubrication. Classification of bearings, Bushed bearing, Pedestal bearing, Pivot bearing, Collar bearings and Antifriction bearings. **6 Hours**

**UNIT-8: Power Transmission**

**Belt Drives**- Classification and applications, Derivations on length of belt. Definitions - Velocity ratio, Creep and slip, Idler pulley, stepped pulley and fast & loose pulley.  
**Gears**- Definitions, Terminology, Types and uses. Gear drives and  
**Gear Trains**– Definitions and classifications, Simple problems. **6 Hours**

**Text Books:**

1. A Text Book of Elements of Mechanical Engineering - S. Trymbaka Murthy, 3rd revised edition 2006, I .K. International Publishing House Pvt. Ltd., New Delhi.

**Reference Books:**

1. A Text Book of Elements of Mechanical Engineering – K.R. Gopalkrishna, Subhash Publishers, Bangalore.  
2. The Elements of Workshop Technology - Vol I & II , SKH Chowdhary, AKH Chowdhary , Nirjhar Roy, 11th edition 2001, Media Promotors and Publishers, Mumbai.  
3. Elements of Mechanical Engineering –Dr.A.S.Ravindra, Best Publications, 7th edition 2009.

**COMPUTER AIDED ENGINEERING DRAWING**

**Sub Code: 10CED14 / 10CED24 IA Marks: 25**  
**Hrs/ Week: 06(Instruction 2 hr. + Sketching & Practice 4 hr.) Exam Hours: 03**  
**Total Hrs: 84 (Instruction 28 hr. +Sketching & Practice 56 hr.) Exam Marks: 100**

**1. Introduction to Computer Aided Sketching**

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment.  
Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate,  
trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering. **12 Hours**

**2. Orthographic Projections**

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems). **12 Hours**

**3. Orthographic Projections of Plane Surfaces**

**(First Angle Projection Only)**  
Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates). **12 Hours**

**4. Projections of Solids**

**(First angle Projection only)**  
Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid). **24 Hours**

**5. Sections And Development of Lateral Surfaces of Solids**

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on sections of solids).  
Development of lateral surfaces of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces). **12 Hours**

**6. Isometric Projection (Using Isometric Scale Only)**

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids). **12 Hours**

**Text Books:**

1. **Engineering Drawing**- N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat.  
2. **A Primer on Computer Aided Engineering Drawing-2006**, Published by VTU, Belgaum.

**Reference Books:**

1. **Computer Aided Engineering Drawing**- S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.  
2. **Engineering Graphics**- K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.  
3. **Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production**- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.  
4. **Computer Aided Engineering drawing**- Prof. M. H. Annaiah, New Age International Publisher, New Delhi. 2009.

**Conducting classes**

Classes may be conducted in two slots/ week of 3 hours each (Instruction 1 hr. +Sketching & Practice 2 hr.)

**Scheme of Evaluation for Internal Assessment (25 Marks)**  
1. 15 Marks for Class work (Sketching & Computer Aided Engineering drawing printouts in A4 size sheets).  
2. 10 Marks for test in the same pattern as that of the main examination.(Better of the two Tests).

All the solutions must be valued on the spot by examining the sketches, display and the hard copies. All the sketches including the computer printouts must be submitted and they must be preserved for one year.

**Scheme of Examination**

1. Chapter 1 is only for practice and Internal Assessment and not for examination.  
2. Separate Question paper must be set for each batch of students, jointly by the Internal & External examiners.  
3. A maximum of **THREE**questions must be set as per the following pattern *(No mixing of questions from different Chapters).*

**Q. No. From Chapters Marks Allotted**  
1 Chapter 2 or Chapter 3 30  
2 Chapter 4 40  
3 Chapter 5 or Chapter 6 30  
**Total 100**

**Scheme of Evaluation**

**Q. No. Solutions & Sketching on graph book**  
**Computer display & printout**

**Total Marks**  
1 10 Marks 20 Marks 30  
2 15 Marks 25 Marks 40  
3 15 Marks 15 Marks 30

**Total 40 Marks 60 Marks 100**  
Students have to submit the computer printouts and the sketches drawn on the graph sheets at the end of the examination. Both Internal & External examiners have to jointly evaluate the solutions (sketches) and computer display & printouts of each student for 100 marks (40 marks for solutions & sketches + 60 marks for computer display and printouts) and submit the marks list along with the solution (sketches) on graph sheets & computer printouts in separate covers.  
4. Each batch must consist of a minimum of 10 students and a maximum of 12 students.  
5. Examination can be conducted in parallel batches, if necessary.

**BASIC ELECTRICAL ENGINEERING**

**Sub Code: 10ELE15/ 10ELE25 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART – A**

**UNIT-1:**

**1–a) D. C. Circuits:**Ohm's Law and Kirchhoff’s Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources.Power and Energy. Illustrative examples. **4Hours**  
**I–b) Electromagnetism:**Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced emf’s. Concept of self inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic field. Illustrative examples. **3Hours**

**UNIT-2: Single-phase A.C. Circuits**

Generation of sinusoidal voltage, definition of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities. Analysis, with phasor diagrams, of R, L, C, R-L, R-C and R-L-C circuits, real power, reactive power, apparent power and power factor. Illustrative examples involving series, parallel and series- parallel circuits. **7 Hours**

**UNIT-3: 3 Three Phase Circuits**

Necessity and advantages of three phase systems, generation of three phase power, definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of  
balanced star and delta connections. Power in balanced three-phase circuits, measurement of power by two-wattmeter method. Illustrative examples. **6 Hours**

**UNIT-4:**

**4–a) Measuring Instruments:**Construction and Principle of operation of dynamometer type wattmeter and single-phase induction type energy meter (problems excluded). **3 Hours**  
**4–b) Domestic Wiring:**Service mains, meter board and distribution board. Brief discussion on Cleat, Casing & Capping and conduit (concealed) wiring. Two-way and three-way control of a lamp. Elementary discussion on fuse  
and Miniature Circuit Breaker (MCB’s). Electric shock, precautions against shock –Earthing: Pipe and Plate. **3 Hours**

**PART – B**

**UNIT-5: DC Machines**

Working principle of DC machine as a generator and a motor. Types and constructional features. emf equation of generator, relation between emf induced and terminal voltage enumerating the brush drop and  
drop due to armature reaction. Illustrative examples.  
DC motor working principle, Back emf and its significance, torque equation. Types of D.C. motors, characteristics and applications. Necessity of a starter for DC motor. Illustrative examples on back emf and torque. **7 Hours**

**UNIT-6: Transformers**

Principle of operation and construction of single-phase transformers (core and shell types). emf equation, losses, efficiency and voltage regulation (Open Circuit and Short circuit tests, equivalent circuit and  
phasor diagrams are excluded). Illustrative problems on emf equation and efficiency only. **7 H**ours

**UNIT-7: Synchronous Generators**

Principle of operation. Types and constructional features. emf equation. Concept of winding factor (excluding derivation of distribution and pitch factors). Illustrative examples on emf. equation. **6 Hours**

**UNIT-8: Three Phase Induction Motors**

Concept of rotating magnetic field. Principle of operation. Types and Constructional features. Slip and its significance. Applications of squirrel - cage and slip - ring motors. Necessity of a starter, star-delta starter. Illustrative examples on slip calculations. **6 Hours**

**Text Books:**

1. “Basic Electrical Engineering”, D C Kulshreshtha, ,TMH,2009 Edition.  
2. “Fundamentals of Electrical Engineering”, Rajendra Prasad, PHI, Second Edition, 2009.

**Reference Books:**

1 "Electrical Technology", E. Hughes International Students 9th Edition, Pearson, 2005.  
2 “Basic Electrical Engineering”,Abhijit Chakrabarti,Sudipta nath,Chandan Kumar Chanda,TMH,First reprint 2009.  
3 Problems in Electrical Engineering,Parker Smith,CBS Publishers and Distributors, 9th Edition,2003.

**BASIC ELECTRONICS**

**Sub Code: 10ELN15 / 10ELN25 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hrs: 52 Exam Marks: 100**

**PART - A**

**UNIT-1: SEMICONDUCTOR DIODES AND APPLICATIONS**

p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line, Temperature dependence of p-n characteristics, AC equivalent circuits, Zener diodes Half-wave diode rectifier, Ripple factor, Full-wave diode rectifier, Other full-wave circuits, Shunt capacitor filter - Approximate analysis of capacitor filters, Power supply performance, Zener diode voltage regulators, Numerical examples as applicable. **7 Hours**

**UNIT-2: TRANSISTORS**

Bipolar Junction transistor, Transistor Voltages and currents, amplification, Common Base, Common Emitter and Common Collector Characteristics, DC Load line and Bias Point. **Hours**

**UNIT-3: BIASING METHODS**

Base Bias, Collector to Base Bias, Voltage divider Bias, Comparison of basic bias circuits, Bias circuit design, Thermal Stability of Bias Circuits (Qualitative discussions only). **6 Hours**

**UNIT-4: OTHER DEVICES**

Silicon Controlled Rectifier (S.C.R), SCR Control Circuits, More S.C.R applications; Uni-junction transistor, UJT applications, Junction Field effect Transistors(Exclude Fabrication and Packaging), JFET Characteristics, FET Amplifications, Numerical examples as applicable. **7 Hours**

**PART - B**

**UNIT-5: AMPLIFIERS & OSCILLATORS**

Decibels and Half power points, Single Stage CE Amplifier and Capacitor coupled two stage CE amplifier(Qualitative discussions only), Series voltage negative feedback and Additional effects of Negative feed back(Qualitative discussions only), The Barkhausen Criterion for Oscillations, BJT RC phase shift oscillator, Hartley ,Colpitts and crystal oscillator ( Qualitative discussions only) Numerical problems as applicable. **6 Hours**

**UNIT-6: INTRODUCTION TO OPERATIONAL AMPLIFIERS**

Ideal OPAMP, Saturable property of an OP AMP, Inverting and Non Inverting OPAMP circuits, Need for OPAMP, Characteristics and applications – voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable Cathode Ray Oscilloscope (CRO). **6 Hours**

**UNIT-7: OMMUNICATION SYSTEMS**

Block diagram, Modulation, Radio Systems, Super hetrodyne Receivers, Numerical examples as applicable.  
**NUMBER SYSTEMS:**Introduction, decimal system, Binary, Octal and Hexadecimal number systems, addition and subtraction, fractional number, Binary Coded Decimal numbers**. 7 Hours**

**UNIT-8: DIGITAL LOGIC**

Boolean algebra, Logic gates, Half-adder, Full-adder, Parallel Binary adder. **7 Hours**

**Text Books:**

1. Electronic Devices and Circuits: David. A. Bell; Oxford University Press, 5th Edn., 2008.

**Reference Books:**

1. Electronic Devices and Circuits: Jacob Millman, Christos C. Halkias TMH, 1991 Reprint 2001.  
2. Electronic Communication Systems, George Kennedy, TMH 4th Edition.  
3. Digital Logic and Computer Design, Morris Mano, PHI, EEE.  
4. Basic Eelctronics, RD Sudhaker Samuel, U B Mahadevaswamy, V. Nattarsu, Saguine-Pearson, 2007.

**WORKSHOP PRACTICE**

**Sub Code: 10WSL16/ 10WSL26 IA Marks: 25**  
**Hrs/ Week: 03 Exam Hours: 03**  
**Total Hrs: 42 Exam Marks: 50**

1. Fitting  
i. Study of fitting tools  
ii. Study of fitting operations & joints  
iii. Minimum 5 models involving rectangular, triangular, semi circular and dovetail joints.

2. Welding  
iv. Study of electric arc welding tools & equipments  
v. Minimum 4 Models- electric arc welding-Butt joint, Lap joint, T-joint & L-joint.

3. Study and demonstration of Sheet metal and soldering work.

4. Study & demonstration of power Tools in Mechanical Engineering.

**Scheme of Examination:**

Fitting 30 Marks  
Welding 10 Marks  
Viva Voce 10 marks

**Reference Book:**

1. The Elements of Workshop Technology -, Vol 1 & 2, S.K.H. Choudhury, A.K.H.Choudhury, Nirjhar Roy, 11th edition, 2001, Media Promoters and Publishers, Mumbai.

**COMPUTER PROGRAMMING LABORATORY**

**Subject Code: 10CPL16 / 10CPL26 IA Marks: 25**  
**Hrs/Week: 03 Exam Hours: 03**  
**Total Hours: 42 Exam Marks: 50**

**PART – A**

1. Design, develop and execute a program in C to find and output all the roots of a given quadratic equation, for non-zero coefficients.

2. Design, develop and execute a program in C to implement Euclid’s algorithm to find the GCD and LCM of two integers and to output the results along with the given integers.

3. Design, develop and execute a program in C to reverse a given four digit integer number and check whether it is a palindrome or not. Output the given number with suitable message.

4. Design, develop and execute a program in C to evaluate the given polynomial f(x) = a4x4 + a3x3 + a2x2 + a1x + a0 for given value of x and the coefficients using Horner’s method.

5. Design, develop and execute a program in C to copy its input to its output, replacing each string of one or more blanks by a single blank.

6. Design, develop and execute a program in C to input N integer numbers in ascending order into a single dimensional array and perform a binary search for a given key integer number and report success or failure in the form of a suitable message.

7. Design, develop and execute a program in C to input N integer numbers into a single dimensional array, sort them in ascending order using bubble sort technique and print both the given array and the sorted array with suitable headings.

8. Design, develop and execute a program in C to compute and print the word length on the host machine.

**PART – B**

9. Design, develop and execute a program in C to calculate the approximate value of exp(0.5) using the Taylor Series expansion for the exponential function. Use the terms in the expansion until the last term is less than the  
machine epsilon defined FLT\_EPSILON in the header file <float.h>. Also print the value returned by the Mathematical function exp( ).

10. Design, develop and execute a program in C to read two matrices A (M x N) and B (P x Q) and compute the product of A and B if the matrices are compatible for multiplication. The program must print the input matrices and  
the resultant matrix with suitable headings and format if the matrices are compatible for multiplication, otherwise the program must print a suitable message. (For the purpose of demonstration, the array sizes M, N, P, and Q can all be less than or equal to 3)

11. Design, develop and execute a parallel program in C to add, element wise, two one-dimensional arrays A and B of N integer elements and store the result in another one-dimensional array C of N integer elements.

12. Design and develop a function rightrot (x, n) in C that returns the value of the integer x rotated to the right by n bit positions as an unsigned integer. Invoke the function from the main with different values for x and n and print  
the results with suitable headings.

13. Design and develop a function isprime (x) that accepts an integer argument and returns 1 if the argument is prime and 0 otherwise. The function must use plain division checking approach to determine if a given number is prime. Invoke this function from the main with different values obtained from the user and print appropriate messages.

14. Design, develop and execute a parallel program in C to determine and print the prime numbers which are less than 100 making use of algorithm of the Sieve of Eratosthenes.

15. Design and develop a function reverses (s) in C to reverse the string s in place. Invoke this function from the main for different strings and print the original and reversed strings.

16. Design and develop a function match any (s1,s2) which returns the first location in the string s1 where any character from the string s2 occurs, or – 1 if s1 contains no character from s2. Do not use the standard library function which does a similar job! Invoke the function match any (s1. s2) from the main for different strings and print both the strings and the return value from the function match any (s1,s2).

**Note:**In the practical examination, the student has to answer two questions. One question from Part A and one question from Part B will be selected by the student by lots. All the questions listed in the syllabus have to be included in the lots. The change of question (Part A only / Part B only / Both Part A & Part B) has to be considered, provided the request is made for the same, within half an hour from the start of the examination. The allotment of marks is as detailed below:

**Sl. No. Activity Max. Marks**  
1. Procedure Part A 5\* Writing program & procedure for the assigned problems along with algorithms / flowchart Part B 5\*  
2. Conduction Execution of the program and Part A 10 showing the results in proper format Part B 20  
3. Viva-voce\*\* 10

**Total Max. Marks 50**

**Minimum passing Marks (40% of Max. Marks) 20**  
\* To be considered as zero if student has been allowed change of question.

**LABORATORY EXPERIMENTS IN ENGINEERING PHYSICS**

**Sub Code: 10PHYL17/10PHYL27 IA Marks: 25**  
**Hrs/ Week: 03 Exam Hours: 03**  
**Total Hrs: 10 Exam Marks: 50**

**EXPERIMENTS:**

1. Series & Parallel LCR Circuits.(Determination of resonant frequency & quality factor)

2. I-V Characteristics of Zener Diode.(determination of knee voltage, zener voltage & forward resistance)

3. Characteristics of a Transistor.(Study of Input & Output characteristics and calculation of input resistance, output resistance & amplification factor)

4. Photo Diode Characteristics.(Study of I-V characteristics in reverse bias and variation of photocurrent as a function of reverse voltage & intensity)

5. Ultrasonic Interferometer (Measurement of velocity of sounds in solids/liquids).

6. Dielectric constant (Measurement of dielectric constant).

7. Magnetic properties (Study of retentivity and coercivity by B-H graph method).

8. Diffraction (Measurement of wavelength of laser / Hg source using diffraction grating).

9. Planck’s constant (Using the principle of photoelectric effect/LED’s).

10. Electrical Resistivity (Determination of resistivity in semiconductor by four probe method).

11. Verification of Stefan’s law.

12. Determination of Fermi energy.(Measurement of Fermi energy in copper)

13. Uniform Bending Experiment.(Determination of Youngs modulus of material bar)

14. Newtons Rings.(Determination of radius of curvature of planoconvex lens)

**ENGINEERING CHEMISTRY LABORATORY**

**Sub Code: 10CHEL17/10CHEL27 IA Marks: 25**  
**Hrs/ Week: 03 Exam Hours: 03**  
**Total Hrs: 42 Exam Marks: 50**

**PART – A**

1. Potentiometric estimation of FAS using standard K2Cr2O7 solution

2. Colorimetric estimation of Copper

3. Conductometric estimation of an Acid mixture using standard NaOH solution

4. Flame Photometric estimation of Sodium and Potassium in the given sample of Water

5. Determination of pKa of a weak acid using pH Meter

6. Determination of Viscosity co-efficient of a given liquid using Ostwald’s Viscometer.

**PART – B**

1. Determination of Total Hardness of a sample of Water using Disodium salt of EDTA.

2. Determination of CaO in the given sample of Cement by Rapid EDTA method.

3. Determination of Percentage of Copper in Brass using standard Sodium thiosulphate solution.

4. Determination of Iron in the given sample of Haematite ore solution using Potassium dichromate Crystals by external indicator method.

5. Determination of COD of the given Industrial Waste water sample.

6. Determination of Total Alkalinity of a given Water Sample using standard Hydrochloric acid.

**References Books:**

1) Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.  
2) Vogel’s Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J. Bassett, J. Mendham and R.C Denney.

**Scheme of Examination:**

One experiment from Part- A and another from Part - B shall be set. Different experiments may be set from Part- A and a common experiment from Part – B.

**CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS**

**Sub Code: 10CIP18/10CIP28 IA Marks: 25**  
**Hrs/ Week: 02 Exam Hours: 02**  
**Total Horus: 26 Exam Marks: 50**

1 Preamble to the constitution of India. Fundamental rights under Part – III – details of Exercise of rights, Limitations & Important cases.**4 Hours**

2 Relevance of Directive principles of State Policy under Part – IV. Fundamental duties & their significance. **3 Hours**

3 Union Executive – President, Prime Minister, Parliament & the Supreme Court of India. **3 Hours**

4 State executive – Governors, Chief Minister, State Legislator and High Courts. **3 Hours**

5 Constitutional Provisions for Scheduled Castes & Tribes, Women & Children & Backward classes. Emergency Provisions. **4 Hours**

6 Electoral process, Amendment procedure, 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments. **3 Hours**

7 Scope & aims of engineering Ethics. Responsibility of Engineers. Impediments to responsibility. **3 Hours**

8 Honesty, Integrity and reliability, risks, safety & liability in engineering. **3 Hours**

**Text Books:**  
1. Durga Das Basu: “Introduction to the Constitution of India” (Students Edn.) Prentice – Hall EEE, 19th/20th Edn., 2001.  
2. “Engineering Ethics” by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia, 2003-08-05.

**Reference Books:**

1. “An Introduction to Constitution of India” by M.V.Pylee, Vikas Publishing, 2002.  
2. “Engineering Ethics” by M. Govindarajan, S.Natarajan, V.S. Senthilkumar., Prentice – Hall of India Pvt. Ltd. New Delhi, 2004.

**Scheme of examination:**

Question paper is of objective type. Students have to pass this subject compulsorily. However, marks will not be considered for awarding class/rank.

**ENVIRONMENTAL STUDIES**

**Sub Code: 10CIV18/10CIV28 IA Marks: 25**  
**Hrs/ Week: 02 Exam Hours: 02**  
**Total Hours: 26 Exam Marks: 50**

**PART – A**

**UNIT-1**

Environment -\_ Definition, Eco system -- Balanced ecosystem, Human activities - Food, Shelter, Economic and Social Security. **3 Hours**

**UNIT-2**

Effects of human activities on environment - Agriculture, Housing, Industry, Mining, and Transportation activities, Environmental Impact Assessment. Sustainable Development. **3 Hours**

**UNIT-3**

Natural Resources - Water resources - Availability and Quality aspects. Water borne diseases, Water induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material Cycles - Carbon, Nitrogen  
and Sulphur Cycles. **4 Hours**

**UNIT-4**

Energy - Different types of energy, Electro-magnetic radiation. Conventional and Non - Conventional sources - Hydro Electric, Fossil fuel based, Nuclear, Solar, Biomass and Bio-gas. Hydrogen as an alternative future source of  
Energy. **4 Hours**

**PART – B**

**UNIT-5**

Environmental Pollution and their effects. Water pollution. Land pollution . Noise pollution . Public Health aspects. **3 Hours**

**UNIT-6**

Current Environmental issues of importance: Population Growth, Climate change and Global warming - Effects, Urbanization, Automobile pollution. **3 Hours**

**UNIT-7**

Acid Rain, Ozone layer depletion, Animal Husbandry **3 Hours**

**UNIT-8**

Environmental Protection - Role of Government, Legal aspects, Initiatives by Non - Governmental Organizations (NGO), Environmental Education, Women Education. **3 Hours**

**NOTE:** Question paper is of objective type for 50 marks **(Fifty questions have to be set with 4 multiple choice answers).**Students have to pass the subject compulsorily. However, marks will not be considered for awarding class/rank.

**Text Books:**

1) Benny Joseph (2005), “Environmental Studies”, Tata McGraw – Hill Publishing Company Limited  
2) Ranjit Daniels R.J. and Jagdish Kirshnaswamy, (2009), “Environmental Studies”, Wiley India Private Ltd., New Delhi  
3) Rajagopalan R. (2005), “Environmental Studies – From Crisis to Cure”, Oxford Univesity Press

**Reference Books:**

1) Raman Sivakumar, (2005), “Principles of Environmental Science and Engineering”, Second Edition, Cengage learning, Singapore  
2) Meenakshi P. (2006), “Elements of Environmental Science and Engineering”, Prentice Hall of India Private Limited, New Delhi  
3) Prakash S.M. (2007), “Environmental Studies”, Elite Publishers, Mangalore  
4) Erach Bharucha (2005), “Text Book of Environmental Studies”, for UGC, University Press  
5) Tyler Miller Jr. G. (2004), “Environmental Science – Working with the Earth”, Tenth Edition, Thomson Brooks/Cole  
6) Tyler Miller Jr. G. (2006), “Environmental Science – Working with the Earth”, Eleventh Edition, Thomson Brooks/Cole  
7) “Text Book of Environmental and Ecology” by Dr. Pratibha Sing, Dr. Anoop Singh and Dr. Piyush Malaviya. Acme Learning Pvt. Ltd., New Delhi.

**ENGINEERING MATHEMATICS – II**

**Sub Code: 10MAT21 IA Marks: 25**  
**Hrs/ Week: 04 Exam Hours: 03**  
**Total Hours: 52 Exam Marks: 100**

**PART-A**

**UNIT-1: Differential Equations - 1**

Equations of first order and higher degree (p-y-x equations), Equations solvable for p-y-x. General and singular solutions, Clairauit’s equation.  
Applications of differential equations of first order–illustrative examples\*. **6 Hours**

**UNIT-2: Differential Equations – 2**

Linear differential equations: Solution of second and higher order equations with constant coefficients by inverse differential operator method. Simultaneous differential equations of first order – Applications. **7 Hours**

**UNIT-3: Differential Equations – 3**

Method of variation of parameters, Solutions of Cauchy’s and Legendre’s linear equations, Series solution of equations of second order, Frobenius method – simple problems. **6 Hours**

**UNIT-4: Partial Differential Equations (PDE)**

Formation of Partial differential equations (PDE) by elimination of arbitrary constants/ functions. Solution of non-homogeneous PDE by direct integration. Solution homogeneous PDE involving derivative with respect to one independent variable only. Solution of Lagrange’s linear PDE. Solution of PDE by the Method of separation of variables (first and second order equations). **7 Hours**

**PART-B**

**UNIT-5: Integral Calculus**

Multiple Integrals **–**Evaluation of Double integrals and triple integrals. Evaluation of double integrals over a given region, by change of order of integration, by change of variables. Applications to area and volume – illustrative examples\*.  
Beta and Gamma Functions - Properties and problems. **6 Hours**

**UNIT-6: Vector Integration**

Line integrals – definition and problems, Surface and volume integralsdefinition. Green’s theorem in a plane, Stoke’s and Gauss divergence theorem (statements only). **6 Hours**

**UNIT-7: Laplace Transforms-1**

Definition, transforms of elementary functions, properties, Periodic function, Unit step function and unit impulse function. **7 Hours**

**UNIT-8: Laplace Transorms-2**

Inverse Laplace Transforms, Convolution theorem, solution of linear differential equations using Laplace transforms. Applications – illustrative examples\*. **7 Hours**

**Note: \* In the case of illustrative examples, questions are not to be set.**

**Text Books:**

1) B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers.  
2) Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

**Reference Book:**

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. 2) Peter V. O’Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd. Publishers.
3. **SEMESTER**

**ENGINEERING MATHEMATICS – III**

**CODE: 10 MAT 31 IA Marks: 25**

**Exam Hrs: 03 Hrs/Week: 04**

**Exam Marks:100 Total Hrs: 52**

**PART A**

**Unit-I: FOURIER SERIES**

Convergence and divergence of infinite series of positive terms, definition and illustrative examples\*

Periodic functions, Dirichlet’s conditions, Fourier series of periodic functions of period  and arbitrary period, half range Fourier series. Complex form of Fourier Series. Practical harmonic analysis. **[7 hours]**

**Unit-II: FOURIER TRANSFORMS**

**I**nfinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms **[6 hours]**

**Unit-III: APPLICATIONS OF PDE**

Various possible solutions of one dimensional wave and heat equations, two dimensional Laplace’s equation by the method of separation of variables, Solution of all these equations with specified boundary conditions. D’Alembert’s solution of one dimensional wave equation. **[6 hours]**

**Unit-IV: CURVE FITTING AND OPTIMIZATION**

Curve fitting by the method of least squares- Fitting of curves of the form

Y = *ax* +*b*, *y* = *a x* 2+ *b x* + *c*, *y* = *a e bx* , y= *axb*

Optimization: Linear programming, mathematical formulation of linear programming problem (LPP), Graphical method and simplex method. **[7 hours]**

**PART-B**

**Unit-V: NUMERICAL METHODS - 1**

Numerical Solution of algebraic and transcendental equations: Regula-falsi method, Newton - Raphson method. Iterative methods of solution of a system of equations: Gauss-seidel and Relaxation methods. Largest eigen value and the corresponding eigen vector by Rayleigh’s power method. **[6 hours]**

**Unit-VI: NUMERICAL METHODS – 2**

Finite differences: Forward and backward differences, Newton’s forward and backward interpolation formulae. Divided differences - Newton’s divided difference formula, Lagrange’s interpolation formula and inverse interpolation formula.

Numerical integration: Simpson’s one-third, three-eighth and Weddle’s rules (All formulae/rules without proof) **[7 hours]**

**Unit-VII: NUMERICAL METHODS – 3**

Numerical solutions of PDE – finite difference appr oximation to derivatives, Numerical solution of two dimensional Laplace’s equation, one dimensional heat and wave equations **[7 hours]**

**Unit-VIII: DIFFERENCE EQUATIONS AND Z-TRANSFORMS**

Difference equations: Basic definition; Z-transforms – definition, standard Z-transforms, damping rule, shifting rule, initial value and final value theorems. Inverse Z-transform. Application of Z-transforms to solve difference equations. **[6 hours]**

**Note: \* In the case of illustrative examples, questions are not to be set.**

**Text Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

**Reference Book:**

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. Peter V. O’Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers

**ELECTRONIC CIRCUITS**

**SUBJECT CODE: 10CS32 IA Marks: 25**

**Exam Hrs: 03 Hrs/Week: 03**

**Total Hrs: 52 Exam Marks:52**

**PART A**

**UNIT - 1**

Transistors, UJTs, and Thyristors: Operating Point, Common-Emitter Configuration, Thermal Runaway, Transistor Switch, Unijunction Transistors, SCR. **7 Hours**

**UNIT-2**

Field Effect Transistors: Bipolar Junction Transistors versus Field Effect Transistors, Junction Field Effect Transistors, Metal Oxide Field Effect Transistors, Differences between JFETs and MOSFETs, Handling MOSFETs, Biasing MOSFETs, FET Applications, CMOS Devices, Insulated Gate Bipolar Transistors (IGBTs) **6 Hours**

**UNIT - 3**

Optoelectronic Devices: Introduction, Photosensors, Photoconductors , Photodiodes, Phototransistors, Light-Emitting Diodes, Liquid Crystal Displays, Cathode Ray Tube Displays, Emerging Display Technologies, Optocouplers

**UNIT - 4**

Small Signal Analysis of Amplifiers: Amplifier Bandwidth: Frequency Considerations, Hybrid h-Parameter Model for an Amplifier, Transistor Hybrid Model, Analysis of a Transistor Amplifier using complete h-Parameter Model, Analysis of a Transistor Amplifier Configurations using Simplified h-Parameter Model (CE configuration only), Small-Signal 4 Analysis of FET Amplifiers, Cascading Amplifiers, Darlington Amplifier, Low-Frequency Response of Amplifiers (BJT amplifiers only).

**PART - B**

**UNIT - 5 Large Signal Amplifiers, Feedback Amplifier:** Classification and characteristics of Large Signal Amplifiers, Feedback Amplifiers: Classification of Amplifiers, Amplifier with Negative Feedback, Advantages of Negative Feedback, Feedback Topologies, Voltage-Series (Series-Shunt) Feedback, Voltage-Shunt (Shunt-Shunt) Feedback, Current-Series (Series-Series) Feedback, Current-Shunt (Shunt-Series) Feedback. **6 Hours**

**UNIT – 6** **7 Hours**

Oscillators, Wave-Shaping Circuits: Classification of Oscillators, Conditions for Oscillations: Barkhausen Criterion, Types of Oscillators, Crystal Oscillator, Voltage-Controlled Oscillators, Frequency Stability. Wave-Shaping Circuits: Basic RC Low-Pass Circuit, RC Low-Pass Circuit as Integrator, Basic RC High-Pass Circuit, RC High-Pass Circuit as Differentiator, Multivibrators, Integrated Circuit (IC) Multivibrators

**UNIT - 7** **7 Hours**

Hours Linear Power Supplies, Switched mode Power Supplies: Linear Power Supplies: Constituents of a Linear Power Supply, Designing Mains Transformer; Linear IC Voltage Regulators, Regulated Power Supply Parameters. Switched Mode Power Supplies: Switched Mode Power Supplies, Switching Regulators, Connecting Power Converters in Series, Connecting Power Converters in Parallel

**UNIT - 8** **6 Hours**

Operational Amplifiers: Ideal Opamp versus Practical Opamp, Performance Parameters, Some Applications: Peak Detector Circuit, Absolute Value Circuit, Comparator, Active Filters, Phase Shifters, Instrumentation Amplifier, Non-Linear Amplifier, Relaxation Oscillator, Current-To-Voltage Converter, Voltage-To-Current Converter, Sine Wave Oscillators.

**Text Book:** Anil K Maini, Varsha Agarwal: Electronic Devices and Circuits, Wiley, 2009.

(4.1, 4.2, 4.7, 4.8, 5.1 to 5.3, 5.5, 5.6, 5.8, 5.9, 5.13, 5.14, 6.1, 6.3, 7.1 to 7.5, 7.10 to 7.14, Listed topics only from 8, 10.1, 11, 12.1, 12.2, 12.3, 12.5, 13.1 to 13.6, 13.9, 13.10, 14.1, 14.2, 14.6, 14.7,

15.1, 15.5 to 15.7. 16.3, 16.4, 17.12 to 17.22)

**Reference Books:**

1. Jacob Millman, Christos Halkias, Chetan D Parikh: Millman’s Integrated Electronics – Analog and Digital Circuit s and Systems, 2nd Edition, Tata McGraw Hill, 2010.
2. R. D. Sudhaker Samuel: Electronic Circuits, Sanguine-Pearson, 2010.

**LOGIC DESIGN**

**Subject Code: 10CS33**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART-A**

**UNIT – 1 Digital Principles, Digital Logic:** Definitions for Digital Signals, Digital Waveforms, Digital Logic, 7400 TTL Series, TTL Parameters The Basic Gates: NOT, OR, AND, Universal Logic Gates: NOR, NAND, Positive and Negative Logic, Introduction to HDL.  **7 Hours**

**UNIT – 2 Combinational Logic Circuits** : Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don’t-care Conditions, Product-of-sums Method, Product-of-sums simplifications, Simplification by Quine-McClusky Method, Hazards and Hazard Covers, HDL Implementation Models. **6 Hours**

**UNIT – 3 Data-Processing Circuits:** Multiplexers, Demultiplexers, 1-of-16 Decoder,Encoders, Exclusive-or Gates, Parity Generators and Checkers, Magnitude Comparator, Programmable Array Logic, Programmable Logic Arrays, HDL Implementation of Data Processing Circuits **7 Hours**

**UNIT – 4 7 Hours Clocks, Flip-Flops**: Clock Waveforms, TTL Clock, Schmitt trigger, Clocked D FLIP-FLOP, Edge-triggered D FLIP-FLOP, Edge-triggered JK FLIP-FLOP, FLIP-FLOP Timing, JK Master-slave FLIP-FLOP, Switch Contact Bounce Circuits, Various Representation of FLIP-FLOPs, Analysis of Sequential Circuits, HDL Implementation of FLIP-FLOP **7 Hours**

**PART-B**

**UNIT – 5 6 Hours**

**Registers:** Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In - Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers, Register Implementation in HDL

**UNIT – 6 7 Hours**

**Counters:** Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, Presettable Counters, Counter Design as a Synthesis problem, A Digital Clock, Counter Design using HDL

**UNIT – 7 7 Hours**

**Design of Synchronous and Asynchronous Sequential Circuits:** Design of Synchronous Sequential Circuit: Model Selection, State Transition Diagram, State Synthesis Table, Design Equations and Circuit Diagram, Implementation using Read Only Memory, Algorithmic State Machine, State Reduction Technique. Asynchronous Sequential Circuit: Analysis of Asynchronous Sequential Circuit, Problems with Asynchronous Sequential Circuits, Design of Asynchronous Sequential Circuit, FSM Implementation in HDL

**UNIT – 8 6 Hours**

**D/A Conversion and A/D Conversion:** Variable, Resistor Networks, Binary Ladders, D/A Converters, D/A Accuracy and Resolution, A/D Converter-Simultaneous Conversion, A/D Converter-Counter Method, Continuous A/D Conversion, A/D Techniques, Dual-slope A/D Conversion, A/D Accuracy and Resolution

**Text Book:**

1. Donald P Leach, Albert Paul Malvino & Goutam Saha: Digital Principles and Applications, 7th Edition, Tata McGraw Hill, 2010.

**Reference Books:**

1. Stephen Brown, Zvonko Vranesic: Fundamentals of Digital Logic Design with VHDL, 2nd Edition, Tata McGraw Hill, 2005.
2. R D Sudhaker Samuel: Illustrative Approach to Logic Design, Sanguine-Pearson, 2010.
3. Charles H. Roth: Fundamentals of Logic Design, Jr., 5th Edition, Cengage Learning, 2004.
4. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss: Digital Systems Principles and Applications, 10th Edition, Pearson Education, 2007.
5. M Morris Mano: Digital Logic and Computer Design, 10th Edition, Pearson Education, 2008.

**DISCRETE MATHEMATICAL STRUCTURES**

**Subject Code: 10CS34**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1 6 Hours**

**Set Theory:** Sets and Subsets, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, A First Word on Probability, Countable and Uncountable Sets

**UNIT – 2 7 Hours**

**Fundamentals of Logic:** Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference

**UNIT – 3 6 Hours**

**Fundamentals of Logic contd.:** The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems

**UNIT – 4 7 Hours**

**Properties of the Integers:** Mathematical Induction, The Well Ordering Principle – Mathematical Induction, Recursive Defin itions

**PART – B**

**UNIT – 5 7 Hours**

Relations and Functions: Cartesian Products and Relations, Functions – Plain and One-to-One, Onto Functions – Stirling Num bers of the Second Kind, Special Functions, The Pigeon-hole Principle, Function Composition and Inverse Functions

**UNIT – 6** **7 Hours**

**Relations *contd.*:** Properties of Relations, Computer Recognition – Ze ro-OneMatrices and Directed Graphs, Partial Orders – Hass e Diagrams, Equivalence Relations and Partitions

**UNIT – 7 6 Hours Groups:** Definitions, Examples, and Elementary Properties,

Homomorphisms, Isomorphisms, and Cyclic Groups, Cosets, and Lagrange’s Theorem.

**Coding Theory and Rings:** Elements of Coding Theory, The HammingMetric, The Parity Check, and Generator Matrices

8

**UNIT – 8**

**Group Codes:** Decoding with Coset Leaders, Hamming Matrices

**6 Hours**

**Rings and Modular Arithmetic:** The Ring Structure – Definition andExamples, Ring Properties and Substructures, The Integers Modulo n

**Text Book:**

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, , 5th Edition, Pearson Education, 2004.

(Chapter 3.1, 3.2, 3.3, 3.4, Appendix 3, Chapter 2, Chapter 4.1, 4.2, Chapter 5.1 to 5.6, Chapter 7.1 to 7.4, Chapter 16.1, 16.2, 16.3, 16.5 to 16.9, and Chapter 14.1, 14.2, 14.3).

**Reference Books:**

1. Kenneth H. Rosen: Discrete Mathematics and its Applications, 7th Edition, McGraw Hill, 2010.
2. Jayant Ganguly: A Treatise on Discrete Mathematical Structures, Sanguine-Pearson, 2010.
3. D.S. Malik and M.K. Sen: Discrete Mathematical Structures: Theory and Applications, Cengage Learning, 2004.
4. Thomas Koshy: Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.

**DATA STRUCTURES WITH C**

**(Common to CSE & ISE)**

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| **Subject Code: 10CS35** | **I.A. Marks : 25** |
| **Hours/Week : 04** | **Exam Hours: 03** |
| **Total Hours : 52** | **Exam Marks: 100** |
| **PART – A** |  |
| **UNIT - 1** | **8 Hours** |
| **BASIC CONCEPTS:** Pointers and Dynamic Memory Allocation, | |
| Algorithm Specification, Data Abstraction, Performance Analysis, | |
| Performance Measurement |  |
| **UNIT - 2** | **6 Hours** |

**ARRAYS and STRUCTURES:** Arrays, Dynamically Allocated Arrays,Structures and Unions, Polynomials, Sparse Matrices, Representation of Multidimensional Arrays

9

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| **UNIT - 3** | **6 Hours** |
| **STACKS AND QUEUES:** Stacks, Stacks Using Dynamic Arrays, Queues, | |
| Circular Queues Using Dynamic Arrays, Evaluation of Expressions, | |
| Multiple Stacks and Queues. |  |
| **UNIT - 4** | **6 Hours** |

**LINKED LISTS:** Singly Linked lists and Chains, Representing Chains inC, Linked Stacks and Queues, Polynomials, Additional List operations, Sparse Matrices, Doubly Linked Lists

**PART - B**

**UNIT - 5** **6 Hours**

**TREES – 1:** Introduction, Binary Trees, Binary Tree Traversals, ThreadedBinary Trees, Heaps.

**UNIT - 6**

**6 Hours**

**TREES – 2, GRAPHS:** Binary Search Trees, Selection Trees, Forests,

Representation of Disjoint Sets, Counting Binary Trees, The Graph Abstract

Data Type.

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| **UNIT - 7** | **6 Hours** |
| **PRIORITY QUEUES** Single- and Double-Ended Priority Queues, Leftist | |
| Trees, Binomial Heaps, Fibonacci Heaps, Pairing Heaps. |  |
| **UNIT - 8** | **8 Hours** |

**EFFICIENT BINARY SEARCH TREES:** Optimal Binary Search Trees,AVL Trees, Red-Black Trees, Splay Trees.

**Text Book:**

1. Horowitz, Sahni, Anderson-Freed: Fundamentals of Data Structures in C, 2nd Edition, Universities Press, 2007.

(Chapters 1, 2.1 to 2.6, 3, 4, 5.1 to 5.3, 5.5 to 5.11, 6.1, 9.1 to 9.5, 10)

**Reference Books:**

1. Yedidyah, Augenstein, Tannenbaum: Data Structures Using C and C++, 2nd Edition, Pearson Education, 2003.
2. Debasis Samanta: Classic Data Structures, 2nd Edition, PHI, 2009.
3. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Cengage Learning, 2005.

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1. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2007.

**OBJECT ORIENTED PROGRAMMING WITH C++**

**(Common to CSE & ISE)**

**Subject Code: 10CS36**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam** **Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT 1**

**6 Hours**

**Introduction:** Overview of C++, Sample C++ program, Different data types,operators, expressions, and statements, arrays and strings, pointers & user-defined types

Function Components, argument passing, inline functions, function overloading, recursive functions

**UNIT 2** **7 Hours**

**Classes & Objects – I:** Class Specification, Class Objects, Scope resolutionoperator, Access members, Defining member functions, Data hiding, Constructors, Destructors, Parameterized constructors, Static data members, Functions

**UNIT 3** **7 Hours**

**Classes & Objects –II:** Friend functions, Passing objects as arguments,Returning objects, Arrays of objects, Dynamic objects, Pointers to objects, Copy constructors, Generic functions and classes, Applications

Operator overloading using friend functions such as +, - , pre-increment, post-increment, [ ] etc., overloading <<, >>.

**UNIT 4** **6 Hours**

**Inheritance – I:** Base Class, Inheritance and protected members, Protectedbase class inheritance, Inheriting multiple base classes

**PART – B**

**UNIT 5 6 Hours Inheritance – II:** Constructors, Destructors and Inheritance, Passing

parameters to base class constructors, Granting access, Virtual base classes

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**UNIT 6** **7 Hours**

**Virtual functions, Polymorphism:** Virtual function, Calling a Virtualfunction through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.

**UNIT 7** **6 Hours**

**I/O System Basics, File I/0:** C++ stream classes, Formatted I/O, I/Omanipulators, fstream and the File classes, File operations

**UNIT 8** **7 Hours**

**Exception Handling, STL:** Exception handling fundamentals, Exceptionhandling options

STL: An overview, containers, vectors, lists, maps.

**Text Books:**

1. Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.

**Reference Books:**

1. Stanley B.Lippmann, Josee Lajore: C++ Primer, 4th Edition, Pearson Education, 2005.
2. Paul J Deitel, Harvey M Deitel: C++ for Programmers, Pearson Education, 2009.
3. K R Venugopal, Rajkumar Buyya, T Ravi Shankar: Mastering C++, Tata McGraw Hill, 1999.

**DATA STRUCTURES WITH C/C++ LABORATORY**

**(Common to CSE & ISE)**

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| --- | --- | --- |
| **Subject Code: 10CSL37** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

1. Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
2. Design, develop, and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of

12

single character operands and the binary operators + (plus), - (minus), \* (multiply) and / (divide).

1. Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), \* (multiply) and / (divide).
2. Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations:

a. Insert b. Delete c. Display

1. Design, develop, and execute a program in C++ based on the following requirements:

An EMPLOYEE class is to contain the following data members and member functions:

Data members: Employee\_Number (an integer), Employee\_Name (a string of characters), Basic\_Salary (an integer) , All\_Allowances (an integer), IT (an integer), Net\_Salary (an integer).

Member functions: to read the data of an employee, to calculate Net\_Salary and to print the values of all the data members. (All\_Allowances = 123% of Basic; Income Tax (IT) = 30% of the gross salary (= basic\_Salary \_ All\_Allowance); Net\_Salary = Basic\_Salary + All\_Allowances – IT)

1. Design, develop, and execute a program in C++ to create a class called STRING and implement the following operations. Display the results after every operation by overloading the operator <<.
   1. STRING s1 = “VTU”
   2. STRING s2 = “BELGAUM”
   3. STIRNG s3 = s1 + s2; (Use copy constructor)
2. Design, develop, and execute a program in C++ to create a class called STACK using an array of integers and to implement the following operations by overloading the operators + and - :
   1. s1=s1 + element; where s1 is an object of the class STACK and element is an integer to be pushed on to top of the stack.
   2. s1=s1- ; where s1 is an object of the class STACK and – operator pops off the top element.

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Handle the STACK Empty and STACK Full conditions. Also display the contents of the stack after each operation, by overloading the operator <<.

1. Design, develop, and execute a program in C++ to create a class called LIST (linked list) with member functions to insert an element at the front of the list as well as to delete an element from the front of the list. Demonstrate all the functions after creating a list object.
2. Design, develop, and execute a program in C to read a sparse matrix of integer values and to search the sparse matrix for an element specified by the user. Print the result of the search appropriately. Use the triple <row, column, value> to represent an element in the sparse matrix.
3. Design, develop, and execute a program in C to create a max heap of integers by accepting one element at a time and by inserting it immediately in to the heap. Use the array representation for the heap. Display the array at the end of insertion phase.
4. Design, develop, and execute a program in C to implement a doubly linked list where each node consists of integers. The program should support the following operations:
   1. Create a doubly linked list by adding each node at the front.
   2. Insert a new node to the left of the node whose key value is read as an input.
   3. Delete the node of a given data if it is found, otherwise

display appropriate message.

* 1. Display the contents of the list.

(Note: Only either (a,b and d) or (a, c and d) may be asked in the examination)

1. Design, develop, and execute a program in C++ to create a class called DATE with methods to accept two valid dates in the form dd/mm/yy and to implement the following operations by overloading the operators + and -. After every operation the results are to be displayed by overloading the operator <<.
   1. no\_of\_days = d1 – d2; where d1 and d2 are DATE obje cts, d1 >=d2 and no\_of\_days is an integer.
   2. d2 = d1 + no\_of\_days; where d1 is a DATE object and no\_of\_days is an integer.
2. Design, develop, and execute a program in C++ to create a class called OCTAL, which has the characteristics of an octal number.

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Implement the following operations by writing an appropriate constructor and an overloaded operator +.

1. OCTAL h = x ; where x is an integer
2. int y = h + k ; where h is an OCTAL object and k is an integer.

Display the OCTAL result by overloading the operator <<. Also display the values of h and y.

14. Design, develop, and execute a program in C++ to create a class

called BIN\_TREE that represents a Binary Tree, with member functions to perform inorder, preorder and postorder traversals. Create a BIN\_TREE object and demonstrate the traversals.

**Note: In the examination each student picks one question from**

**a lot of *all* the 14 questions.**

**ELECTRONIC CIRCUITS & LOGIC DESIGN LABORATORY (Common to CSE & ISE)**

**Subject Code: 10CSL38**

**Hours/Week : 03**

**Total Hours : 42**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks : 50**

**PART-A**

1. a) Design and construct a suitable circuit and demonstrate the working of positive clipper, double-ended clipper and positive clamper using diodes.
   1. Demonstrate the working of the above circuits using a simulation package.
2. a) Design and construct a suitable circuit and determine the frequency response, input impedance, output impedance, and bandwidth of a CE amplifier.
   1. Design and build the CE amplifier circuit using a simulation package and determine the voltage gain for two different values of supply voltage and for two different values of emitter resistance.
3. a) Design and construct a suitable circuit and determine the drain characteristics and transconductance characteristics of an enhancement-mode MOSFET.
   1. Design and build CMOS inverter using a simulation package and verify its truth table.

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1. a) Design and construct a Schmitt trigger using Op-Amp for given UTP and LTP values and demonstrate its working.
   1. Design and implement a Schmitt trigger using Op-Amp using a simulation package for two sets of UTP and LTP values and demonstrate its working.
2. a) Design and construct a rectangular waveform generator (Op-Amp relaxation oscillator) for given frequency and demonstrate its working.
   1. Design and implement a rectangular waveform generator (Op-Amp relaxation oscillator) using a simulation package and demonstrate the change in frequency when all resistor values are doubled.
3. Design and implement an astable multivibrator circuit using 555 timer for a given frequency and duty cycle.

**PART – B**

1. a) Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.
   1. Design and develop the Verilog /VHDL code for an 8:1 multiplexer. Simulate and verify its working.
2. a) Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth table.
   1. Design and develop the Verilog / VHDL code for D Flip-Flop with positive-edge triggering. Simulate and verify its working.
3. a) Design and implement a mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.
   1. Design and develop the Verilog / VHDL code for mod-8 up counter. Simulate and verify its working.
4. a) Design and implement a ring counter using 4-bit shift register

and demonstrate its working.

b) Design and develop the Verilog / VHDL code for switched tail counter. Simulate and verify its working.

1. Design and implement an asynchronous counter using decade counter IC to count up from 0 to n (n<=9) and demonstrate its working.

16

1. Design and construct a 4-bit R-2R ladder D/A converter using Op-Amp. Determine its accuracy and resolution.

**Notes:**

1. **In the examination, each student picks one question from**

**the lot of questions, either from Part-A or from Part-B. About half the students in the batch are to get a question from Part-A while the rest are to get the question from Part-B.**

1. **Any simulation package like MultiSim / Pspice etc may be used.**

**IV SEMESTER**

**ENGINEERING MATHEMATICS – IV**

**CODE: 10 MAT 41**

**Hrs/Week: 04**

**Total Hrs: 52**

**IA Marks: 25**

**Exam Hrs: 03**

**Exam Marks:100**

**PART-A**

**Unit-I: NUMERICAL METHODS - 1**

Numerical solution of ordinary differential equations of first order and first degree; Picard’s method, Taylor’s series method, mo dified Euler’s method, Runge-kutta method of fourth-order. Milne’s and Adams - Bashforth predictor and corrector methods (No derivations of formulae).

**[6 hours]**

**Unit-II: NUMERICAL METHODS – 2**

Numerical solution of simultaneous first order ordinary differential equations: Picard’s method, Runge-Kutta method of fourth-order.

Numerical solution of second order ordinary differential equations: Picard’s method, Runge-Kutta method and Milne’s method.

**[6 hours]**

**Unit-III: Complex variables – 1**

Function of a complex variable, Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties of analytic functions.

17

Application to flow problems- complex potential, velocity potential, equipotential lines, stream functions, stream lines.

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|  |  | **[7 hours]** | |
| **Unit-IV: Complex variables – 2** | |  |  |
|  |  |  |  |
| Conformal Transformations: Bilinear Transformations. | | Discussion | of |
| Transformations: *w* = *z* 2 , w = *e* *z* , *w* = *z* + (*a* 2 / *z*) . | | Complex | line |
| integrals- Cauchy’s theorem and Cauchy’s integral f ormula. | |  |  |
|  |  | **[7 hours]** | |

**PART-B**

**Unit-V: SPECIAL FUNCTIONS**

Solution of Laplace equation in cylindrical and spherical systems leading Bessel’s and Legendre’s differential equations, Ser ies solution of Bessel’s differential equation leading to Bessel function of first kind. Orthogonal property of Bessel functions. Series solution of Legendre’s differential equation leading to Legendre polynomials, Rodrigue’s formula.

**[7 hours]**

**Unit-VI: PROBABILITY THEORY - 1**

Probability of an event, empherical and axiomatic definition, probability associated with set theory, addition law, conditional probability, multiplication law, Baye’s theorem.

**[6 hours]**

**Unit-VII: PROBABILITY THEORY- 2**

Random variables (discrete and continuous), probability density function, cumulative density function. Probability distributions – Binomial and Poisson distributions; Exponential and normal distributions.

**[7 hours]**

**Unit-VIII: SAMPLING THEORY**

18

Sampling, Sampling distributions, standard error, test of hypothesis for means, confidence limits for means, student’s t-distribution. Chi -Square distribution as a test of goodness of fit

**[6 hours]**

**Text Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

**Reference Book:**

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. Peter V. O’Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers

**GRAPH THEORY AND COMBINATORICS**

**(Common to CSE & ISE)**

**Subject Code: 10CS42**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam** **Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT - 1** **7 Hours**

**Introduction to Graph Theory:** Definitions and Examples, Subgraphs,Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits

19

**UNIT – 2** **6 Hours**

**Introduction to Graph Theory *contd*.:** Planar Graphs, Hamilton Paths andCycles, Graph Colouring, and Chromatic Polynomials

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| **UNIT - 3** | **6 Hours** |
| **Trees:** Definitions, Properties, and Examples, Routed Trees, Trees and | |
| Sorting, Weighted Trees and Prefix Codes |  |
| **UNIT - 4** | **7 Hours** |

**Optimization and Matching:** Dijkstra’s Shortest Path Algorithm, MinimalSpanning Trees – The algorithms of Kruskal and Prim , Transport Networks – Max-flow, Min-cut Theorem, Matching Theory

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| **PART – B** |  |
| **UNIT - 5** | **6 Hours** |
| **Fundamental Principles of Counting:** The Rules of Sum and Product, | |
| Permutations, Combinations – The Binomial Theorem, | Combinations with |
| Repetition, The Catalon Numbers |  |
| **UNIT - 6** | **6 Hours** |

**The Principle of Inclusion and Exclusion:** The Principle of Inclusion andExclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials

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| **UNIT - 7** | **7 Hours** |
| **Generating Functions:** Introductory Examples, Definition and Examples – | |
| Calculational Techniques, Partitions of Integers, the Exponential Generating | |
| Function, the Summation Operator |  |
| **UNIT - 8** | **7 Hours** |

**Recurrence Relations:** First Order Linear Recurrence Relation, The SecondOrder Linear Homogeneous Recurrence Relation with Constant Coefficients, The Non-homogeneous Recurrence Relation, The Method of Generating Functions

**Text Book:**

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2004.

(Chapter 11, Chapter 12.1 to 12.4, Chapter 13, Chapter 1, Chapter 8.1 to 8.4, Chapter 9 Chapter 10.1 to 10.4).

**Reference Books:**

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1. D.S. Chandrasekharaiah: Graph Theory and Combinatorics, Prism, 2005.
2. Chartrand Zhang: Introduction to Graph Theory, TMH, 2006.
3. Richard A. Brualdi: Introductory Combinatorics, 4th Edition, Pearson Education, 2004.
4. Geir Agnarsson & Raymond Geenlaw: Graph Theory, Pearson Education, 2007.

**DESIGN AND ANALYSIS OF ALGORITHMS**

**(Common to CSE & ISE)**

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| **Subject Code: 10CS43** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

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| **PART – A** |  |
| **UNIT – 1** | **7 Hours** |
| **INTRODUCTION:** Notion of Algorithm, Review of Asymptotic Notations, | |
| Mathematical Analysis of Non-Recursive and Recursive Algorithms |  |
| Brute Force Approaches: Introduction, Selection Sort and Bubble Sort, | |
| Sequential Search and Brute Force String Matching. |  |
| **UNIT - 2** | **6 Hours** |
| **DIVIDE AND CONQUER:** Divide and Conquer: General | Method, |

Defective Chess Board, Binary Search, Merge Sort, Quick Sort and its performance.

**UNIT - 3 7 Hours THE GREEDY METHOD:** The General Method, Knapsack Problem, Job

Sequencing with Deadlines, Minimum-Cost Spanning Trees: Prim’s Algorithm, Kruskal’s Algorithm; Single Source Shortest Paths.

**UNIT - 4 6 Hours DYNAMIC PROGRAMMING:** The General Method, Warshall’s

Algorithm, Floyd’s Algorithm for the All-Pairs Shortest Paths Problem, Single-Source Shortest Paths: General Weights, 0/1 Knapsack, The Traveling Salesperson problem.

**PART – B**

**UNIT - 5**

**7 Hours**

21

**DECREASE-AND-CONQUER APPROACHES, SPACE-TIME TRADEOFFS:** Decrease-and-Conquer Approaches: Introduction, InsertionSort, Depth First Search and Breadth First Search, Topological Sorting Space-Time Tradeoffs: Introduction, Sorting by Counting, Input Enhancement in String Matching.

**UNIT – 6** **7 Hours**

**LIMITATIONS OF ALGORITHMIC POWER AND COPING WITH THEM:** Lower-Bound Arguments, Decision Trees, P, NP, and NP-CompleteProblems, Challenges of Numerical Algorithms.

**UNIT - 7** **6 Hours**

**COPING WITH LIMITATIONS OF ALGORITHMIC POWER:** Backtracking: n - Queens problem, Hamiltonian Circuit Problem, Subset – Sum Problem.

Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesperson Problem.

Approximation Algorithms for NP-Hard Problems – Tra veling Salesperson Problem, Knapsack Problem

**UNIT – 8** **6 Hours**

**PRAM ALGORITHMS:** Introduction, Computational Model, ParallelAlgorithms for Prefix Computation, List Ranking, and Graph Problems,

**Text Books:**

1. Anany Levitin: Introduction to The Design & Analysis of Algorithms, 2nd Edition, Pearson Education, 2007.

(Listed topics only from the Chapters 1, 2, 3, 5, 7, 8, 10, 11).

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, Universities Press, 2007.

(Listed topics only from the Chapters 3, 4, 5, 13)

**Reference Books:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 3rd Edition, PHI, 2010.
2. R.C.T. Lee, S.S. Tseng, R.C. Chang & Y.T.Tsai: Introduction to the Design and Analysis of Algorithms A Strategic Approach, Tata McGraw Hill, 2005.

**UNIX AND SHELL PROGRAMMING**

**(Common to CSE & ISE)**

22

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| --- | --- | --- |
| **Subject Code: 10CS44** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART – A**

**UNIT – 1** **6 Hours**

The Unix Operating System, The UNIX architecture and Command Usage,

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| The File System |  |
| **UNIT - 2** | **6 Hours** |
| Basic File Attributes, the vi Editor |  |
| **UNIT – 3** | **7 Hours** |
| The Shell, The Process, Customizing the environment |  |
| **UNIT - 4** | **7 Hours** |
| More file attributes, Simple filters |  |
| **PART – B** |  |
| **UNIT – 5** | **6 Hours** |
| Filters using regular expressions, |  |
| **UNIT – 6** | **6 Hours** |
| Essential Shell Programming |  |
| **UNIT - 7** | **7 Hours** |
| awk – An Advanced Filter |  |
| **UNIT - 8** | **7 Hours** |
| perl - The Master Manipulator |  |

**Text Book:**

1. Sumitabha Das: UNIX – Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.

(Chapters 1.2, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19)

**Reference Books:**

1. Behrouz A. Forouzan and Richard F. Gilberg: UNIX and Shell Programming**,** Cengage Learning, 2005.
2. M.G. Venkateshmurthy: UNIX & Shell Programming**,** Pearson Education, 2005.

**MICROPROCESSORS**

23

(**Common to CSE & ISE)**

**Subject Code: 10CS45**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

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| **PART A** |  |
| **UNIT – I** | **7 Hours** |
| **Introduction, Microprocessor Architecture – 1:** A Historical Background, | |
| The Microprocessor-Based Personal Computer Systems. |  |
| The Microprocessor and its Architecture: Internal | Microprocessor |
| Architecture, Real Mode Memory Addressing. |  |
| **UNIT – 2** | **7 Hours** |

**Microprocessor Architecture – 2, Addressing Modes:** Introduction toProtected Mode Memory Addressing, Memory Paging, Flat Mode Memory Addressing Modes: Data Addressing Modes, Program Memory Addressing Modes, Stack Memory Addressing Modes

**UNIT – 3 6 Hours Programming – 1:** Data Movement Instructions: MOV Revisited,

PUSH/POP, Load-Effective Address, String Data Transfers, Miscellaneous Data Transfer Instructions, Segment Override Prefix, Assembler Details. Arithmetic and Logic Instructions: Addition, Subtraction and Comparison, Multiplication and Division.

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| **UNIT - 4** | **6 Hours** |
| **Programming – 2:** Arithmetic and Logic Instructions (continued): BCD and | |
| ASCII Arithmetic, Basic Logic Instructions, Shift and Rotate, String | |
| Comparisons. |  |
| Program Control Instructions: The Jump Group, Controlling the Flow of the | |

Program, Procedures, Introduction to Interrupts, Machine Control and Miscellaneous Instructions.

**PART B**

**UNIT - 5** **6 Hours**

**Programming – 3:** Combining Assembly Language with C/C++: UsingAssembly Language with C/C++ for 16-Bit DOS Applications and 32-Bit Applications

Modular Programming, Using the Keyboard and Video Display, Data Conversions, Example Programs

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| **UNIT - 6** | **7 Hours** |
| **Hardware Specifications, Memory Interface – 1:** Pin-Outs and the Pin | |
| Functions, Clock Generator, Bus Buffering and | Latching, Bus Timings, |

Ready and Wait State, Minimum versus Maximum Mode.

Memory Interfacing: Memory Devices

**UNIT – 7 6 Hours Memory Interface – 2, I/O Interface – 1:** Memory Interfacing (continued):

Address Decoding, 8088 Memory Interface, 8086 Memory Interface.

Basic I/O Interface: Introduction to I/O Interface, I/O Port Address Decoding.

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| **UNIT 8** | **7 Hours** |
| **I/O Interface – 2, Interrupts, and** | **DMA:** I/O Interface (continued): The |
| Programmable Peripheral Interface | 82C55, Programmable Interval Timer |

8254.

Interrupts: Basic Interrupt Processing, Hardware Interrupts: INTR and

INTA/; Direct Memory Access: Basic DMA Operation and Definition.

**Text Book:**

1. Barry B Brey: The Intel Microprocessors, 8th Edition, Pearson Education, 2009.

(Listed topics only from the Chapters 1 to 13)

**Reference Books:**

1. Douglas V. Hall: Microprocessors and Interfacing, Revised 2nd Edition, TMH, 2006.
2. K. Udaya Kumar & B.S. Umashankar : Advanced Microprocessors & IBM-PC Assembly Language Programming, TMH 2003.
3. James L. Antonakos: The Intel Microprocessor Family: Hardware and Software Principles and Applications, Cengage Learning, 2007.

**COMPUTER ORGANIZATION**

**(Common to CSE & ISE)**

**Subject Code: 10CS46**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam** **Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT - 1** **6 Hours**

**Basic Structure of Computers:** Computer Types, Functional Units, BasicOperational Concepts, Bus Structures, Performance – Processor Clock, Basic

25

Performance Equation, Clock Rate, Performance Measurement, Historical Perspective

**Machine Instructions and Programs:** Numbers, Arithmetic Operations andCharacters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing,

**UNIT - 2** **7 Hours**

**Machine Instructions and Programs *contd*.:** Addressing Modes, AssemblyLanguage, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions

**UNIT - 3** **6 Hours**

I**nput/Output Organization:** Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses

**UNIT - 4** **7 Hours**

**Input/Output Organization *contd*.:** Interface Circuits, Standard I/OInterfaces – PCI Bus, SCSI Bus, USB

**PART – B**

**UNIT - 5** **7 Hours**

**Memory System:** Basic Concepts, Semiconductor RAM Memories, ReadOnly Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage

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| **UNIT - 6** | **7 Hours** |
| **Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast | |
| Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, | |
| Fast Multiplication, Integer Division, Floating-point Numbers and Operations | |
| **UNIT - 7** | **6 Hours** |
| **Basic Processing Unit:** Some Fundamental Concepts, Execution of a | |
| Complete Instruction, Multiple Bus Organization, Hard-wired Control, | |
| Microprogrammed Control |  |
| **UNIT - 8** | **6 Hours** |

**Multicores, Multiprocessors, and Clusters:** Performance, The Power Wall,The Switch from Uniprocessors to Multiprocessors, Amdahl’s Law, Shared Memory Multiprocessors, Clusters and other Message Passing Multiprocessors, Hardware Multithreading, SISD, IMD, SIMD, SPMD, and Vector.

**Text Books:**

26

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

(Listed topics only from Chapters 1, 2, 4, 5, 6, 7)

1. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edit ion, 4th Edition, Elsevier, 2009.

(Listed topics only)

**Reference Books:**

1. William Stallings: Computer Organization & Architecture, 7th Edition, PHI, 2006.
2. Vincent P. Heuring & Harry F. Jordan: Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2004.

**DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY**

**(Common to CSE & ISE)**

|  |  |  |
| --- | --- | --- |
| **Subject Code: 10CSL47** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

**Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.**

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.

The elements can be read from a file or can be generated using the random number generator.

1. Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. a. Obtain the Topological ordering of vertices in a given digraph.

b. Compute the transitive closure of a given directed graph using Warshall's algorithm.

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4. Implement 0/1 Knapsack problem using Dynamic Programming.

1. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
2. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
3. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.

b. Check whether a given graph is connected or not using DFS method.

1. Find a subset of a given set S = {sl, s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.
2. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
3. Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.
4. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved.
5. Implement N Queen's problem using Back Tracking.

**Note: In the examination *each* student picks one question from the lot of *all* 12 questions.**

**MICROPROCESSORS LABORATORY**

**(Common to CSE & ISE)**

|  |  |  |
| --- | --- | --- |
| **Subject Code : 10CSL48** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

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**Notes:**

* + **Develop and execute the following programs using 8086 Assembly Language. Any suitable assembler like MASM, TASM etc may be used.**
  + **Program should have suitable comments.**
  + **The board layout and the circuit diagram of the interface are to be provided to the student during the examination.**

1. a) Search a key element in a list of ‘n’ 16-bit num bers using the
   1. Read the status of eight input bits from the Logic Controller Interface and display ‘FF’ if it is the parity of t he input read is even; otherwise display 00.
2. a) Write two ALP modules stored in two different files; one module is to read a character from the keyboard and the other one is to display a character. Use the above two modules to read a string of characters from the keyboard terminated by the carriage return and print the string on the display in the next line.
   1. Implement a BCD Up-Down Counter on the Logic Controller Interface.
3. a) Sort a given set of ‘n’ numbers in ascending ord er using the Bubble Sort algorithm.
   1. Read the status of two 8-bit inputs (X & Y) from the Logic Controller Interface and display X\*Y.
4. a) Read an alphanumeric character and display its equivalent ASCII code at the center of the screen.
   1. Display messages FIRE and HELP alternately with flickering effects on a 7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read both the messages (Examiner does not specify these delay values nor is it necessary for the student to compute these values).
5. a) Reverse a given string and check whether it is a palindrome or not.
   1. Assume any suitable message of 12 characters length and display it in the rolling fashion on a 7-segment display interface for a

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suitable period of time. Ensure a flashing rate that makes it easy to read both the messages. (Examiner does not specify these delay values nor is it necessary for the student to compute these values).

1. a) Read two strings, store them in locations STR1 and STR2. Check whether they are equal or not and display appropriate messages. Also display the length of the stored strings.
   1. Convert a 16-bit binary value (assumed to be an unsigned integer) to BCD and display it from left to right and right to left for specified number of times on a 7-segment display interface.
2. a) Read your name from the keyboard and display it at a specified location on the screen after the message “ **What is your name?”** You must clear the entire screen before display.
   1. Scan a 8 x 3 keypad for key closure and to store the code of the key pressed in a memory location or display on screen. Also display row and column numbers of the key pressed.
3. a) Compute **nCr** using recursive procedure. Assume that ‘n’ and ‘r’ are non-negative integers.
   1. Drive a Stepper Motor interface to rotate the motor in specified direction (clockwise or counter-clockwise) by N steps (Direction and N are specified by the examiner). Introduce suitable delay between successive steps. (Any arbitrary value for the delay may be assumed by the student).
4. a) Read the current time from the system and display it in the standard format on the screen.
   1. Generate the Sine Wave using DAC interface (The output of the DAC is to be displayed on the CRO).
5. a) Write a program to simulate a Decimal Up-counter to display 00-99.
   1. Generate a Half Rectified Sine wave form using the DAC interface. (The output of the DAC is to be displayed on the CRO).
6. a) Read a pair of input co-ordinates in BCD and move the cursor to the specified location on the screen.
   1. Generate a Fully Rectified Sine waveform using the DAC interface. (The output of the DAC is to be displayed on the CRO).
7. a) Write a program to create a file (input file) and to delete an existing file.

30

1. Drive an elevator interface in the following way:
   1. Initially the elevator should be in the ground floor, with all requests in OFF state.
   2. When a request is made from a floor, the elevator should move to that floor, wait there for a couple of seconds (approximately), and then come down to ground floor and stop. If some requests occur during going up or coming down they should be ignored.

**Note: In the examination *each* student picks one question from the lot of *all* 12 questions.**

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**V SEMESTER**

**SOFTWARE ENGINEERING**

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| **Subject Code: 10IS51** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART – A**

**UNIT – 1** **6 Hours**

**Overview:** Introduction: FAQ's about software engineering, Professional andethical responsibility.

Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems.

**UNIT – 2** **6 Hours**

**Critical Systems, Software Processes:** Critical Systems: A simple safety-critical system; System dependability; Availability and reliability.

Software Processes: Models, Process iteration, Process activities; The Rational Unified Process; Computer Aided Software Engineering.

**UNIT – 3 7 Hours Requirements:** Software Requirements: Functional and Non-functional

requirements; User requirements; System requirements; Interface specification; The software requirements document.

Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

**UNIT – 4** **7 Hours**

**System models, Project Management:** System Models: Context models;Behavioral models; Data models; Object models; Structured methods. Project Management: Management activities; Project planning; Project scheduling; Risk management

**PART - B**

**UNIT – 5** **7 Hours**

**Software Design:** Architectural Design: Architectural design decisions;System organization; Modular decomposition styles; Control styles.

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Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution.

**UNIT – 6** **6 Hours**

**Development:** Rapid Software Development: Agile methods; Extremeprogramming; Rapid application development.

Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution.

**UNIT – 7**

**Verification and** **Validation:**

Verification and Validation:

**7 Hours**

Planning;

Software inspections; Automated static analysis; Verification and formal methods.

Software testing: System testing; Component testing; Test case design; Test automation.

**UNIT – 8**

**Management:** Managing People: Selecting staff; Motivating

**6 Hours**

people;

Managing people; The People Capability Maturity Model.

Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing.

**Text Books:**

1. Ian Sommerville: Software Engineering, 8th Edition, Pearson Education, 2007.

(Chapters-: 1, 2, 3, 4, 5, 6, 7, 8, 11, 14, 17, 21, 22, 23, 25, 26)

**Reference Books:**

1. Roger.S.Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill, 2007.
2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India, 2009.

**SYSTEM SOFTWARE**

|  |  |  |
| --- | --- | --- |
| **Subject Code: 10CS52** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART – A**

**UNIT – 1 6 Hours Machine Architecture:** Introduction, System Software and Machine

Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples.

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**UNIT – 2 6 Hours Assemblers -1:** Basic Assembler Function - A Simple SIC Assembler,

Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation.

**UNIT – 3 6 Hours Assemblers -2:** Machine Independent Assembler Features – Literals,

Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations - One-Pass Assembler, Multi-Pass Assembler, Implementation Examples - MASM Assembler.

**UNIT – 4** **8 Hours**

**Loaders and Linkers:** Basic Loader Functions - Design of an AbsoluteLoader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader; Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples - MS-DOS Linker.

**PART – B**

**UNIT – 5 6 Hours Editors and Debugging Systems:** Text Editors - Overview of Editing

Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities, Relationship With Other Parts Of The System, User-Interface Criteria

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| **UNIT – 6** | **8 Hours** |
| **Macro Processor:** Basic Macro Processor Functions - Macro Definitions and | |
| Expansion, Macro Processor Algorithm and Data Structures, Machine- | |
| Independent Macro Processor Features - Concatenation of Macro Parameters, | |
| Generation of Unique | Labels, Conditional Macro Expansion, Keyword |

Macro Parameters, Macro Processor Design Options - Recursive Macro Expansion, General-Purpose Macro Processors, Macro Processing Within Language Translators, Implementation Examples - MASM Macro Processor, ANSI C Macro Processor.

**UNIT – 7** **6 Hours**

**Lex and Yacc – 1:** Lex and Yacc - The Simplest Lex Program, RecognizingWords With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running

34

LEX and YACC, LEX and Hand- Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line.

**UNIT – 8** **6 Hours**

**Lex and Yacc - 2 :** Using YACC – Grammars, Recursive Rules, Shift/Reduc eParsing, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, Variables and Typed Tokens.

**Text Books:**

1. Leland.L.Beck: System Software, 3rd Edition, Pearson Education, 1997.

(Chapters 1.1 to 1.3, 2 (except 2.5.2 and 2.5.3), 3 (except 3.5.2 and 3.5.3), 4 (except 4.4.3))

1. John.R.Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD, 1998.

(Chapters 1, 2 (Page 2-42), 3 (Page 51-65))

**Reference Books:**

1. D.M.Dhamdhere: System Programming and Operating Systems, 2nd Edition, Tata McGraw - Hill, 1999.

**OPERATING SYSTEMS**

|  |  |  |
| --- | --- | --- |
| **Subject Code: 10CS53** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART – A**

**UNIT – 1** **6 Hours**

**Introduction to Operating Systems, System structures:** What operatingsystems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments.Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.

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**UNIT – 2** **7 Hours**

**Process Management:** Process concept; Process scheduling; Operations onprocesses; Inter-process communication. Multi-Threaded Programming:

Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling.

**UNIT – 3** **7 Hours**

**Process Synchronization :** Synchronization: The Critical section problem;Peterson’s solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

**UNIT – 4** **6 Hours**

**Deadlocks:** Deadlocks: System model; Deadlock characterization; Methodsfor handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

**PART – B**

**UNIT – 5 7 Hours Memory Management:** Memory Management Strategies: Background;

Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

**UNIT – 6** **7 Hours**

**File System, Implementation of File System:** File System: File concept;Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management

**UNIT – 7** **6 Hours**

**Secondary Storage Structures, Protection :** Mass storage structures; Diskstructure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems.

**UNIT – 8** **6 Hours**

**Case Study: The Linux Operating System:** Linux history; Designprinciples; Kernel modules; Process management; Scheduling; Memory management; File systems, Input and output; Inter-process communication.

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**Text Books**:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 8th edition, Wiley India, 2009.

(Listed topics only from Chapters 1 to 12, 17, 21)

**Reference Books:**

1. D.M Dhamdhere: Operating systems - A concept based Approach, 2nd Edition, Tata McGraw- Hill, 2002.
2. P.C.P. Bhatt: Introduction to Operating Systems: Concepts and Practice, 2nd Edition, PHI, 2008.
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 1990.

**DATABASE MANAGEMENT SYSTEMS**

|  |  |  |
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| **Subject Code: 10CS54** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART - A**

**UNIT – 1** **6 Hours**

**Introduction:** Introduction; An example; Characteristics of Databaseapproach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS.

Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

**UNIT – 2** **6 Hours**

**Entity-Relationship Model:** Using High-Level Conceptual Data Models forDatabase Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

**UNIT – 3 8 Hours Relational Model and Relational Algebra :** Relational Model Concepts;

Relational Model Constraints and Relational Database Schemas; Update 37

Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

**UNIT – 4** **6 Hours**

**SQL – 1:** SQL Data Definition and Data Types; Specifying basic constraintsin SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries.

**PART - B**

**UNIT – 5 6 Hours SQL – 2 :** Insert, Delete and Update statements in SQL; Specifying

constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM.

**UNIT – 6** **6 Hours**

**Database Design – 1:** Informal Design Guidelines for Relation Schemas;Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form

**UNIT – 7** **6 Hours**

**Database Design -2:** Properties of Relational Decompositions; Algorithmsfor Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms

**UNIT – 8** **8 Hours**

**Transaction Management:** The ACID Properties; Transactions andSchedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write-ahead log protocol; Checkpointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

**Text Books:**

1. Elmasri and Navathe: Fundamentals of Database Systems, 5th Edition, Pearson Education, 2007.

38

(Chapters 1, 2, 3 except 3.8, 5, 6.1 to 6.5, 7.1, 8, 9.1, 9.2 except SQLJ, 9.4, 10)

1. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003. (Chapters 16, 17.1, 17.2, 18)

**Reference Books:**

1. Silberschatz, Korth and Sudharshan: Data base System Concepts, 6th Edition, Mc-GrawHill, 2010.
2. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson Education, 2006.

**COMPUTER NETWORKS - I**

**Subject Code: 10CS55**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT - 1**

**7 Hours**

**Introduction:** Data Communications, Networks, The Internet, Protocols &Standards, Layered Tasks,

The OSI model, Layers in OSI model, TCP/IP Protocol suite, Addressing

**UNIT- 2** **7 Hours**

**Physical Layer-1:** Analog & Digital Signals, Transmission Impairment, DataRate limits, Performance, Digital-digital conversion (Only Line coding: Polar, Bipolar and Manchester coding), Analog-to-digital conversion (only PCM), Transmission Modes, Digital-to-analog conversion

**UNIT- 3** **6 Hours**

**Physical Layer-2 and Switching:** Multiplexing, Spread Spectrum,Introduction to switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks

**UNIT- 4** **6 Hours**

**Data Link Layer-1:** Error Detection & Correction: Introduction, Blockcoding, Linear block codes, Cyclic codes, Checksum.

**PART - B**

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**UNIT- 5** **6 Hours**

**Data Link Layer-2:** Framing, Flow and Error Control, Protocols, NoiselessChannels, Noisy channels, HDLC, PPP (Framing, Transition phases only)

**UNIT- 6** **7 Hours**

**Multiple Access & Ethernet:** Random access, Controlled Access,

Channelization, Ethernet: IEEE standards, Standard

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| Ethernet, Changes in the standard, Fast Ethernet, Gigabit Ethernet |  |
| **UNIT - 7** | **6 Hours** |
| **Wireless LANs and Cellular Networks:** Introduction, IEEE 802.11, | |
| Bluetooth, Connecting devices, Cellular Telephony |  |
| **UNIT - 8:** | **7 Hours** |

**Network Layer:** Introduction, Logical addressing, IPv4 addresses, IPv6addresses, Internetworking basics,

IPv4, IPv6, Comparison of IPv4 and IPv6 Headers.

**Text Books:**

1. Behrouz A. Forouzan,: Data Communication and Networking, 4th Edition Tata McGraw-Hill, 2006.

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| --- | --- | --- | --- |
| (Chapters 1.1 to 1.4, | 2.1 to 2.5, 3.1 To 3.6, 4.1 to 4.3, | 5.1, 6.1, 6.2, | 8.1 |
| to 8.3, 10.1 to 10.5, | 11.1 to 11.7, 12.1 to 12.3, 13.1 to | 13.5, 14.1, | 14.2, |

15.1, 16.1, 19.1, 19.2, 20.1 to 20.3)

**Reference Books:**

1. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental Concepts and Key architectures, 2nd Edition Tata McGraw-Hill, 2004.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
4. Nader F. Mir: Computer and Communication Networks, Pearson Education, 2007.

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**FORMAL LANGUAGES AND AUTOMATA THEORY**

**Subject Code: 10CS56** **I.A. Marks** **: 25**

**Hours/Week : 04** **Exam** **Hours: 03**

**Total Hours : 52** **Exam Marks: 100**

**PART - A**

**UNIT – 1** **7 Hours**

**Introduction to Finite Automata:** Introduction to Finite Automata; Thecentral concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata

**UNIT – 2** **7 Hours**

**Finite Automata, Regular Expressions:** An application of finite automata;Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions

**UNIT – 3 6 Hours Regular Languages, Properties of Regular Languages:** Regular

languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata

**UNIT – 4** **6 Hours**

**Context-Free Grammars And Languages :** Context –free grammars; Parsetrees; Applications; Ambiguity in grammars and Languages .

**PART – B**

**UNIT – 5** **7 Hours**

**Pushdown Automata:** Definition of the Pushdown automata; the languagesof a PDA; Equivalence of PDA’s and CFG’s; Determi nistic Pushdown Automata

**UNIT – 6** **6 Hours**

**Properties of Context-Free Languages:** Normal forms for CFGs; Thepumping lemma for CFGs; Closure properties of CFLs

**UNIT – 7** **7 Hours**

**Introduction To Turing Machine:** Problems that Computers cannot solve;The turning machine; Programming techniques for Turning Machines;

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Extensions to the basic Turning Machines; Turing Machine and Computers.

**UNIT – 8** **6 Hours**

**Undecidability:** A Language that is not recursively enumerable; AnUndecidable problem that is RE; Post’s Correspondence problem; Other undecidable problems.

**Text Books:**

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, 2007.

(Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6, 7, 8.1 to 8.4, 8.6, 9.1, 9.2, 9.4.1, 9.5)

**Reference Books:**

1. K.L.P. Mishra: Theory of Computer Science, Automata, Languages, and Computation, 3rd Edition, PHI Learning, 2009.
2. Raymond Greenlaw, H.James Hoover: Fundamentals of the Theory of Computation, Principles and Practice, Elsevier, 1998.
3. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007.
4. Thomas A. Sudkamp: An Introduction to the Theory of Computer Science, Languages and Machines, 3rd Edition, Pearson Education, 2006.

**DATABASE APPLICATIONS LABORATORY**

|  |  |  |
| --- | --- | --- |
| **Subject Code: 10CSL57** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

1. Consider the following relations:

Student (*snum:* integer, *sname:* string, *major:* string, *level:* string,

*age:* integer)

Class (*name:* string, *meets at:* string, *room:* string, *d:* integer)

Enrolled (*snum:* integer, *cname:* string)

Faculty (fi*d*: integer, *fname:* string, *deptid:* integer)

The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class. Level is a two character code with 4 different values (example: Junior: JR etc)

Write the following queries in SQL. No duplicates should be printed in any of the answers.

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* 1. Find the names of all Juniors (level = JR) who are enrolled in a class taught by Prof. Harshith
  2. Find the names of all classes that either meet in room R128 or have five or more Students enrolled.
  3. Find the names of all students who are enrolled in two classes that meet at the same time.
  4. Find the names of faculty members who teach in every room in which some class is taught.
  5. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.

1. The following relations keep track of airline flight information:

Flights (*no:* integer, *from:* string, *to:* string, *distance:* integer,

*Departs:* time, *arrives:* time, *price:* real)

Aircraft (*aid:* integer, *aname:* string, *cruisingrange:* integer)

Certified (*eid:* integer, *aid:* integer)

Employees (*eid:* integer, *ename:* string, *salary:* integer)

Note that the Employees relation describes pilots and other kinds of

employees as well; Every pilot is certified for some aircraft, and only pilots are certified to fly.

Write each of the following queries in SQL.

* 1. Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80, 000.
  2. For each pilot who is certified for more than three aircrafts, find the *eid* and the maximum *cruisingrange* of the aircraft for which she or he is certified.
  3. Find the names of pilots whose *salary* is less than the price of the cheapest route from Bengaluru to Frankfurt.
  4. For all aircraft with *cruisingrange* over 1000 Kms, .find the name of the aircraft and the average salary of all pilots certified for this aircraft.
  5. Find the names of pilots certified for some Boeing aircraft.
  6. Find the *aid*s of all aircraft that can be used on routes from Bengaluru to New Delhi.

1. Consider the following database of student enrollment in courses & books adopted for each course.

STUDENT (regno: string, name: string, major: string, bdate:date) COURSE (course #:int, cname:string, dept:string)

ENROLL ( regno:string, course#:int, sem:int, marks:int) BOOK \_ ADOPTION (course# :int, sem:int, book-ISBN:int)

TEXT (book-ISBN:int, book-title:string, publisher:string, author:string)

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* 1. Create the above tables by properly specifying the primary keys and the foreign keys.
  2. Enter at least five tuples for each relation.
  3. Demonstrate how you add a new text book to the database and make this book be adopted by some department.
  4. Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for courses offered by the ‘CS’ department that use more than two books.
  5. List any department that has *all* its adopted books published by a specific publisher.
  6. Generate suitable reports.
  7. Create suitable front end for querying and displaying the results.

1. The following tables are maintained by a book dealer.

AUTHOR (author-id:int, name:string, city:string, country:string)

PUBLISHER (publisher-id:int, name:string, city:string, country:string)

CATALOG (book-id:int, title:string, author-id:int, publisher-id:int, category-id:int, year:int, price:int)

CATEGORY (category-id:int, description:string)

ORDER-DETAILS (order-no:int, book-id:int, quantity:int)

* 1. Create the above tables by properly specifying the primary keys and the foreign keys.
  2. Enter at least five tuples for each relation.
  3. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
  4. Find the author of the book which has maximum sales.
  5. Demonstrate how you increase the price of books published by a specific publisher by 10%.
  6. Generate suitable reports.
  7. Create suitable front end for querying and displaying the results.

1. Consider the following database for a banking enterprise

BRANCH(branch-name:string, branch-city:string, assets:real)

ACCOUNT(accno:int, branch-name:string, balance:real)

DEPOSITOR(customer-name:string, accno:int)

CUSTOMER(customer-name:string, customer-street:string, customer-city:string)

LOAN(loan-number:int, branch-name:string, amount:real)

BORROWER(customer-name:string, loan-number:int)

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1. Create the above tables by properly specifying the primary keys and the foreign keys
2. Enter at least five tuples for each relation
3. Find all the customers who have at least two accounts at the *Main* branch.
4. Find all the customers who have an account at *all* the branches located in a specific city.
5. Demonstrate how you delete all account tuples at every branch located in a specific city.
6. Generate suitable reports.
7. Create suitable front end for querying and displaying the results.

**Instructions:**

1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Front end may be created using either VB or VAJ or any other similar tool.
4. The student need not create the front end in the examination. The results of the queries may be displayed directly.
5. Relevant queries other than the ones listed along with the exercises may also be asked in the examination.
6. Questions must be asked based on lots.

**SYSTEM SOFTWARE & OPERATING SYSTEMS**

**LABORATORY**

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| --- | --- | --- |
| **Subject Code: 10CSL58** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

**PART - A**

**LEX and YACC Programs:**

Design, develop, and execute the following programs using LEX:

1. a) Program to count the number of characters, words, spaces and

lines in a given input file.

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b) Program to count the numbers of comment lines in a given C program. Also eliminate them and copy the resulting program into separate file.

1. a) Program to recognize a valid arithmetic expression and to recognize the identifiers and operators present. Print them separately.
   1. Program to recognize whether a given sentence is simple or compound.
2. Program to recognize and count the number of identifiers in a given input file.

Design, develop, and execute the following programs using YACC:

1. a) Program to recognize a valid arithmetic expression that uses operators +, -, \* and /.
   1. Program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.
2. a) Program to evaluate an arithmetic expression involving operators +, -, \* and /.
   1. Program to recognize strings ‘aaab’, ‘abbb’, ‘ab ’ and ‘a’ using the grammar (anbn, n>= 0).
3. Program to recognize the grammar (anb, n>= 10).

**PART B**

**UNIX Programming:**

Design, develop, and execute the following programs:

1. a) Non-recursive shell script that accepts any number of

arguments and prints them in the Reverse order, ( For example, if the script is named rargs, then executing rargs A B C should produce C B A on the standard output).

b) C program that creates a child process to read commands from the standard input and execute them (a minimal implementation

of a shell – like program). You can assume that no arguments will be passed to the commands to be executed.

1. a) Shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions

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are identical, outputs the common permissions, otherwise outputs each file name followed by its permissions.

* 1. C program to create a file with 16 bytes of arbitrary data from the beginning and another 16 bytes of arbitrary data from an offset of 48. Display the file contents to demonstrate how the hole in file is handled.

1. a) Shell script that accepts file names specified as arguments and creates a shell script that contains this file as well as the code to recreate these files. Thus if the script generated by your script is executed, it would recreate the original files(This is same as the “bundle” script described by Brain W. Kernighan and Rob Pike

in “ The Unix Programming Environment”, Prentice – Hall

India).

b) C program to do the following: Using fork( ) create a child

process. The child process prints its own process-id and id of

its parent and then exits. The parent process waits for its child to finish (by executing the wait( )) and prints its own process-id and the id of its child process and then exits.

**Operating Systems:**

1. Design, develop and execute a program in C / C++ to simulate the working of Shortest Remaining Time and Round-Robin Scheduling Algorithms. Experiment with different quantum sizes for the Round-Robin algorithm. In all cases, determine the average turn-around time. The input can be read from key board or from a file.
2. Using OpenMP, Design, develop and run a multi-threaded program to generate and print Fibonacci Series. One thread has to generate the numbers up to the specified limit and another thread has to print them. Ensure proper synchronization.
3. Design, develop and run a program to implement the Banker’s Algorithm. Demonstrate its working with different data values.

**Instructions:**

In the examination, a combination of one LEX and one YACC problem has to be asked from Part A for a total of 30 marks and one programming exercise from Part B has to be asked for a total of 20 marks.

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**VI SEMESTER**

**MANAGEMENT AND ENTREPRENEURSHIP**

**(Common to All Branches)**

|  |  |  |
| --- | --- | --- |
| **Subject Code: 10AL61** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**UNIX SYSTEM PROGRAMMING**

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| --- | --- | --- |
| **Subject Code: 10CS62** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART - A**

**UNIT – 1 6 Hours Introduction:** UNIX and ANSI Standards: The ANSI C Standard, The

ANSI/ISO C++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards.

UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics.

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| --- | --- |
| **UNIT – 2** | **6 Hours** |
| **UNIX Files:** File Types, The UNIX and POSIX File System, The UNIX and | |
| POSIX File Attributes, Inodes in UNIX System V, | Application Program |

Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.

**UNIT – 3** **7 Hours**

**UNIX File APIs:** General File APIs, File and Record Locking, DirectoryFile APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs, General File Class, regfile Class for Regular Files, dirfile Class for Directory Files, FIFO File Class, Device File Class, Symbolic Link File Class, File Listing Program.

**UNIT – 4** **7 Hours**

**UNIX Processes:** The Environment of a UNIX Process: Introduction, mainfunction, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation,

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Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.

**PART - B**

**UNIT – 5** **7 Hours**

**Process Control :** Introduction, Process Identifiers, fork, vfork, exit, wait,waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection.

Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups.

**UNIT – 6** **7 Hours**

**Signals and Daemon Processes:** Signals: The UNIX Kernel Support forSignals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers.

Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.

**UNIT – 7** **6 Hours**

**Interprocess Communication – 1:** Overview of IPC Methods, Pipes, popen,pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores.

**UNIT – 8** **6 Hours**

**Interprocess Communication – 2:** Shared Memory, Client-ServerProperties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.

**Text Books:**

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999.

(Chapters 1, 5, 6, 7, 8, 9, 10)

1. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005.

(Chapters 7, 8, 9, 13, 14, 15)

**Reference Books:**

1. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.
2. Maurice J Bach: The Design of the UNIX Operating System, Pearson Education, 1987.

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1. Uresh Vahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

**COMPILER DESIGN**

**Subject Code: 10CS63**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1** **8 Hours**

**Introduction, Lexical analysis:** Language processors; The structure of aCompiler; The evolution pf programming languages; The science of building a Compiler; Applications of compiler technology; Programming language basics.

Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.

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| **UNIT – 2** | **6 Hours** |
| **Syntax Analysis – 1:** Introduction; Context-free Grammars; Writing a | |
| Grammar. Top-down Parsing; Bottom-up Parsing. |  |
| **UNIT – 3** | **6 Hours** |
| **Syntax Analysis – 2:** Top-down Parsing; Bottom-up Parsing. |  |
| **UNIT – 4** | **6 Hours** |

**Syntax Analysis – 3** : Introduction to LR Parsing: Simple LR; More powerfulLR parsers (excluding Efficient construction and compaction of parsing tables) ; Using ambiguous grammars; Parser Generators.

**PART – B**

**UNIT – 5 7 Hours Syntax-Directed Translation:** Syntax-directed definitions; Evaluation

orders for SDDs; Applications of syntax-directed translation; Syntax-directed translation schemes.

**UNIT – 6** **6 Hours**

**Intermediate Code Generation:** Variants of syntax trees; Three-addresscode; Translation of expressions; Control flow; Back patching; Switch-statements; Procedure calls.

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**UNIT – 7** **6 Hours**

**Run-Time Environments :** Storage Organization; Stack allocation of space;Access to non-local data on the stack; Heap management; Introduction to garbage collection.

**UNIT – 8** **7 Hours**

**Code Generation:** Issues in the design of Code Generator; The TargetLanguage; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks; A Simple Code Generator

**Text Books:**

1. Alfred V Aho, Monica S.Lam, Ravi Sethi, Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, 2nd Edition, Pearson Education, 2007.

(Chapters 1, 3.1 to 3.4, 4 excluding 4.7.5 and 4.7.6, 5.1 to 5.4, 6.1, 6.2, 6.4, 6.6, 6.7 to 6.9, 7.1 to 7.5, 8.1 to 8.6.)

**Reference Books:**

1. Charles N. Fischer, Richard J. leBlanc, Jr.: Crafting a Compiler with C, Pearson Education, 1991.
2. Andrew W Apple: Modern Compiler Implementation in C, Cambridge University Press, 1997.
3. Kenneth C Louden: Compiler Construction Principles & Practice, Cengage Learning, 1997.

**COMPUTER NETWORKS - II**

**Subject Code: 10CS64**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT - 1**

**6 Hours**

**Packet Switching Networks - 1:** Network services and internal networkoperation, Packet network topology, Routing in Packet networks, Shortest path routing: Bellman-Ford algorithm.

**UNIT – 2** **6 Hours**

**Packet Switching Networks – 2:** Shortest path routing (continued), Trafficmanagement at the Packet level, Traffic management at Flow level, Traffic management at flow aggregate level.

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**UNIT – 3**

**6 Hours**

**TCP/IP-1:**

TCP/IP architecture, The Internet Protocol, IPv6, UDP.

**UNIT – 4** **8 Hours**

**TCP/IP-2:** TCP, Internet Routing Protocols, Multicast Routing, DHCP, NAT

and Mobile IP.

**PART – B**

**UNIT - 5**

**7 Hours**

**Applications, Network Management, Network Security:** Application layeroverview, Domain Name System (DNS), Remote Login Protocols, E-mail, File Transfer and FTP, World Wide Web and HTTP, Network management, Overview of network security, Overview of security methods, Secret-key encryption protocols, Public-key encryption protocols, Authentication, Authentication and digital signature, Firewalls.

**UNIT – 6** **6 Hours**

**QoS, VPNs, Tunneling, Overlay Networks**: Overview of QoS, IntegratedServices QoS, Differentiated services QoS, Virtual Private Networks, MPLS, Overlay networks.

**UNIT - 7** **7 Hours**

**Multimedia Networking**: Overview of data compression, Digital voice andcompression, JPEG, MPEG, Limits of compression with loss, Compression methods without loss, Overview of IP Telephony, VoIP signaling protocols, Real-Time Media Transport Protocols, Stream control Transmission Protocol (SCTP)

**UNIT – 8** **6 Hours**

**Mobile AdHoc Networks and Wireless Sensor Neworks**: Overview ofWireless Ad-Hoc networks, Routing in AdHOc Networks, Routing protocols for and Security of AdHoc networks, Sensor Networks and protocol structures, Communication Energy model, Clustering protocols, Routing protocols, ZigBee technology and 802.15.4.

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**Text Books:**

1. Communication Networks – Fundamental Concepts & key architectures, Alberto Leon Garcia & Indra Widjaja, 2nd Edition, Tata McGraw-Hill, India

(7 - excluding 7.6, 8)

1. Computer & Communication Networks, Nadir F Mir, Pearson Education, India

(9, 10 excluding 10.7, 12.1 to 12.3, 16, 17.1 to 17.6, 18.1 to18.3, 18.5, 19, 20)

**Reference Books:**

1. Behrouz A. Forouzan: Data Communications and Networking, 4th Edition, Tata McGraw-Hill, 2006.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
4. Wayne Tomasi: Introduction to Data Communications and Networking, Pearson Education, 2005.

**COMPUTER GRAPHICS AND VISUALIZATION**

|  |  |  |
| --- | --- | --- |
| **Subject Code: 10CS65** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART - A**

**UNIT – 1** **7 Hours**

**Introduction:** Applications of computer graphics; A graphics system;Images: Physical and synthetic; Imaging Systems; The synthetic camera model; The programmer’s interface; Graphics architectures; Programmable Pipelines; Performance Characteristics

Graphics Programming: The Sierpinski gasket; Programming Two Dimensional Applications.

**UNIT – 2** **6 Hours**

**The OpenGL:** The OpenGL API; Primitives and attributes; Color; Viewing;Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting Implicit Functions

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**UNIT – 3** **7 Hours**

**Input and Interaction:** Interaction; Input devices; Clients and Servers; DisplayLists; Display Lists and Modeling; Programming Event Driven Input; Menus; Picking; A simple CAD program; Building Interactive Models; Animating Interactive Programs; Design of Interactive Programs; Logic Operations

**UNIT – 4 6 Hours Geometric Objects and Transformations-I:** Scalars, Points, and Vectors;

Three-dimensional Primitives; Coordinate Systems and Frames; Modeling a Colored Cube; Affine Transformations; Rotation, Translation and Scaling;

**PART - B**

**UNIT – 5 5 Hours Geometric Objects and Transformations-II:** Geometric Objects and

Transformations; Transformation in Homogeneous Coordinates; Concatenation of Transformations; OpenGL Transformation Matrices; Interfaces to three-dimensional applications; Quaternion’s.

**UNIT – 6** **7 Hours**

**Viewing :** Classical and computer viewing; Viewing with a Computer;Positioning of the camera; Simple projections; Projections in OpenGL; Hidden-surface removal; Interactive Mesh Displays; Parallel-projection matrices; Perspective-projection matrices; Projections and Shadows.

**UNIT – 7** **6 Hours**

**Lighting and Shading:** Light and Matter; Light Sources; The Phong Lightingmodel; Computation of vectors; Polygonal Shading; Approximation of a sphere by recursive subdivisions; Light sources in OpenGL; Specification of materials in OpenGL; Shading of the sphere model; Global Illumination.

**UNIT – 8** **8 Hours**

**Implementation:** Basic Implementation Strategies; Four major tasks; Clipping;Line-segment clipping; Polygon clipping; Clipping of other primitives; Clipping in three dimensions; Rasterization; Bresenham’s algorithm; Polygon Rasterization; Hidden-surface removal; Antialiasing; Display considerations.

**Text Books:**

1. Edward Angel: Interactive Computer Graphics A Top-Down Approach with OpenGL, 5th Edition, Pearson Education, 2008. (Chapters 1 to 7)

**Reference Books:**

1. Donald Hearn and Pauline Baker: Computer Graphics- OpenGL Version, 3rd Edition, Pearson Education, 2004.

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1. F.S. Hill Jr.: Computer Graphics Using OpenGL, 3rd Edition, PHI, 2009.
2. James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Pearson Education 1997.

**OPERATIONS RESEARCH**

**Subject Code: 10CS661**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT – 1** **6 Hours**

**Introduction, Linear Programming – 1:** Introduction: The origin, natureand impact of OR; Defining the problem and gathering data; Formulating a mathematical model; Deriving solutions from the model; Testing the model; Preparing to apply the model; Implementation .

Introduction to Linear Programming: Prototype example; The linear programming (LP) model.

**UNIT – 2 7 Hours LP – 2, Simplex Method – 1:** Assumptions of LP; Additional examples.

The essence of the simplex method; Setting up the simplex method; Algebra of the simplex method; the simplex method in tabular form; Tie breaking in the simplex method

**UNIT – 3** **6 Hours**

**Simplex Method – 2:** Adapting to other model forms; Post optimality

analysis; Computer implementation

Foundation of the simplex method.

**UNIT – 4** **7 Hours**

**Simplex Method – 2, Duality Theory:** The revised simplex method, afundamental insight.

The essence of duality theory; Economic interpretation of duality, Primal dual relationship; Adapting to other primal forms

**PART - B**

**UNIT – 5** **7 Hours**

**Duality Theory and Sensitivity Analysis, Other Algorithms for LP :** The

role of duality in sensitive analysis; The essence of sensitivity analysis;

55

Applying sensitivity analysis. The dual simplex method; Parametric linear programming; The upper bound technique.

**UNIT – 6** **7 Hours**

**Transportation and Assignment Problems:** The transportation problem; Astreamlined simplex method for the transportation problem; The assignment problem; A special algorithm for the assignment problem.

**UNIT – 7** **6 Hours**

**Game Theory, Decision Analysis:** Game Theory: The formulation of twopersons, zero sum games; Solving simple games- a prototype example; Games with mixed strategies; Graphical solution procedure; Solving by linear programming, Extensions.

Decision Analysis: A prototype example; Decision making without experimentation; Decision making with experimentation; Decision trees.

**UNIT – 8** **6 Hours**

**Metaheuristics:** The nature of Metaheuristics, Tabu Search, SimulatedAnnealing, Genetic Algorithms.

**Text Books:**

1. Frederick S. Hillier and Gerald J. Lieberman: Introduction to

Operations Research: Concepts and Cases, 8th Edition, Tata McGraw Hill, 2005.

(Chapters: 1, 2, 3.1 to 3.4, 4.1 to 4.8, 5, 6.1 to 6.7, 7.1 to 7.3, 8, 13, 14, 15.1 to 15.4)

**Reference Books:**

1. Wayne L. Winston: Operations Research Applications and Algorithms, 4th Edition, Cengage Learning, 2003.
2. Hamdy A Taha: Operations Research: An Introduction, 8th Edition, Pearson Education, 2007.

**SIGNALS AND SYSTEMS**

**Subject Code: 10CS662**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT – 1** **7 Hours**

**Introduction:** Definitions of a signal and a system; Classification of signals;Basic operations on signals; Elementary signals.

56

**UNIT – 2** **7 Hours**

**Systems, Time-domain representations – 1:** Systems viewed asinterconnections of operations; Properties of systems; Convolution; Impulse response representation; Properties of impulse response representation.

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| **UNIT – 3** | **6 Hours** |
| **Time domain representation – 2:** Differential and | difference equation |
| representations; Block diagram representations. |  |
| **UNIT – 4** | **6 Hours** |

**Fourier Representation – 1:** Fourier representation: Introduction; Fourierrepresentations for four signal classes; Orthogonality of complex sinusoidal signals.

**PART – B**

**UNIT – 5** **6 Hours**

**Fourier Representation -2:** DTFS representations; Continuous-tine Fourier-series representations; DTFT and FT representations; Properties of Fourier representations.

**UNIT – 6 7 Hours Application of Fourier representations – 1 :** Frequency response of LTI

systems; Solution of differential and difference equations using system function.

**UNIT – 7** **7 Hours**

**Applications of Fourier Representations – 2, Z-Tran sforms – 1:** Fouriertransform representations for periodic signals; Sampling of continuous time signals and signal reconstruction.

Introduction to Z-transform; Properties of ROC; Properties of Z-transforms; Inversion of Z-transforms

**UNIT –Z – 8 6 Hours Transforms – 2:** Transforms analysis of LTI systems; Transfer function;

Stability and causality; Unilateral Z-transforms and its application to solve difference equations

**Text Books:**

1. Simon Haykin and Barry Van Veen: Signals and Systems, 2nd Edition, Wiley India, 2007.

(Chapters: 1.1 to 1.8, 2.2 to 2.5, 3.1 to 3.6, 4.2 to 4.3, 4.7, 7.1 to 7.6, 7.8)

**Reference Books:**

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1. Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab: Signals and Systems, 2nd Edition, PHI, 1997, Indian reprint 2009.
2. Ganesh Rao D and Satish Tunga: Signals and Systems - A Simplified Approach, Sanguine Technical Publishers, 2003-04.

**DATA COMPRESSION**

**Subject Code: 10CS663**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT –1** **7 Hours**

**Introduction, Lossless Compression -1:** Compression techniques; Modelingand coding.

Mathematical preliminaries for lossless compression: Overview; Basic concepts of Information Theory; Models; Coding; Algorithmic information theory; Minimum description length principle.

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| Huffmancoding: | Overview;TheHuffmancodingalgorithm, |
| Minimumvariance | Huffman codes; Application of Huffman coding for text |
| compression. |  |
| **UNIT – 2** | **6 Hours** |

**Lossless Compression – 2:** Dictionary Techniques: Overview; Introduction;Static dictionary; Adaptive dictionary; Applications: UNIX compress, GIF, PNG, V.42.

Lossless image compression: Overview; Introduction; Basics; CALIC; JPEG-LS; Multiresoution approaches; Facsimile encoding: Run-length coding, T.4 and T.6.

**UNIT – 3**

**Basics of Lossy Coding:** Some mathematical

concepts:

**6 Hours**

Overview;

Introduction; Distortion criteria; Models.

Scalar quantization: Overview; Introduction; The quantization problem; Uniform quantizer; Adaptive quantization.

**UNIT – 4**

**Vector Quantization,** **Differential**

**Encoding:** Vector

**7 Hours**

quantization:

Overview; Introduction; Advantages of vector quantization over scalar quantization; The LBG algorithm.

Differential Encoding: Overview; Introduction; The basic algorithm;

Prediction in DPCM; Adaptive DPCM; Delta modulation; Speech coding;

Image coding.

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**PART - B**

**UNIT – 5** **7 Hours**

**Some Mathematical Concepts, Transform coding:** Some mathematicalconcepts: Linear systems; Sampling; Discrete Fourier transform; Z-transform.

Transform coding: Overview; introduction; The transform; Transforms of interest; Quantization and coding for transform coefficients; Application to image compression – JPEG; Application to audio comp ression – MDCT.

**UNIT – 6 6 Hours Subband Coding, Audio Coding:** Subband Coding: Overview;

introduction; Filters; The basic subband coding algorithm; Bit allocation; Application to speech coding – G.722; Application t o audio coding – MPEG audio; Application to image compression.

Audio Coding: Overview; Introduction; MPEG audio coding; MPEG advanced audio coding; Dolby AC3; Other standards.

**UNIT – 7 6 Hours Wavelet-Based Compression:** Overview; Introduction; Wavelets;

Multiresolution and the scaling function; Implementation using Filters; Image compression; Embedded zerotree coder; Set partitioning in hierarchical trees; JPEG 2000.

**UNIT – 8** **7 Hours**

**Video Compression:** Overview; Introduction; Motion compensation; Videosignal representation; H.261; Model-based coding; Asymmetric applications; MPEG-1 and MPEG-2; H.263; H.264, MPEG-4 and advanced video coding; Packet video.

**Text Books:**

1. Khalid Sayood: Introduction to Data Compression, 3rd Edition, Elsevier, 2006. (Chapters 1, 2 excluding 2.2.1 and 2.4.3, 3.1, 3.2, 3.2.1, 3.8.2, 5, 7.1 to 7.5, 7.6, 7.6.1, 7.6.2, 8.1 to 8.3, 8.6, 9.1 to 9.5, 10.1 to 10.4, 11, 12.6 to 12.9, 13, 14.1 to 14.4, 14.9 to 14.12, 15, 16,

18.1 to 18.13)

**Reference Books:**

1. D. Salomon: Data Compression: The Complete Reference, Springer, 1998.

59

**PATTERN RECOGNITION**

**Subject Code: 10CS664**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1** **6 Hours**

**Introduction:** Machine perception, an example; Pattern Recognition System;The Design Cycle; Learning and Adaptation.

**UNIT – 2 7 Hours Bayesian Decision Theory:** Introduction, Bayesian Decision Theory;

Continuous Features, Minimum error rate, classification, classifiers, discriminant functions, and decision surfaces; The normal density; Discriminant functions for the normal density.

**UNIT – 3 7 Hours Maximum-likelihood and Bayesian Parameter Estimation:** Introduction;

Maximum-likelihood estimation; Bayesian Estimation; Bayesian parameter estimation: Gaussian Case, general theory; Hidden Markov Models.

**UNIT – 4 6 Hours Non-parametric Techniques:** Introduction; Density Estimation; Parzen

windows; kn – Nearest- Neighbor Estimation; The Nearest- Neighb or Rule; Metrics and Nearest-Neighbor Classification.

**PART – B**

**UNIT – 5 7 Hours Linear Discriminant Functions:** Introduction; Linear Discriminant

Functions and Decision Surfaces; Generalized Linear Discriminant Functions; The Two-Category Linearly Separable case; Minimizing the Perception Criterion Functions; Relaxation Procedures; Non-separable Behavior; Minimum Squared-Error procedures; The Ho-Kashyap procedures.

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| **UNIT – 6** | **6 Hours** |
| **Stochastic Methods:** Introduction; Stochastic Search; Boltzmann Learning; | |
| Boltzmann Networks and Graphical Models; Evolutionary Methods. |  |
| **UNIT – 7** | **6 Hours** |

**Non-Metric Methods:** Introduction; Decision Trees; CART; Other TreeMethods; Recognition with Strings; Grammatical Methods.

60

**UNIT – 8 7 Hours Unsupervised Learning and Clustering:** Introduction; Mixture Densities

and Identifiability; Maximum-Likelihood Estimates; Application to Normal Mixtures; Unsupervised Bayesian Learning; Data Description and Clustering; Criterion Functions for Clustering.

**Text Books:**

1. Richard O. Duda, Peter E. Hart, and David G.Stork: Pattern Classification, 2nd Edition, Wiley-Interscience, 2001.

**Reference Books:**

1. Earl Gose, Richard Johnsonbaugh, Steve Jost: Pattern Recognition and Image Analysis, PHI, Indian Reprint 2008.

**STOCHASTIC MODELS AND APPLICATIONS**

**Subject Code: 10CS665**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1** **6 Hours**

**Introduction – 1:** Axioms of probability; Conditional probability andindependence; Random variables; Expected value and variance; Moment-Generating Functions and Laplace Transforms; conditional expectation; Exponential random variables.

**UNIT – 2** **6 Hours**

**Introduction – 2:** Limit theorems; Examples: A random graph; TheQuicksort and Find algorithms; A self-organizing list model; Random permutations.

**UNIT – 3** **7 Hours**

**Probability Bounds, Approximations, and Computations:** Tail probabilityinequalities; The second moment and conditional expectation inequality; probability bounds via the Importance sampling identity; Poisson random variables and the Poisson paradigm; Compound Poisson random variables.

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| **UNIT – 4** |  | **7 Hours** |
| **Markov Chains:** Introduction; | Chapman-Kologorov | Equations; |
| Classification of states; Limiting | and stationary probabilities; some | |
|  |  | 61 |

applications; Time-Reversible Markov Chains; Markov Chain Monte Carlo methods.

**PART – B**

**UNIT – 5** **6 Hours**

**The Probabilistic Method:** Introduction; Using probability to proveexistence; Obtaining bounds from expectations; The maximum weighted independent set problem: A bound and a ranom algorithm; The set covering problem; Antichains; The Lovasz Local lemma; A random algorithm for finding the minimal cut in a graph.

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| **UNIT – 6** | **6 Hours** |
| **Martingales:** Martingales: | Definitions and examples; The martingale |
| stopping theorem; The Hoeffding-Azuma inequality; Sub-martingales. | |
| **UNIT – 7** | **7 Hours** |

**Poisson Processes, Queuing Theory – 1:** The non-stationary Poissonprocess; The stationary Poisson process; Some Poisson process computations; Classifying the events of a non-stationary Poisson process; Conditional distribution of the arrival times

Queuing Theory: Introduction; Preliminaries; Exponential models

**UNIT – 8** **7 Hours**

**Queuing Theory – 2:** Birth-and-Death exponential queuing systems; Thebackwards approach in exponential queues; A closed queuing network; An open queuing network; The M/G/1 queue; Priority queues.

**Text Books:**

1. Sheldon M. Ross: Probability Models for Computer Science, Elsevier, 2002.

**Reference Books:**

1. B. R. Bhat: Stochastic Models Analysis and Applications, New Age International, 2000.
2. Scott L. Miller, Donald G. Childers: Probability and Random Processes with Applications to Signal Processing and Communications, Elsevier, 2004.

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**PROGRAMMING LANGUAGES**

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| **Subject Code: 10CS666** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART - A**

**UNIT – 1** **7 Hours**

**Introduction; Names, Scopes, and Bindings:** The art of language design;

Programming language spectrum; Why study programming languages?

Compilation and interpretation; Programming environments.

Names, scope, and bindings: The notion of binding time; Object lifetime and storage management; Scope rules; Implementing scope; The meaning of names within a scope; The binding of referencing environments; Macro expansion.

**UNIT – 2** **7 Hours**

**Control Flow:** Expression evaluation; Structured and unstructured flow;Sequencing; Selection; Iteration; Recursion; Non-determinacy

**UNIT – 3** **6 Hours**

**Data Types:** Type systems; Type checking; Records and variants; Arrays;Strings; Sets; Pointers and recursive types; Lists; Files and Input/Output; Equality testing and assignment.

**UNIT – 4** **6 Hours**

**Subroutines and Control Abstraction:** Review of stack layout; Callingsequences; Parameter passing; Generic subroutines and modules; Exception handling; Coroutines; Events.

**PART – B**

**UNIT – 5** **6 Hours**

**Data Abstraction and Object Orientation:** Object oriented programming;Encapsulation and Inheritance; Initialization and finalization; Dynamic method binding; Multiple inheritance; Object oriented programming revisited.

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**UNIT – 6 7 Hours Functional Languages, and Logic Languages:** Functional Languages:

Origins; Concepts; A review/overview of scheme; Evaluation order revisited; Higher-order functions; Functional programming in perspective. Logic Languages: Concepts; Prolog; Logic programming in perspective.

**UNIT – 7** **6 Hours**

**Concurrency:** Background and motivation; Concurrency programmingfundamentals; Implementing synchronization; Language-level mechanisms; Message passing.

**UNIT – 8** **7 Hours**

**Run-Time Program Management:** Virtual machines; Late binding ofmachine code; Inspection/introspection.

**Text Books:**

1. Michael L. Scott: Programming Language Pragmatics, 3rd Edition, Elsevier, 2009.

(Chapters 1.1 to 1.5, 3.1 to 3.7, 6 excluding the sections on CD, 7 excluding the ML type system, 8, 9, 10 excluding the sections on CD, 11 excluding the sections on CD, 12, 15. Note: Text Boxes titled Design & Implementation are excluded)

**Reference Books:**

1. Ravi Sethi: Programming languages Concepts and Constructs, 2nd Edition, Pearson Education, 1996.
2. R Sebesta: Concepts of Programming Languages, 8th Edition, Pearson Education, 2008.
3. Allen Tucker, Robert Nonan: Programming Languages, Principles and Paradigms, 2nd Edition, Tata McGraw-Hill, 2007.

**COMPUTER GRAPHICS AND VISUALIZATION LABORATORY**

**Subject Code: 10CSL67**

**Hours/Week : 03**

**Total Hours** **: 42**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 50**

**PART - A**

**Design, develop, and implement the following programs in C / C++**

1. Program to recursively subdivide a tetrahedron to from 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.

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1. Program to implement Liang-Barsky line clipping algorithm.
2. Program to draw a color cube and spin it using OpenGL transformation matrices.
3. Program to create a house like figure and rotate it about a given fixed point using OpenGL functions.
4. Program to implement the Cohen-Sutherland line-clipping

algorithm. Make provision to specify the input line, window for clipping and view port for displaying the clipped image.

1. Program to create a cylinder and a parallelepiped by extruding a circle and quadrilateral respectively. Allow the user to specify the circle and the quadrilateral.
2. Program, using OpenGL functions, to draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the properties of the surfaces of the solid object used in the scene.
3. Program to draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing. Use OpenGL functions.
4. Program to fill any given polygon using scan-line area filling algorithm. (Use appropriate data structures.)
5. Program to display a set of values {fij} as a rectangular mesh.

**PART - B**

Develop a suitable Graphics package to implement the skills learnt in the theory and the exercises indicated in Part A. Use the OpenGL.

**Note**:

1. Any question from Part A may be asked in the examination.
2. A report of about 10 – 12 pages on the package deve loped in Part B, duly certified by the department must be submitted during examination.

**Instructions:**

In the examination, one exercise from Part A is to be asked for a total of 30 marks. The package developed under Part B has to be evaluated for a total of 20 marks.

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**UNIX SYSTEMS PROGRAMMING AND COMPILER DESIGN**

**LABORATORY**

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| --- | --- | --- |
| **Subject Code: 10CSL68** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

**List of Experiments for USP:** Design, develop, and execute thefollowing programs

1. Write a C/C++ POSIX compliant program to check the following limits:

(i) No. of clock ticks (ii) Max. no. of child processes

(iii) Max. path length

(iv) Max. no. of characters in a file name (v) Max. no.

of open files/ process

1. Write a C/C++ POSIX compliant program that prints the POSIX defined configuration options supported on any given system using feature test macros.
2. Consider the last 100 bytes as a region. Write a C/C++ program to check whether the region is locked or not. If the region is locked, print pid of the process which has locked. If the region is not locked, lock the region with an exclusive lock, read the last 50 bytes and unlock the region.
3. Write a C/C++ program which demonstrates interprocess communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
4. a) Write a C/C++ program that outputs the contents of its Environment list

b) Write a C / C++ program to emulate the unix **ln** command

1. Write a C/C++ program to illustrate the race condition.
2. Write a C/C++ program that creates a zombie and then calls system to execute the **ps** command to verify that the process is zombie.
3. Write a C/C++ program to avoid zombie process by forking twice.
4. Write a C/C++ program to implement the **system** function.

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1. Write a C/C++ program to set up a real-time clock interval timer using the **alarm** API.

**List of Experiments for Compiler Design:** Design, develop, andexecute the following programs.

1. Write a C program to implement the syntax-directed definition of “if E then S1” and “if E then S1 else S2”. (Refer Fig. 8.23 in the text book prescribed for 06CS62 Compiler Design, Alfred V Aho, Ravi Sethi, and Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, 2nd Edition, Pearson Education, 2007).
2. Write a yacc program that accepts a regular expression as input and produce its parse tree as output.

**Note: In the examination *each* student picks one question from the lot of *all* 12 questions.**

**VII SEMESTER**

**OBJECT-ORIENTED MODELING AND DESIGN**

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| **Subject Code: 10CS71** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART – A**

**UNIT – 1** **7 Hours**

**Introduction, Modeling Concepts, class Modeling:** What is ObjectOrientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history

Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.

**UNIT – 2** **6 Hours**

**Advanced Class Modeling, State Modeling:** Advanced object and classconcepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.

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State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.

**UNIT – 3 6 Hours Advanced State Modeling, Interaction Modeling:** Advanced State

Modeling: Nested state diagrams; Nested states; Signal generalization;

Concurrency; A sample state model; Relation of class and state models;

Practical tips.

Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

**UNIT – 4 7 Hours Process Overview, System Conception, Domain Analysis:** Process

Overview: Development stages; Development life cycle.

System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement.

Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

**PART – B**

**UNIT – 5 7 Hours Application Analysis, System Design:** Application Analysis: Application

interaction model; Application class model; Application state model; Adding operations.

Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

**UNIT – 6 7 Hours Class Design, Implementation Modeling, Legacy Systems:** Class Design:

Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.

Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.

Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

**UNIT – 7**

**6 Hours**

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**Design Patterns – 1:** What is a pattern and what makes a pattern? Patterncategories; Relationships between patterns; Pattern description Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber.

**UNIT – 8** **6 Hours**

**Design Patterns – 2, Idioms:** Management Patterns: Command processor;View handler.

Idioms: Introduction; what can idioms provide? Idioms and style; Where to find idioms; Counted Pointer example

**Text Books:**

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005.

(Chapters 1 to 17, 23)

1. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007.

(Chapters 1, 3.5, 3.6, 4)

**Reference Books:**

1. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition, Pearson Education, 2007.
2. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, Wiley- Dreamtech India, 2004.
4. Simon Bennett, Steve McRobb and Ray Farmer: Object-Oriented Systems Analysis and Design Using UML, 2nd Edition, Tata McGraw-Hill, 2002.

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**EMBEDDED COMPUTING SYSTEMS**

**Sub Code: 10CS72**

**Hrs/Week: 04**

**Total Hrs: 52**

**IA Marks** **:25**

**Exam Hours :03**

**Exam Marks :100**

**PART- A**

**UNIT – 1 6 Hours Embedded Computing:** Introduction, Complex Systems and

Microprocessors, Embedded Systems Design Process, Formalism for System design

Design Example: Model Train Controller.

**UNIT – 2** **7 Hours**

**Instruction Sets, CPUs:** Preliminaries, ARM Processor, Programming Inputand Output, Supervisor mode, Exceptions, Traps, Coprocessors, Memory Systems Mechanisms, CPU Performance, CPU Power Consumption. Design Example: Data Compressor.

**UNIT – 3** **6 Hours**

**Bus-Based Computer Systems:** CPU Bus, Memory Devices, I/O devices,Component Interfacing, Designing with Microprocessor, Development and Debugging, System-Level Performance Analysis Design Example: Alarm Clock.

**UNIT – 4** **7 Hours**

**Program Design and Analysis:** Components for embedded programs,Models of programs, Assembly, Linking and Loading, Basic Compilation Techniques, Program optimization, Program-Level performance analysis, Software performance optimization, Program-Level energy and power analysis, Analysis and optimization of program size, Program validation and testing. Design Example: Software modem.

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|  | **PART- B** |  |  |  |
| **UNIT – 5** |  |  | **6 Ho urs** | |
| **Real Time Operating System (RTOS) Based Design – 1:** Basics of OS, | | | | |
| Kernel, types of | OSs, tasks, processes, | Threads, | Multitasking | and |
| Multiprocessing, | Context switching, | Scheduling | Policies, | Task |
| Communication, Task Synchronization. | |  |  |  |
| **UNIT – 6** |  |  | **6 Hours** | |
|  |  |  |  | 70 |

**RTOS-Based Design - 2:** Inter process Communication mechanisms,Evaluating OS performance, Choice of RTOS, Power Optimization. Design Example: Telephone Answering machine

**UNIT – 7 7 Hours Distributed Embedded Systems:** Distributed Network Architectures,

Networks for Embedded Systems: I2C Bus, CAN Bus, SHARC Link Ports, Ethernet, Myrinet, Internet, Network Based Design. Design Example: Elevator Controller.

**UNIT – 8 7 Hours Embedded Systems Development Environment:** The Integrated

Development Environment, Types of File generated on Cross Compilation, Dis-assembler /Decompiler, Simulators, Emulators, and Debugging, Target Hardware Debugging.

**Text Books:**

1. Wayne Wolf: Computers as Components, Principles of Embedded Computing Systems Design, 2nd Edition, Elsevier, 2008.
2. Shibu K V: Introduction to Embedded Systems, Tata McGraw Hill, 2009

(Chapters 10, 13)

**Reference Books:**

1. James K. Peckol: Embedded Systems, A contemporary Design Tool, Wiley India, 2008
2. Tammy Neorgaard: Embedded Systems Architecture, Elsevier, 2005.

**PROGRAMMING THE WEB**

**Subject Code: 10CS73**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**UNIT – 1** **6 Hours**

**Fundamentals of Web, XHTML – 1:** Internet, WWW, Web Browsers andWeb Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox.

XHTML: Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links.

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**UNIT – 2** **7 Hours**

**XHTML – 2, CSS:** XHTML (continued): Lists, Tables, Forms, FramesCSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The <span> and <div> tags, Conflict resolution.

**UNIT – 3** **6 Hours**

**Javascript:** Overview of Javascript, Object orientation and Javascript,Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.

**UNIT – 4** **7 Hours**

**Javascript and HTML Documents, Dynamic Documents with Javascript:** The Javascript execution environment, The Document Object Model, Element access in Javascript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification.

Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.

**PART - B**

**UNIT – 5** **6 Hours**

**XML:** Introduction, Syntax, Document structure, Document type definitions,Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

**UNIT – 6** **7 Hours**

**Perl, CGI Programming:** Origins and uses of Perl, Scalars and theiroperations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Functions, Pattern matching, File input and output; Examples.

The Common Gateway Interface; CGI linkage; Query string format; CGI.pm

module; A survey example; Cookies.

Database access with Perl and MySQL

**UNIT – 7** **6 Hours**

**PHP:** Origins and uses of PHP, Overview of PHP, General syntacticcharacteristics, Primitives, operations and expressions, Output, Control

72

statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.

**UNIT – 8** **7 Hours**

**Ruby, Rails:** Origins and uses of Ruby, Scalar types and their operations,Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterators, Pattern matching.

Overview of Rails, Document requests, Processing forms, Rails applications with Databases, Layouts.

**Text Books:**

1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson Education, 2008.

(Listed topics only from Chapters 1 to 9, 11 to 15)

**Reference Books:**

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson Education, 2004.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2007.
3. Xue Bai et al: The web Warrior Guide to Web Programming, Cengage Learning, 2003.

**ADVANCED COMPUTER ARCHITECTURES**

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| **Subject Code: 10CS74** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART - A**

**UNIT – 1** **6 Hours**

**Fundamentals Of Computer Design:** Introduction; Classes of computers;Defining computer architecture; Trends in Technology, power in Integrated Circuits and cost; Dependability; Measuring, reporting and summarizing Performance; Quantitative Principles of computer design.

**UNIT – 2** **6 Hours**

**Pipelining:** Introduction; Pipeline hazards; Implementation of pipeline; Whatmakes pipelining hard to implement?

**UNIT – 3**

**Instruction –Level Parallelism – 1:**

Compiler Techniques for exposing

**7 Hours**

ILP: Concepts and challenges; Basic ILP; Reducing Branch costs with

73

prediction; Overcoming Data hazards with Dynamic scheduling; Hardware-based speculation.

**UNIT – 4** **7 Hours**

**Instruction –Level Parallelism – 2:** Exploiting ILP using multiple issue andstatic scheduling; Exploiting ILP using dynamic scheduling, multiple issue and speculation; Advanced Techniques for instruction delivery and Speculation; The Intel Pentium 4 as example.

**PART - B**

**UNIT – 5** **7 Hours**

**Multiprocessors and Thread –Level Parallelism:** Introduction; Symmetricshared-memory architectures; Performance of symmetric shared–memory multiprocessors; Distributed shared memory and directory-based coherence; Basics of synchronization; Models of Memory Consistency

**UNIT – 6** **6 Hours**

**Review of Memory Hierarchy:** Introduction; Cache performance; CacheOptimizations, Virtual memory

**UNIT – 7** **6 Hours**

**Memory Hierarchy design:** Introduction; Advanced optimizations of Cacheperformance; Memory technology and optimizations; Protection: Virtual memory and virtual machines.

**UNIT – 8** **7 Hours**

**Hardware and Software for VLIW and EPIC:** Introduction: ExploitingInstruction-Level Parallelism Statically; Detecting and Enhancing Loop-Level Parallelism; Scheduling and Structuring Code for Parallelism; Hardware Support for Exposing Parallelism: Predicated Instructions; Hardware Support for Compiler Speculation; The Intel IA-64 Architecture and Itanium Processor; Conclusions.

**Text Books:**

1. John L. Hennessey and David A. Patterson: Computer Architecture, A Quantitative Approach, 4th Edition, Elsevier, 2007.

(Chapter. 1.1 to 1.9, 2.1 to 2.10, 4.1to 4.6, 5.1 to 5.4, Appendix A, Appendix C, Appendix G)

**Reference Books:**

1. Kai Hwang: Advanced Computer Architecture Parallelism, Scalability, Programability**,** 2nd Edition**,** Tata Mc Graw Hill, 2010.

74

1. David E. Culler, Jaswinder Pal Singh, Anoop Gupta: Parallel Computer Architecture, A Hardware / Software Approach, Morgan Kaufman, 1999.

**ADVANCED DBMS**

**Subject Code: 10CS751**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT – 1 7 Hours Overview of Storage and Indexing, Disks and Files :** Data on external

storage; File organizations and indexing; Index data structures; Comparison of file organizations; Indexes and performance tuning

Memory hierarchy; RAID; Disk space management; Buffer manager; Files of records; Page formats and record formats

**UNIT – 2** **7 Hours**

**Tree Structured Indexing:** Intuition for tree indexes; Indexed sequentialaccess method; B+ trees, Search, Insert, Delete, Duplicates, B+ trees in practice

**UNIT – 3** **6 Hours**

**Hash-Based Indexing:** Static hashing; Extendible hashing, Linear hashing,comparisons

**UNIT – 4 6 Hours Overview of Query Evaluation, External Sorting :** The system catalog;

Introduction to operator evaluation; Algorithms for relational operations; Introduction to query optimization; Alternative plans: A motivating example; what a typical optimizer does.

When does a DBMS sort data? A simple two-way merge sort; External merge sort

**PART - B**

**UNIT – 5 6 Hours Evaluating Relational Operators :** The Selection operation; General

selection conditions; The Projection operation; The Join operation; The Set operations; Aggregate operations; The impact of buffering

75

**UNIT – 6** **7 Hours**

**A Typical Relational Query Optimizer:** Translating SQL queries in toRelational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries; other approaches to query optimization.

**UNIT – 7** **7 Hours**

**Physical Database Design and Tuning:** Introduction; Guidelines for indexselection, examples; Clustering and indexing; Indexes that enable index-only plans; Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Choices in tuning queries and views; Impact of concurrency; DBMS benchmarking.

**UNIT – 8** **6 Hours**

**More Recent Applications:** Mobile databases; Multimedia databases;Geographical Information Systems; Genome data management

**Text Books:**

1. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.

(Chapters 8, 9, 10, 11, 12, 13.1 to 13.3, 14, 15, 20)

1. Elmasri and Navathe: Fundamentals of Database Systems, 5th Edition, Pearson Education, 2007.

(Chapter 30)

**Reference Books:**

1. Connolly and Begg: Database Systems, 4th Edition, Pearson Education, 2002.

**DIGITAL SIGNAL PROCESSING**

**Subject Code: 10CS752**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT – 1** **7 Hours**

**The Discrete Fourier Transform: Its Properties and Applications** **:**

Frequency Domain Sampling: The Discrete Fourier Transform: Frequency Domain Sampling and Reconstruction of Discrete-Time Signals, The Discrete Fourier Transform (DFT), The DFT as a Linear Transformation, Relationship of the DFT to other Transforms. Properties of the DFT: Periodicity, Linearity and Symmetry Properties, Multiplication of Two DFT’s and Circular Convolution, Additional DFT Properties; Linear Filtering

76

Methods Based on the DFT: Use of the DFT in Linear Filtering, Filtering of Long Data Sequences; Frequency Analysis of Signals using the DFT.

**UNIT – 2 7 Hours Efficient Computation of the DFT: Fast Fourier Transform Algorithms:**

Efficient Computation of the DFT: FFT Algorithms : Direct Computation of the DFT, Divide-and-Conquer Approach to Computation of the DFT, Radix-

1. FFT Algorithms, Radix-4 FFT Algorithms, Split-Radix FFT Algorithms, Implementation of FFT Algorithms.

Applications of FFT Algorithms: Efficient computation of the DFT of Two Real Sequences, Efficient computation of the DFT of a 2N-Point Real Sequence, Use of the FFT Algorithm in Linear filtering and Correlation.

A Linear filtering approach to Computation of the DFT: The Goertzel Algorithm, The Chirp-Z Transform Algorithm.

Quantization Effects in the Computation of the DFT: Quantization Errors in the Direct Computation of the DFT, Quantization Errors in FFT Algorithms.

**UNIT – 3**

**Implementation of** **Discrete-Time**

**Systems**

**–** **1:**

**6 Hours**

Structures for the

Realization of Discrete-Time Systems

Structures for FIR Systems: Direct-Form Structures, Cascade-Form Structures, Frequency-Sampling Structures, Lattice Structure.

Structures for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures, Lattice and Lattice-Ladder Structures for IIR Systems.

**UNIT – 4 6 Hours Implementation of Discrete-Time Systems – 2:** State-Space System

Analysis and Structures: State-Space Descriptions of Systems Characterized by Difference Equations, Solution of the State-Space Equations, Relationships between Input-Output and State-Space Descriptions, State-Space Analysis in the Z-Domain, Additional State-Space Structures.

Representation of Numbers: Fixed-Point Representation of Numbers, Binary Floating-Point Representation of Numbers, Errors Resulting from Rounding and Truncation.

**PART – B**

**UNIT – 5 6 Hours Implementation of Discrete-Time Systems – 3:** Quantization of Filter

Coefficients: Analysis of Sensitivity to Quantizatior of Filter Coefficients, Quantization of Coefficients in FIR Filters

77

Round-Off Effects in Digital Filters: Limit-Cycle Oscillations in Recursive Systems, Scaling to Prevent Overflow, Statistical Characterization of Quantization effects in Fixed-Point Realizations of Digital Filters.

**UNIT – 6** **7 Hours**

**Design of Digital Filters – 1:** General Considerations: Causality and itsImplications, Characteristics of Practical Frequency-Selective Filters.

Design of FIR Filters: Symmetric And Antisymetric FIR Filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method, Design of Optimum Equiripple Linear-Phase FIR Filters, Design of FIR Differentiators, Design of Hilbert Transformers, Comparison of Design Methods for Linear-Phase FIR filters.

**UNIT – 7** **6 Hours**

**Design of Digital Filters – 2:** Design of IIR Filters from Analog Filters: IIRFilter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation, The Matched-Z Transformation, Characteristics of commonly used Analog Filters, Some examples of Digital Filters Designs based on the Bilinear Transformation.

**UNIT – 8** **7 Hours**

**Design of Digital Filters – 3:** Frequency Transformations: FrequencyTransformations in the Analog Domain, Frequency Transformations in the Digital Domain.

Design of Digital Filters based on Least-Squares method: Padé Approximations method, Least-Square design methods, FIR least-Squares Inverse (Wiener) Filters, Design of IIR Filters in the Frequency domain.

**Text Books:**

1. John G. Proakis and Dimitris G. Manolakis: Digital Signal Processing, 3rd Edition, Pearson Education, 2003.

(Chapters 5, 6, 7 and 8)

**Reference Books:**

1. Paulo S. R. Diniz, Eduardo A. B. da Silva And Sergio L. Netto: Digital Signal Processing: System Analysis and Design, Cambridge University Press, 2002.
2. Sanjit K. Mitra: Digital Signal Processing: A Computer Based Approach, Tata Mcgraw-Hill, 2001.
3. Alan V Oppenheim and Ronald W Schafer: Digital Signal Processing, PHI, Indian Reprint, 2008.

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**JAVA AND J2EE**

**Subject Code:10CS753**

**Hours/Week: 4**

**Total Hours: 52**

**IA Marks: 25**

**Exam Marks: 100**

**Exam Hours: 3**

**PART - A**

**UNIT – 1** **6 Hours**

**Introduction to Java**: Java and Java applications; Java Development Kit(JDK); Java is interpreted, Byte Code, JVM; Object-oriented programming; Simple Java programs.

Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers.

Operators and Expressions: Arithmetic Operators, Bitwise operators, Relational operators, The Assignment Operator, The ? Operator; Operator Precedence; Logical expression; Type casting; Strings

Control Statements: Selection statements, iteration statements, Jump Statements.

**UNIT – 2 6 Hours Classes, Inheritance, Exceptions, Applets :** Classes: Classes in Java;

Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes.

Inheritance: Simple, multiple, and multilevel inheritance; Overriding, overloading.

Exception handling**:** Exception handling in Java.

The Applet Class: Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The AudioClip Interface; The AppletStub Interface; Output to the Console.

**UNIT – 3 7 Hours Multi Threaded Programming, Event Handling:** Multi Threaded

Programming: What are threads? How to make the classes threadable; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producer-consumer problems.

Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes.

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**UNIT – 4** **7 Hours**

**Swings:** Swings: The origins of Swing; Two key Swing features;Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Jlabel and ImageIcon; JTextField;The Swing Buttons; JTabbedpane; JScrollPane; JList; JComboBox; JTable.

**PART – B**

**UNIT – 5** **6 Hours**

**Java 2 Enterprise Edition Overview, Database Access:** Overview of J2EE

and J2SE

The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.

**UNIT – 6** **7 Hours**

**Servlets:** Background; The Life Cycle of a Servlet; Using Tomcat for ServletDevelopment; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

**UNIT – 7** **6 Hours**

**JSP, RMI:** Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String,User Sessions, Cookies, Session Objects.

Java Remote Method Invocation: Remote Method Invocation concept; Server side, Client side.

**UNIT – 8** **7 Hours**

**Enterprise Java Beans:** Enterprise java Beans; Deployment Descriptors;Session Java Bean, Entity Java Bean; Message-Driven Bean; The JAR File.

**Text Books:**

1. Herbert Schildt: Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

(Chapters 1, 2, 3, 4, 5, 6, 8, 10, 11, 21, 22, 29, 30, 31)

1. Jim Keogh: J2EE - The Complete Reference, Tata McGraw Hill, 2007.

(Chapters 5, 6, 11, 12, 15)

**Reference Books:**

1. Y. Daniel Liang: Introduction to JAVA Programming, 7th Edition, Pearson Education, 2007.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education, 2004.

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**MULTIMEDIA COMPUTING**

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| **Subject Code: 10CS754** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

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|  | **PART – A** |
| **UNIT – 1** | **7 Hours** |
| **Introduction, Media and Data Streams, Audio Technology:** Multimedia | |
| Elements; Multimedia | Applications; Multimedia Systems Architecture; |

Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards; The need for Data Compression; Multimedia Databases.

Media: Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Presentation Spaces & Values, and Presentation Dimensions; Key Properties of a Multimedia System: Discrete & Continuous Media, Independence Media, Computer Controlled Systems, Integration; Characterizing Data Streams: Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous Transmission Mode; Characterizing Continuous Media Data Streams.

Sound: Frequency, Amplitude, Sound Perception and Psychoacoustics; Audio Representation on Computers; Three Dimensional Sound Projection; Music and MIDI Standards; Speech Signals; Speech Output; Speech Input; Speech Transmission.

**UNIT – 2** **7 Hours**

**Graphics and Images, Video Technology, Computer-Based Animation:** Capturing Graphics and Images Computer Assisted Graphics and Image Processing; Reconstructing Images; Graphics and Image Output Options.

Basics; Television Systems; Digitalization of Video Signals; Digital Television; Basic Concepts; Specification of Animations; Methods of

Controlling Animation; Display of Animation; Transmission of Animation; Virtual Reality Modeling Language.

**UNIT – 3** **7 Hours**

**Data Compression – 1:** Storage Space; Coding Requirements; Source,Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG: Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT-based Mode, Lossless Mode, Hierarchical Mode

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| **UNIT – 4** | **6 Hours** |
| **Data Compression – 2:** H.261 (Px64) and H.263: Image Preparation, Coding | |
| Algorithms, Data Stream, H.263+ and H.263L; MPEG: Video Encoding, | |
| Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal | |
| Compression. |  |
| **PART - B** |  |
| **UNIT – 5** | **6 Hours** |
| **Optical Storage Media:** History of Optical Storage; Basic Technology; | |
| Video Discs and Other WORMs; Compact Disc Digital Audio; Compact Disc | |
| Read Only Memory; CD-ROM Extended Architecture; Further CD-ROM- | |
| Based Developments; Compact Disc Recordable; Compact Disc Magneto- | |
| Optical; Compact Disc Read/Write; Digital Versatile Disc. |  |
| **UNIT – 6** | **6 Hours** |
| **Content Analysis :** Simple Vs. Complex Features; Analysis of | Individual |
| Images; Analysis of Image Sequences; Audio Analysis; Applications. | |
| **UNIT – 7** | **6 Hours** |

**Data and File Format Standards:** Rich-Text Format; TIFF File Format;Resource Interchange File Format (RIFF); MIDI File Format; JPEG DIB File Format for Still and Motion Images; AVI Indeo File Format; MPEG Standards; TWAIN

**UNIT – 8** **7 Hours**

**Multimedia Application Design :** Multimedia Application Classes; Types ofMultimedia Systems; Virtual Reality Design; Components of Multimedia Systems; Organizing Multimedia Databases; Application Workflow Design Issues; Distributed Application Design Issues.

**Text Books:**

1. Ralf Steinmetz, Klara Narstedt: Multimedia Fundamentals: Vol 1-Media Coding and Content Processing, 2nd Edition, PHI, Indian Reprint 2008.

(Chapters 2, 3, 4, 5, 6, 7, 8, 9)

1. Prabhat K. Andleigh, Kiran Thakrar: Multimedia Systems Design, PHI, 2003.

(Chapters 1, 3, 7)

**Reference Books:**

1. K.R Rao, Zoran S. Bojkovic and Dragorad A. Milovanovic: Multimedia Communication Systems: Techniques, Standards, and Networks, Pearson Education, 2002.
2. Nalin K Sharad: Multimedia Information Networking, PHI, 2002.

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**DATA WAREHOUSING AND DATA MINING**

**Subject Code: 10CS755**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1**

**Data Warehousing:**

**6 Hours**

Introduction, Operational Data Stores (ODS), Extraction Transformation Loading (ETL), Data Warehouses. Design Issues, Guidelines for Data Warehouse Implementation, Data Warehouse Metadata

**UNIT – 2**

**6 Hours**

**Online Analytical Processing (OLAP):** Introduction, Characteristics of

OLAP systems, Multidimensional view and Data cube, Data Cube

Implementations, Data Cube operations, Implementation of OLAP and

overview on OLAP Softwares.

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| **UNIT – 3** | **6 Hours** |
| **Data Mining:** Introduction, Challenges, Data Mining Tasks, Types of Data, | |
| Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining | |
| Applications |  |
| **UNIT – 4** | **8 Hours** |

**Association Analysis: Basic Concepts and Algorithms:** Frequent ItemsetGeneration, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Itemsets, FP Growth Algorithm, Evaluation of Association Patterns

**PART - B**

**UNIT – 5** **6 Hours**

**Classification -1 :** Basics, General approach to solve classification problem,Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers.

**UNIT – 6** **6 Hours**

**Classification - 2 :** Bayesian Classifiers, Estimating Predictive accuracy ofclassification methods, Improving accuracy of clarification methods, Evaluation criteria for classification methods, Multiclass Problem.

83

**UNIT – 7** **8 Hours**

**Clustering Techniques:** Overview, Features of cluster analysis, Types ofData and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis

**UNIT – 8** **6 Hours**

**Web Mining:** Introduction, Web content mining, Text Mining, UnstructuredText, Text clustering, Mining Spatial and Temporal Databases.

**Text Books:**

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson Education, 2005.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.

**Reference Books:**

1. Arun K Pujari: Data Mining Techniques 2nd Edition, Universities Press, 2009.
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
3. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining, and OLAP Computing, Mc GrawHill Publisher, 1997.

**NEURAL NETWORKS**

**Subject Code: 10CS756**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1**

**Introduction**

**7 Hours**

What is a Neural Network?, Human Brain, Models of Neuron, Neural Networks viewed as directed graphs, Feedback, Network Architectures, Knowledge representation, Artificial Intelligence and Neural Networks.

**UNIT – 2**

**Learning Processes – 1**

**6 Hours**

Introduction, Error-correction learning, Memory-based learning, Hebbian learning, Competitive learning,Boltzamann learning, Credit Assignment problem, Learning with a Teacher, Learning without a Teacher, Learning tasks, Memory, Adaptation.

**UNIT – 3** **7 Hours**

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**Learning Processes – 2** , **Single Layer Perceptrons:** Statistical nature of thelearning process, Statistical learning theory, Approximately correct model of learning.

Single Layer Perceptrons: Introduction, Adaptive filtering problem, Unconstrained optimization techniques, Linear least-squares filters**,** Least-mean square algorithm, Learning curves, Learning rate annealing techniques, Perceptron, Perceptron convergence theorem, Relation between the Perceptron and Bayes classifier for a Gaussian environment.

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| **UNIT – 4** | **6 Hours** | |
| **Multilayer** | **Perceptrons – 1:** Introduction, Some preliminaries, | Back- |
| propagation | Algorithm, Summary of back-propagation algorithm, | XOR |

problem, Heuristics for making the back-propagation algorithm perform better, Output representation and decision rule, Computer experiment, Feature detection, Back-propagation and differentiation.

**PART - B**

**UNIT – 5** **7 Hours**

**Multilayer Perceptrons – 2:** Hessian matrix, Generalization, approximationof functions, Cross validation, Network pruning techniques, virtues and limitations of back- propagation learning, Accelerated convergence of back propagation learning, Supervised learning viewed as an optimization problem, Convolution networks.

**UNIT – 6** **6 Hours**

**Radial-Basic Function Networks – 1:** Introduction, Cover’s theorem on theseparability of patterns, Interpolation problem, Supervised learning as an ill-posed Hypersurface reconstruction problem, Regularization theory, Regularization networks, Generalized radial-basis function networks, XOR problem, Estimation of the regularization parameter.

**UNIT – 7 6 Hours Radial-Basic Function Networks – 2, Optimization – 1:** Approximation

properties of RBF networks, Comparison of RBF networks and multilayer Perceptrons, Kernel regression and it’s relation to RBF networks, Learning strategies, Computer experiment.

Optimization using Hopfield networks: Traveling salesperson problem, Solving simultaneous linear equations, Allocating documents to multiprocessors.

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**UNIT – 8**

**Optimization Methods – 2:**

**7 Hours**

Iterated gradient descent, Simulated Annealing, Random Search, Evolutionary computation- Evolutionary algorithms, Initialization, Termination criterion, Reproduction, Operators, Replacement, Schema theorem

**Text Books:**

1. Simon Haykin: Neural Networks - A Comprehensive Foundation, 2nd Edition, Pearson Education, 1999.

(Chapters 1.1-1.8, 2.1-2.15, 3.1-3.10, 4.1-4.19, 5.1-5.14)

1. Kishan Mehrotra, Chilkuri K. Mohan, Sanjay Ranka: Artificial Neural Networks, Penram International Publishing, 1997.

(Chapters 7.1-7.5)

**Reference Books:**

1. B.Yegnanarayana: Artificial Neural Networks, PHI, 2001.

**C# PROGRAMMING AND .NET**

**Subject Code: 10CS761**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1** **6 Hours**

**Interfaces and Collections:** Defining Interfaces Using C# Invoking InterfaceMembers at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects ( ICloneable), Building Comparable Objects ( I Comparable ),

Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).

**UNIT – 2** **8 Hours**

**Callback Interfaces, Delegates, and Events, Advanced Techniques:** Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, , Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using)Events.

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The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer . Using C# Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading Operators, interacting with Overload Operator from Overloaded- Operator- Challenged Languages, Creating Custom Conversion Routines, Defining Implicit Conversion Routines, The Internal Representations of Customs Conversion Routines

**UNIT – 3** **6 Hours**

**Understanding .NET Assembles:** Problems with Classic COM Binaries, AnOverview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary’s, Manifest, Exploring the CarLibrary’s Types, Building the Multifile Assembly ,Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies ( The

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| Details), Understanding Shared Assembly, | Understanding Shared Names, |
| BuildingaSharedAssembly,UnderstandingDelaySigning, | |
| Installing/Removing Shared Assembly, Using a Shared Assembly | |
| **UNIT – 4** | **6 Hours** |

**Object- Oriented Programming with C#:** Forms Defining of the C# Class,Definition the “Default Public Interface” of a Type , Recapping the Pillars of OOP, The First Pillars: C#’s Encapsulation Services, Pseudo- Encapsulation: Creating Read-Only Fields, The Second Pillar: C#’s Inheritance Supports, keeping Family Secrets: The “ Protected” Keyword, N ested Type Definitions, The Third Pillar: C #’s Polymorphic Support, Casting Between .

**PART – B**

**UNIT – 5** **6 Hours**

**Exceptions and Object Lifetime:** Ode to Errors, Bugs, and Exceptions, TheRole of .NET Exception Handing, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception(System. System Exception), Custom Application-Level Exception(System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debuggin g System Exception Using VS. NET, Understanding Object Lifetime, the CIT of “new’, The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type.

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**UNIT – 6** **6 Hours**

**Interfaces and Collections:** Defining Interfaces Using C# Invoking InterfaceMembers at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects ( I Comparable ), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).

**UNIT – 7** **8 Hours**

**Callback Interfaces, Delegates, and Events, Advanced Techniques:** Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using)Events.

The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer . Using C# Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading Operators, interacting with Overload Operator from Overloaded- Operator- Challenged Languages, Creating Custom Conversion Routines, Defining Implicit Conversion Routines, The Internal Representations of Customs Conversion Routines

**UNIT – 8** **6 Hours**

**Understanding .NET Assembles:** Problems with Classic COM Binaries, AnOverview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary’s, Manifest, Exploring the CarLibrary’s Types, Building the Multifile Assembly, Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies ( The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly

**Text Books:**

1. Andrew Troelsen: Pro C# with .NET 3.0, 4th Edition, Wiley India, 2009.

Chapters: 1 to 11 (up to pp.369)

1. E. Balagurusamy: Programming in C#, 2nd Edition, Tata McGraw Hill, 2008.

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(Programming Examples 3.7, 3.10, 5.5, 6.1, 7.2, 7.4, 7.5, 7.6, 8.1,

8.2, 8.3, 8.5, 8.7, 8.8, 9.1, 9.2, 9.3, 9.4, 10.2, 10.4, 11.2, 11.4, 12.1,

12.4, 12.5, 12.6, 13.1, 13.2, 13.3, 13.6, 14.1, 14.2, 14.4, 15.2, 15.3,

16.1, 16.2, 16.3, 18.3, 18.5.18.6)

**Reference Books:**

1. Tom Archer: Inside C#, WP Publishers, 2001.
2. Herbert Schildt: C# The Complete Reference, Tata McGraw Hill, 2004.

**DIGITAL IMAGE PROCESSING**

**Subject Code: 10CS762**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1** **6 Hours**

**Digitized Image and its properties:** Basic concepts, Image digitization,Digital image properties

**UNIT – 2** **7 Hours**

**Image Preprocessing:** Image pre-processing: Brightness and geometrictransformations, local preprocessing.

**UNIT – 3**

**7 Hours**

**Segmentation – 1:**

Thresholding, Edge-based segmentation.

**UNIT – 4**

**7 Hours**

**Segmentation – 2:**

Region based segmentation, Matching.

**PART – B**

**UNIT – 5** **7 Hours**

**Image Enhancement:** Image enhancement in the spatial domain:Background, Some basic gray level transformations, Histogram processing, Enhancement using arithmetic/ logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Image enhancement in the frequency domain: Background, Introduction to the Fourier transform and the frequency domain, Smoothing Frequency-Domain filters, Sharpening Frequency Domain filters, Homomorphic filtering.

**UNIT – 6** **6 Hours**

**Image Compression:** Image compression: Fundamentals, Image compressionmodels, Elements of information theory, Error-Free Compression, Lossy compression.

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**UNIT – 7 7 Hours Shape representation:** Region identification, Contour-based shape

representation and description, Region based shape representation and description, Shape classes.

**UNIT – 8** **6 Hours**

**Morphology:** Basic morphological concepts, Morphology principles, Binarydilation and erosion, Gray-scale dilation and erosion, Morphological segmentation and watersheds

**Text Books:**

1. Milan Sonka, Vaclav Hlavac and Roger Boyle: Image Processing, Analysis and Machine Vision, 2nd Edition, Thomoson Learning, 2001.

(Chapters 2, 4.1 to 4.3, 5.1 to 5.4, 6, 11.1 to 11.4, 11.7)

1. Rafel C Gonzalez and Richard E Woods: Digital Image Processing, 3rd Edition, Pearson Education, 2003.

(Chapters 3.1 to 3.7, 4.1 to 4.5, 8.1 to 8.5)

**Reference Books:**

1. Anil K Jain, “Fundamentals of Digital Image Process ing”, PHI, 1997, Indian Reprint 2009.
2. B.Chanda, D Dutta Majumder, “Digital Image Processi ng and Analysis”, PHI, 2002.

**GAME THEORY**

**Subject Code: 10CS763**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT – 1** **8 Hours**

**Introduction, Strategic Games:** What is game theory? The theory of rationalchoice; Interacting decision makers.

Strategic games; Examples: The prisoner’s dilemma, Bach or Stravinsky, Matching pennies; Nash equilibrium; Examples of Nash equilibrium; Best-response functions; Dominated actions; Equilibrium in a single population: symmetric games and symmetric equilibria.

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**UNIT – 2** **6 Hours**

**Mixed Strategy Equilibrium:** Introduction; Strategic games in which playersmay randomize; Mixed strategy Nash equilibrium; Dominated actions; Pure equilibria when randomization is allowed, Illustration: Expert Diagnosis; Equilibrium in a single population, Illustration: Reporting a crime; The formation of players’ beliefs; Extensions; Representing preferences by expected payoffs.

**UNIT – 3** **6 Hours**

**Extensive Games:** Extensive games with perfect information; Strategies andoutcomes; Nash equilibrium; Subgame perfect equilibrium; Finding subgame perfect equilibria of finite horizon games: Backward induction. Illustrations: The ultimatum game, Stackelberg’s model of duopoly, Buying votes.

**UNIT – 4 6 Hours Extensive games: Extensions and Discussions:** Extensions: Allowing for

simultaneous moves, Illustrations: Entry in to a monopolized industry, Electoral competition with strategic voters, Committee decision making, Exit from a declining industry; Allowing for exogenous uncertainty, Discussion: subgame perfect equilibrium and backward induction.

**PART – B**

**UNIT – 5** **7 Hours**

**Bayesian Games, Extensive Games with Imperfect Information:** Motivational examples; General definitions; Two examples concerning information; Illustrations: Cournot’s duopoly game with imperfect information, Providing a public good, Auctions; Auctions with an arbitrary distribution of valuations.

Extensive games with imperfect information; Strategies; Nash equilibrium; Beliefs and sequential equilibrium; Signaling games; Illustration: Strategic information transmission.

**UNIT – 6 7 Hours Strictly Competitive Games, Evolutionary Equilibrium:** Strictly

competitive games and maximization; Maximization and Nash equilibrium; Strictly competitive games; Maximization and Nash equilibrium in strictly competitive games.

Evolutionary Equilibrium: Monomorphic pure strategy equilibrium; Mixed strategies and polymorphic equilibrium; Asymmetric contests; Variations on themes: Sibling behavior, Nesting behavior of wasps, The evolution of sex ratio.

**UNIT – 7**

**6 Hours**

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**Iterated Games:** Repeated games: The main idea; Preferences; Repeatedgames; Finitely and infinitely repeated Prisoner’s dilemma; Strategies in an infinitely repeated Prisoner’s dilemma; Some Nash equilibria of an infinitely repeated Prisoner’s dilemma, Nash equilibrium payo ffs of an infinitely repeated Prisoner’s dilemma.

**UNIT – 8 6 Hours Coalitional Games and Bargaining:** Coalitional games. The Core.

Illustrations: Ownership and distribution of wealth, Exchanging homogeneous items, Exchanging heterogeneous items, Voting, Matching. Bargaining as an extensive game; Illustration of trade in a market; Nash's axiomatic model of bargaining

**Text Books:**

1. Martin Osborne: An Introduction to Game Theory, Oxford

University Press, Indian Edition, 2004.

(Listed topics only from Chapters 1 to 11, 13, 14, 16)

**Reference Books:**

1. Roger B. Myerson: Game Theory: Analysis of Conflict, Harvard University Press, 1997.
2. Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green: Microeconomic Theory. Oxford University Press, New York, 1995.
3. Philip D. Straffin, Jr.: Game Theory and Strategy, The Mathematical Association of America, January 1993.

**ARTIFICIAL INTELLIGENCE**

**Subject Code: 10CS764**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT – 1** **7 Hours**

**Introduction:** What is AI? Intelligent Agents: Agents and environment;Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies.

**UNIT – 2** **7 Hours**

**Informed Search, Exploration, Constraint Satisfaction, Adversial Search:** Informed search strategies; Heuristic functions; On-line search agents and unknown environment. Constraint satisfaction problems; Backtracking search

92

for CSPs. Adversial search: Games; Optimal decisions in games; Alpha-Beta pruning.

**UNIT – 3** **6 Hours**

**Logical Agents:** Knowledge-based agents; The wumpus world as an exampleworld; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

**UNIT – 4 6 Hours First-Order Logic, Inference in First-Order Logic – 1:** Representation

revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting

**PART – B**

**UNIT – 5**

**6 Hours**

**Inference in First-Order Logic – 2:** Forward chaining; Backward chaining;Resolution.

**UNIT – 6** **7 Hours**

**Knowledge Representation:** Ontological engineering; Categories andobjects; Actions, situations, and events; Mental events and mental objects; The Internet shopping world; Reasoning systems for categories; Reasoning with default information; Truth maintenance systems.

**UNIT – 7** **7 Hours**

**Planning, Uncertainty, Probabilistic Reasoning:** Planning: The problem;Planning with state-space approach; Planning graphs; Planning with propositional logic.

Uncertainty: Acting under certainty; Inference using full joint distributions; Independence; Bayes’ rule and its use.

Probabilistic Reasoning: Representing knowledge in an uncertain domain; The semantics of Bayesian networks; Efficient representation of conditional distributions; Exact inference in Bayesian networks.

**UNIT – 8** **6 Hours**

**Learning, AI: Present and Future:** Learning: Forms of Learning; Inductivelearning; Learning decision trees; Ensemble learning; Computational learning theory.

AI: Present and Future: Agent components; Agent architectures; Are we going in the right direction? What if AI does succeed?

**Text Books:**

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1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003.

( Chapters 1.1, 2, 3.1 to 3.4, 4.1, 4.2, 4.5, 5.1, 5.2, 6.1, 6.2, 6.3, 7, 8, 9, 10, 11.1, 11.2, 11.4, 11.5, 13.1, 13.4, 13.5, 13.6, 14.1, 14.2, 14.3, 14.4, 18, 27)

**Reference Books:**

1. Elaine Rich, Kevin Knight: Artificial Intelligence, 3rd Edition, Tata McGraw Hill, 2009.
2. Nils J. Nilsson: Principles of Artificial Intelligence, Elsevier, 1980.

**STORAGE AREA NETWORKS**

**Subject Code: 10CS765**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks** **: 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART –A**

**UNIT - 1** **7 Hours**

**Introduction to Information Storage and Management, Storage System Environment:** Information Storage, Evolution of Storage Technology andArchitecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle

Components of Storage System Environment, Disk Drive Components, Disk Drive Performance, Fundamental Laws Governing Disk Performance, Logical Components of the Host, Application Requirements and Disk Performance.

**UNIT - 2** **6 Hours**

**Data Protection, Intelligent Storage system:** Implementation of RAID,RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk Performance, Hot Spares

Components of an Intelligent Storage System, Intelligent Storage Array

**UNIT - 3 7 Hours Direct-Attached Storage, SCSI, and Storage Area Networks:** Types of

DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, Overview of Fibre Channel, The SAN and Its Evolution, Components of SAN, FC Connectivity, Fibre Channel Ports, Fibre Channel Architecture, Zoning, Fibre Channel Login Types, FC Topologies.

**UNIT - 4** **6 Hours**

**NAS, IP SAN:** General – Purpose Service vs. NAS Devices, Benefits ofNAS, NAS File I / O, Components of NAS, NAS Implementations, NAS

94

File-Sharing Protocols, NAS I/O Operations, Factors Affecting NAS Performance and Availability. iSCSI, FCIP.

**PART - B**

**UNIT - 5 6 Hours Content-Addressed Storage, Storage Virtualization:** Fixed Content andArchives, Types of Archive, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS, CAS Examples

Forms of Virtualization, SNIA Storage Virtualization Taxonomy, Storage Virtualizations Configurations, Storage Virtualization Challenges, Types of Storage Virtualization

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| **UNIT - 6** | **6 Hours** |
| **Business Continuity, Backup and Recovery:** Information Availability, BC | |
| Terminology, BC Planning Lifecycle, Failure Analysis, | Business Impact |

Analysis, BC Technology Solutions.

Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

**UNIT - 7 7 Hours Local Replication, Remote Replication:** Source and Target, Uses of Local

Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations, Creating Multiple Replicas, Management Interface, Modes of Remote Replication, Remote Replication Technologies, Network Infrastructure.

**UNIT - 8** **7 Hours**

**Securing the Storage Infrastructure, Managing the Storage Infrastructure:** Storage Security Framework, Risk Triad, Storage SecurityDomains, Security Implementations in Storage Networking

Monitoring the Storage Infrastructure, Storage Management Activities, Storage Infrastructure Management Challenges, Developing an Ideal Solution.

**Text Books:**

1. G. Somasundaram, Alok Shrivastava (Editors): Information Storage and Management, EMC Education Services, Wiley India, 2009.

**Reference Books:**

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2003.
2. Rebert Spalding: Storage Networks, The Complete Reference, Tata McGraw Hill, 2003.

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1. Richard Barker and Paul Massiglia: Storage Area Networks Essentials A Complete Guide to Understanding and Implementing SANs, Wiley India, 2002.

**FUZZY LOGIC**

**Subject Code: 10CS766**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

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| **PART – A** |  |
| **UNIT – 1** | **7 Hours** |
| **Introduction, Classical Sets and Fuzzy Sets:** Background, Uncertainty and | |
| Imprecision, Statistics and Random Processes, Uncertainty in Information, | |
| Fuzzy Sets and Membership, Chance versus Ambiguity. |  |

Classical Sets - Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions

Fuzzy Sets - Fuzzy Set operations, Properties of Fuzzy Sets. Sets as Points in Hypercubes

**UNIT – 2 6 Hours Classical Relations and Fuzzy Relations:** Cartesian Product, Crisp Relations

* Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Non-interactive Fuzzy Sets. Tolerance and Equivalence Relations - Crisp Equivalence Relation, Crisp Tolerance Relation, Fuzzy Tolerance and Equivalence Relations. Value Assignments - Cosine Amplitude, Max-min Method, Other Similarity methods

**UNIT – 3 6 Hours Membership Functions:** Features of the Membership Function, Standard

Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

**UNIT – 4** **7 Hours**

**Fuzzy-to-Crisp Conversions, Fuzzy Arithmetic:** Lambda-Cuts for FuzzySets, Lambda-Cuts for Fuzzy Relations, Defuzzification Methods

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Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets – Extension Principle, Fuzzy Transform ( Mapping), Practical Considerations, Fuzzy Numbers

Interval Analysis in Arithmetic, Approximate Methods of Extension - Vertex method, DSW Algorithm, Restricted DSW Algorithm, Comparisons, Fuzzy Vectors

**PART - B**

**UNIT – 5** **6 Hours**

**Classical Logic and Fuzzy Logic:** Classical Predicate Logic – Tautologies,Contradictions, Equivalence, Exclusive OR and Exclusive NOR, Logical Proofs, Deductive Inferences. Fuzzy Logic, Approximate Reasoning, Fuzzy Tautologies, Contradictions, Equivalence and Logical Proofs, Other forms of the Implication Operation, Other forms of the Composition Operation

**UNIT – 6** **6 Hours**

**Fuzzy Rule- Based Systems:** Natural Language, Linguistic Hedges, Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference

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| **UNIT – 7** | **7 Hours** |
| **Fuzzy Decision Making :** Fuzzy Synthetic Evaluation, Fuzzy Ordering, | |
| Preference and consensus, Multiobjective Decision Making, | Fuzzy Bayesian |

Decision Method, Decision Making under Fuzzy States and Fuzzy Actions.

**UNIT – 8** **7 Hours**

**Fuzzy Classification:** Classification by Equivalence Relations - CrispRelations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering

**Text Books:**

1. Timothy J. Ross: Fuzzy Logic with Engineering Applications, 2nd Edition, Wiley India, 2006..

(Chapter 1 (pp 1-14), Chapter 2 (pp 17-34), Chapter 3 ( pp 46-70), Chapter 4 (pp 87-122), Chapter 5 (pp 130-146), Chapter 6 (pp 151-178), Chapter 7 ( pp 183-210), Chapter 8 (pp 232-254), Chapter 9 (pp 313-352), Chapter 10 ( pp 371 – 400))

**Reference Books:**

1. B Kosko: Neural Networks and Fuzzy systems: A Dynamical System approach, PHI, 1991.

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| **Networks Laboratory** |  |  |
| **Subject Code: 10CSL77** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

**Note: Student is required to solve one problem from PART-A and one problem from PART-B. The questions are allotted based on lots. Both questions carry equal marks.**

**PART A – Simulation Exercises**

**The following experiments shall be conducted using either NS228/OPNET or any other suitable simulator.**

1. Simulate a three nodes point – to – point network w ith duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate a four node point-to-point network with the links connected as follows:

n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent betwe en n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

1. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
2. Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
3. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
4. Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

**PART-B**

**Implement the following in C/C++:**

1. Write a program for error detecting code using CRC-CCITT (16- bits).
2. Write a program for distance vector algorithm to find suitable path for transmission.
3. Using TCP/IP sockets, write a client – server progr am to make the client send the file name and to make the server send back the contents of the requested file if present.

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1. Implement the above program using as message queues or FIFOs as IPC channels.
2. Write a program for simple RSA algorithm to encrypt and decrypt the data.
3. Write a program for congestion control using leaky bucket algorithm.

**Note:**

In the examination, a combination of one problem has to be asked from Part A for a total of 25 marks and one problem from Part B has to be asked for a total of 25 marks. The choice must be based on random selection from the entire lots.

**Web Programming Laboratory**

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| **Subject Code: 10CSL78** | **I.A. Marks : 25** | |
| **Hours/Week : 03** | **Exam** | **Hours: 03** |
| **Total Hours : 42** | **Exam** | **Marks: 50** |

1. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:
   1. Input: A number n obtained using prompt

Output: The first n Fibonacci numbers

* 1. Input: A number n obtained using prompt

Output: A table of numbers from 1 to n and their squares using **alert**

1. a) Develop and demonstrate, using Javascript script, a XHTML document that collects the USN ( the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
   1. Modify the above program to get the current semester also (restricted to be a number from 1 to 8)
2. a) Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
   1. Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.
3. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include

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USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

* 1. Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.

1. a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.
   1. Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.
2. a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.
   1. Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
3. Write a Perl program to display a digital clock which displays the current time of the server.
4. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.
5. Write a PHP program to store current date-time in a COOKIE and display the ‘Last visited on’ date-time on the web page upon reopening of the same page.
6. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
7. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.
8. Build a Rails application to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

**Note: In the examination *each* student picks one question from the lot of *all* 12 questions.**

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**VIII SEMESTER**

**SOFTWARE ARCHITECTURES**

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| **Subject Code: 10IS81** | **I.A. Marks : 25** | |
| **Hours/Week : 04** | **Exam** | **Hours: 03** |
| **Total Hours : 52** | **Exam** | **Marks: 100** |

**PART – A**

**UNIT – 1** **6 Hours**

**Introduction:** The Architecture Business Cycle: Where do architecturescome from? Software processes and the architecture business cycle; What makes a “good” architecture? What software archite cture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

**UNIT – 2** **7 Hours**

**Architectural Styles and Case Studies:** Architectural styles; Pipes andfilters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style.

**UNIT – 3** **6 Hours**

**Quality:** Functionality and architecture; Architecture and quality attributes;System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.

**UNIT – 4** **7 Hours**

**Architectural Patterns – 1:** Introduction; From mud to structure: Layers,Pipes and Filters, Blackboard.

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| **PART – B** |  |
| **UNIT – 5** | **7 Hours** |
| **Architectural Patterns – 2:** Distributed Systems: Broker; Interactive | |
| Systems: MVC, Presentation-Abstraction-Control. |  |
| **UNIT – 6** | **6 Hours** |
| **Architectural Patterns – 3:** Adaptable Systems: Microkernel; Reflection. | |
| **UNIT – 7** | **6 Hours** |
| **Some Design Patterns:** Structural decomposition: Whole | – Part; |
| Organization of work: Master – Slave; Access Contro l: Proxy. |  |
| **UNIT – 8** | **7 Hours** |

**Designing and Documenting Software Architecture:** Architecture in thelife cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views.

**Text Books:**

1. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, 2nd Edition, Pearson Education, 2003.

(Chapters 1, 2, 4, 5, 7, 9)

1. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007.

(Chapters 2, 3.1 to 3.4)

1. Mary Shaw and David Garlan: Software Architecture- Perspectives on an Emerging Discipline, PHI, 2007.

(Chapters 1.1, 2, 3)

**Reference Books:**

1. E. Gamma, R. Helm, R. Johnson, J. Vlissides: Design Patterns-Elements of Reusable Object-Oriented Software, Pearson Education, 1995.

**Web Reference:** http://www.hillside.net/patterns/

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| **SYSTEM MODELING AND SIMULATION** | |  |
| **Sub Code: 10CS82** | **IA Marks** | **: 25** |
| **Hrs/Week: 04** | **Exam Hours** | **: 03** |
| **Total Hrs: 52** | **Exam Marks** | **: 100** |
|  | **PART – A** |  |
| **UNIT – 1** |  | **8 Hours** |

**Introduction:** When simulation is the appropriate tool and when it is notappropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. The basics of Spreadsheet simulation, Simulation example: Simulation of queuing systems in a spreadsheet.

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| **UNIT – 2** | **6 Hours** |
| **General Principles, Simulation Software:** Concepts in Discrete-Event | |
| Simulation: The Event-Scheduling / Time-Advance | Algorithm, World |

Views, Manual simulation Using Event Scheduling; List processing. Simulation in Java; Simulation in GPSS

**UNIT – 3** **6 Hours**

**Statistical Models in Simulation:** Review of terminology and concepts;

Useful statistical models; Discrete distributions; Continuous distributions;

Poisson process; Empirical distributions.

**UNIT – 4** **6 Hours**

**Queuing Models:** Characteristics of queuing systems; Queuing notation;Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues; Rough-cut modeling: An illustration..

**PART – B**

**UNIT – 5** **8 Hours**

**Random-Number Generation, Random-Variate Generation:** Properties ofrandom numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties.

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**UNIT – 6** **6 Hours**

**Input Modeling :** Data Collection; Identifying the distribution with data;Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models.

**UNIT – 7** **6 Hours**

**Estimation of Absolute Performance:** Types of simulations with respect tooutput analysis; Stochastic nature of output data; Absolute measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations.

**UNIT – 8** **6 Hours**

**Verification, Calibration, and Validation; Optimization:** Model building,verification and validation; Verification of simulation models; Calibration

and validation of models, Optimization via Simulation

**Text Books**:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation, 5th Edition, Pearson Education, 2010.

(Listed topics only from Chapters1 to 12)

**Reference Books**:

1. Lawrence M. Leemis, Stephen K. Park: Discrete – Eve nt

Simulation: A First Course, Pearson Education, 2006.

1. Averill M. Law: Simulation Modeling and Analysis, 4th Edition, Tata McGraw-Hill, 2007.

**WIRELESS NETWORKS AND MOBILE COMPUTING**

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| --- | --- | --- |
| **Sub Code: 10CS831** | **IA Marks** | **: 25** |
| **Hrs/Week: 04** | **Exam Hours** | **: 03** |
| **Total Hrs: 52** | **Exam Marks** | **: 100** |

**PART-A**

**UNIT – 1**

**6 Hours**

**Mobile Computing Architecture:** Types of Networks, Architecture forMobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing.

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**UNIT – 2 7 Hours Wireless Networks – 1: GSM and SMS:** Global Systems for Mobile

Communication ( GSM and Short Service Messages ( SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications

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| **UNIT – 3** | **6 Hours** |
| **Wireless Networks – 2: GPRS :** GPRS and Packet Data Network, GPRS | |
| Network Architecture, GPRS Network Operations, Data Services in GPRS, | |
| Applications for GPRS, Billing and Charging in GPRS | |
| **UNIT – 4** | **7 Hours** |
| **Wireless Networks – 3: CDMA, 3G and WiMAX:** Spread Spectrum | |
| technology, IS-95, CDMA versus GSM, | Wireless Data, Third Generation |
| Networks, Applications on 3G, Introduction to WiMAX. | |
| **PART - B** | |
| **UNIT – 5** | **6 Hours** |

**Mobile Client:** Moving beyond desktop, Mobile handset overview, Mobile

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| phones and | their features, PDA, Design Constraints in applications for |
| handheld | devices.Mobile IP: Introduction, discovery, Registration, |
| Tunneling, Cellular IP, Mobile IP with IPv6 | |
| **UNIT – 6** | **7 Hours** |
| **Mobile OS and Computing Environment:** Smart Client Architecture, The | |
| Client: User Interface, Data Storage, Performance, Data Synchronization, | |
| Messaging. The Server: Data Synchronization, Enterprise Data Source, | |
| Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, | |

Linux, Proprietary OS Client Development : The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators.

**UNIT – 7** **6 Hours**

**Building, Mobile Internet Applications:** Thin client: Architecture, theclient, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML.

**UNIT – 8** **7 Hours**

**J2ME:** Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDletmodel, Provisioning, MIDlet life-cycle, Creating new application, MIDlet

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event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.

**Text Books:**

1. Dr. Ashok Talukder, Ms Roopa Yavagal, Mr. Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2d Edition, Tata McGraw Hill, 2010
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley, 2003

**Reference Books:**

1. Raj kamal: Mobile Computing, Oxford University Press, 2007.
2. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

**WEB 2.0 AND RICH INTERNET APPLICATIONS**

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| **Sub Code: 10CS832** | **IA Marks** | **: 25** |
| **Hrs/ Week: 04** | **Exam Hours** | **: 03** |
| **Total Hours: 52** | **Exam Marks** | **: 100** |

**PART - A**

**UNIT – 1** **6 Hours**

**Introduction, Ajax – 1:** Web 2.0 and Rich Internet Applications, Overviewof Ajax, Examples of usage of Ajax: Updating web page text, Chatting in real time, Dragging and dropping, Downloading images. Creating Ajax Applications: An example, Analysis of example ajax.html, Creating the JavaScript, Creating and opening the XMLHttpRequest object, Data download, Displaying the fetched data, Connecting to the server, Adding Server-side programming, Sending data to the server using GET and POST, Using Ajax together with XML.

**UNIT – 2** **7 Hours**

**Ajax – 2:** Handling multiple XMLHttpRequest objects in the same page,Using two XMLHttpRequest objects, Using an array of XMLHttpRequest objects, Using inner functions, Downloading JavaScript, connecting to Google Suggest, Creating google.php, Downloading from other domains with Ajax, HTML header request and Ajax, Defeating caching, Examples.Building XML and working with XML in JavaScript, Getting the document element, Accessing any XML element, Handling whitespace in Firefox, Handling cross-browser whitespace, Accessing XML data directly, Validating XML, Further examples of Rich Internet Applications with Ajax.

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**UNIT – 3** **6 Hours**

**Ajax – 3:** Drawing user’s attention to downloaded text, Styling text, colorsand background using CSS, Setting element location in the web pages, Setting the stacking order of web page elements, Further examples of using Ajax. Displaying all the data in an HTML form, Working with PHP server variables, Getting the data in to array format, Wrapping applications in to a single PHP page, Validating input from the user, Validating integers and text, DOM, Appending new elements to a web page using the DOM and Ajax, Replacing elements using the DOM, Handling timeouts in Ajax, Downloading images with Ajax, Example programs.

**UNIT – 4** **7 Hours**

**Flex – 1 :** Introduction: Understanding Flex Application Technologies, UsingFlex Elements, Working with Data Services (Loading Data at Runtime), The Differences between Traditional and Flex Web Applications, Understanding How Flex Applications Work, Understanding Flex and Flash Authoring. Building Applications with the Flex Framework: Using Flex Tool Sets, Creating Projects, Building Applications, Deploying Applications Framework Fundamentals: Understanding How Flex Applications Are Structured, Loading and Initializing Flex Applications, Understanding the Component Life Cycles, Loading One Flex Application into Another Flex Application, Differentiating Between Flash Player and the Flex Framework, Caching the Framework, Understanding Application Domains, Localization, Managing Layout: Flex Layout Overview, Making Fluid Interfaces, Putting It All Together.

**PART B**

**UNIT – 5 7 Hours Flex – 2:** MXML: Understanding MXML Syntax and Structure, Making

MXML Interactive Working with UI Components: Understanding UI Components, Buttons, Value Selectors, Text Components, List-Based Controls, Pop-Up Controls, Navigators, Control Bars Customizing Application Appearance: Using Styles, Skinning components, Customizing the preloader, Themes, Runtime CSS

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| **UNIT – 6** | **6 Hours** |
| **Flex – 3:** ActionScript: Using ActionScript, MXML and ActionScript | |
| Correlations, Understanding ActionScript Syntax, Variables and Properties, | |
| Inheritance, Interfaces, Handling Events, Error Handling, Using XML | |
| **UNIT – 7** | **7 Hours** |
| **Flex – 4:** Managing State: Creating States, Applying States, Defining States, | |
| Adding and | Removing Components, Setting Properties, Setting Styles, |
|  | 107 |

Setting Event Handlers, Using Action Scripts to Define States, Managing Object Creation Policies, Handling State Events, Understanding State Life Cycles, When To Use States.Using Effects and Transitions: Using Effects, Creating Custom Effects, Using Transitions, Creating Custom Transitions.

**UNIT – 8** **6 Hours**

**Flex – 5:** Working with Data: Using Data Models, Data Binding, EnablingData Binding for Custom Classes, Data Binding Examples, Building data binding proxies.Validating and Formatting Data: Validating user input, Formatting Data.

**Text Books:**

1. Steven Holzner: Ajax: A Beginner’s Guide, Tata McGraw Hill, 2009.

(Listed topics from Chapters 3, 4, 6, 7, 11, 12)

1. Chafic Kazon and Joey Lott: Programming Flex 3, O’Reilly, June 2009.

(Listed topics from Chapters 1 to 8, 12 to 15)

**Reference Books:**

1. Jack Herrington and Emily Kim: Getting Started with Flex 3, O’Reilly, 1 st Edition, 2008.
2. Michele E. Davis and John A. Phillips: Flex 3 - A Beginner’s Guide, Tata McGraw-Hill, 2008.
3. Colin Moock: Essential Actionscript 3.0, O’Reilly Publications, 2007.
4. Nicholas C Zakas et al : Professional Ajax, 2nd Edition, Wrox/Wiley India, 2008.

**VLSI DESIGN AND ALGORITHMS**

**Sub Code: 10CS833**

**Hrs/Week: 04**

**Total Hrs: 52**

**IA Marks** **: 25**

**Exam Hours : 03**

**Exam Marks : 100**

**PART - A**

**UNIT 1** **6 Hours**

**Digital Systems and VLSI:** Why design Integrated Circuits? IntegratedCircuits manufacturing, CMOS Technology, Integrated Circuit Design Techniques, IP-based Design.

**UNIT 2**

**8 Hours**

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**Fabrication and Devices:** Fabrication Processes, Transistors, Wires andvias, SCMOS Design Rules, Layout design and tools.

**UNIT 3** **6 Hours**

**Logic Gates – 1:** Combinatorial logic functions, Static Complementarygates, Switch Logic.

**UNIT 4** **6 Hours**

**Logic Gates – 2:** Alternative gate Circuits, Low Power gates, Delay throughresistive interconnect; Delay through inductive interconnect, Design for yield, Gates as IP.

**PART - B**

**UNIT 5** **6 Hours**

**Combinational Logic Networks:** Standard cell-based layout, Combinatorialnetwork delay, Logic and interconnect design, Power Optimization, Switch logic networks, Combinational logic testing.

**UNIT 6** **6 Hours**

**Sequential Machines:** Latches and Flip-flops, Sequential systems andclocking disciplines, Clock generators, Sequential systems design, Power optimization, Design validation, Sequential testing.

**UNIT 7** **6 Hours**

**Architecture Design:**Register Transfer design, High Level Synthesis,Architecture for Low Power, Architecture testing.

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| **UNIT 8** |  |  | **8 Hours** |
| **Design Problems and Algorithms :** | Placement | and | Partitioning: Circuit |
| Representation, Wire-length Estimation, Types | | of | Placement Problems, |
| Placement Algorithms, Constructive | Placement, | Iterative Improvement, | |

Partitioning, The Kernighan-Lin Partitioning Algorithm. Floor Planning: Concepts, Shape functions and floor plan sizing.Routing: Types of Local Routing Problems, Area Routing, Channel Routing, Introduction to Global Routing, Algorithms for Global Routing

**Text Books:**

1. Wayne Wolf: Modern VLSI Design - IP-Based Design, 4th Edition, PHI Learning, 2009.

(Listed topics only from Chapters 1 to 5, and 8)

1. Sabih H. Gerez: Algorithms for VLSI Design Automation, Wiley India, 2007.

(Listed topics only from Chapters 7, 8, and 9)

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| **NETWORK MANAGEMENT SYSTEMS** | |  |
| **Sub Code: 10CS834** | **IA Marks** | **: 25** |
| **Hrs/Week: 04** | **Exam Hours** | **: 03** |
| **Total Hrs: 52** | **Exam Marks** | **: 100** |

**PART – A**

**UNIT 1 7 Hours Introduction:** Analogy of Telephone Network Management, Data and

Telecommunication Network Distributed computing Environments, TCP/IP-Based Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management – The I mportance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.

**UNIT 2 6 Hours Basic Foundations: Standards, Models, and Language:** Network

Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, M anaged Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.

**UNIT 3** **6 Hours**

**SNMPv1 Network Management - 1 :** Managed Network: The History ofSNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, System Overview.

**UNIT 4 7 Hours SNMPv1 Network Management – 2:** The Information Model –

Introduction, The Structure of Management Information, Managed Objects, Management Information Base.The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Model

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**PART - B**

**UNIT 5** **6 Hours**

**SNMP Management – RMON:** Remote Monitoring, RMON SMI and MIB,RMONI1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications; ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON.

**UNIT 6 6 Hours Broadband Network Management: ATM Networks:** Broadband

Networks and Services, ATM Technology – Virtual Pa th-Virtual Circuit, TM Packet Size, Integrated Service, SONET, ATM LAN Emulation, Virtual LAN; ATM Network Management – The ATM Network Refer ence Model, The Integrated Local Management Interface, The ATM Management Information Base, The Role of SNMP and ILMI in ATM Management, M1 Interface: Management of ATM Network Element, M2 Interface: Management of Private Networks, M3 Interface: Customer Network Management of Public Networks, M4 Interface: Public Network Management, Management of LAN Emulation, ATM Digital Exchange Interface Management.

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| **UNIT 7** | **6 Hours** |
| **Broadband Network Management:** Broadband Access Networks and | |
| Technologies – Broadband Access Networks, roadband | Access Technology; |

HFCT Technology – The Broadband LAN, The Cable Mode m, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network i n an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding

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| Schemes; ADSL Management – ADSL Network Management | | Elements, |
| ADSL Configuration Management, ADSL Fault Management, ADSL | | |
| Performance Management, SNMP-Based ADSL Line MIB, MIB Integration | | |
| with Interfaces Groups in MIB-2, ADSL Configuration Profiles. | |  |
| **UNIT 8** |  | **8Hours** |
| **Network Management Applications:** Configuration Management- Network | | |
| Provisioning, Inventory Management, Network Topology, Fault | | |
| Management- Fault Detection, Fault Location and | Isolation | Techniques, |
| Performance Management – Performance Metrics, Data | Monitoring, Problem | |
|  |  | 111 |

Isolation, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, Model-Based Reasoning, Case-Based Reasoning, Codebook correlation Model, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedure s, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Messages Transfer Security, Protection of Networks from Virus Attacks, Accounting Management, Report Management, Policy-Based Management, Service Level Management.

**Text Books:**

1. Mani Subramanian: Network Management- Principles and Practice, 2nd Edition, Pearson Education, 2010.

**Reference Books:**

1. J. Richard Burke: Network management Concepts and Practices: a Hands-On Approach, PHI, 2008.

**INFORMATION AND NETWORK SECURITY**

**Subject Code: 10CS835**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT 1** **6 Hours**

**Planning for Security:** Introduction; Information Security Policy,Standards, and Practices; The Information Security Blue Print; Contingency plan and a model for contingency plan

**UNIT 2** **6 Hours**

**Security Technology-1:** Introduction; Physical design; Firewalls; ProtectingRemote Connections

**UNIT 3** **6 Hours**

**Security Technology – 2:** Introduction; Intrusion Detection Systems (IDS);Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools

**UNIT 4** **8 Hours**

**Cryptography:** Introduction; A short History of Cryptography; Principles ofCryptography; Cryptography Tools; Attacks on Cryptosystems.

**PART - B**

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**UNIT 5** **8 Hours**

**Introduction to Network Security, Authentication Applications:** Attacks,services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs Kerberos, X.509 Directory Authentication Service.

**UNIT 6**

**Electronic Mail Security:** Pretty Good Privacy (PGP); S/MIME

**6 Hours**

**UNIT 7 6 Hours IP Security:** IP Security Overview; IP Security Architecture; AuthenticationHeader; Encapsulating Security Payload; Combining Security Associations; Key Management.

**UNIT 8** **6 Hours**

**Web Security:** Web security requirements; Secure Socket layer (SSL) andTransport layer Security (TLS); Secure Electronic Transaction (SET)

**Text Books:**

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Cengage Learning, 2005. (Chapters 5, 6, 7, 8; Exclude the topics not mentioned in the syllabus)
2. William Stallings: Network Security Essentials: Applications and Standards, 3rd Edition, Pearson Education, 2007.

(Chapters: 1, 4, 5, 6, 7, 8)

**Reference Book:**

1. Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw-Hill, 2007.

**MICROCONTROLLER-BASED SYSTEMS**

**Subject Code: 10CS836**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART – A**

**UNIT 1 7 Hours Introduction, 8051 Assembly Language Programming – 1:**

Microcontrollers and embedded processors; Overview of the 8051 family 8051 Assembly Language Programming (ALP) -1: Inside the 8051; Introduction to 8051 ALP; Assembling and running an 8051 program; The

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PC and ROM space in 8051; Data types, directives, flag bits, PSW register, register banks, and the stack.

**UNIT 2** **6 Hours**

**ALP – 2 :** Jump and loop instructions; Call instructions; Time delay forvarious 8051 family members; I/O programming; I/O bit manipulation programming. Immediate and register addressing modes; Accessing memory using various addressing modes.

**UNIT 3** **7 Hours**

**ALP – 3 - Programming in C:** Bit addresses for I/O and RAM; Extra 128bytes of on-chip RAM in 8052.Arithmetic instructions; Signed numbers and arithmetic operations; Logic and compare instructions; rotate instruction and serialization; BCD, ASCII, and other application programs. Programming in

1. Data types and time delays; I/O programming; Logic operations; Data conversion programs; Accessing code ROM space; Data serialization.

**UNIT 4** **6 Hours**

**Pin Description, Timer Programming:** Pin description of 8051; Intel Hexfile; Programming the 8051 timers; Counter programming; Programming Timers 0 and 1 in C.

**PART – B**

**UNIT 5** **6 Hours**

**Serial Port Programming, Interrupt Programming:** Basics of serialcommunications; 8051 connections to RS232; Serial port programming in assembly and in C 8051 interrupts; Programming timer interrupts; Programming external hardware interrupts; Programming the serial communications interrupt; Interrupt priority in 8051 / 8052; Interrupt programming in C.

**UNIT 6** **7 Hours**

**Interfacing LCD, Keyboard, ADC, DAC and Sensors :** LCE interfacing;Keyboard interfacing; Parallel and serial ADC; DAC interfacing; Sensor interfacing and signal conditioning

**UNIT 7** **7 Hours**

**Interfacing to External Memory, Interfacing with 8255:** Memory addressdecoding; Interfacing 8031 / 8051 with external ROM; 8051 data memory space; Accessing external data memory in C. Interfacing with 8255; Programming 8255 in C.

**UNIT 8**

**6 Hours**

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| **DS12887 RTC interfacing and Programming, Applications :** | DS12887 |

RTC interfacing; DS12887 RTC programming in C; Alarm, SQW, and IRQ features of DS12886 Relays and opto-isolators; Stepper motor interfacing; DC motor interfacing and PWM

**Text Books:**

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay: The 8051 Microcontroller and Embedded Systems using Assembly and C, 2nd Edition, Pearson Education,2008.

**Reference Books:**

1. Raj Kamal: Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education, 2007.
2. Dr. Ramani Kalpathi, Ganesh Raja: Microcontrollers and Applications, 1st Revised Edition, Sanguine - Pearson, 2010.

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| **ADHOC NETWORKS** |  |  |
| **Sub Code: 10CS841** | **IA Marks** | **: 25** |
| **Hrs/Week: 04** | **Exam Hours** | **: 03** |
| **Total Hrs: 52** | **Exam Marks** | **: 100** |
| **PART – A** |  |  |
| **UNIT 1** |  | **6 Hours** |

**Introduction:** Ad hoc Networks: Introduction, Issues in Ad hoc wirelessnetworks, Ad hoc wireless internet.

**UNIT 2**

**7 Hours**

**MAC – 1:** MAC Protocols for Ad hoc wireless Networks: Introduction,

Issues in designing a MAC protocol for Ad hoc wireless Networks, Design

goals of a MAC protocol for Ad hoc wireless Networks, Classification of

MAC protocols, Contention based protocols with reservation mechanisms.

**UNIT 3** **6 Hours**

**MAC – 2:** Contention-based MAC protocols with scheduling mechanism,MAC protocols that use directional antennas, Other MAC protocols.

**UNIT 4**

**7 Hours**

**Routing – 1:** Routing protocols for Ad hoc wireless Networks: Introduction,

Issues in designing a routing protocol for Ad hoc wireless Networks,

Classification of routing protocols, Table drive routing protocol, On-demand

routing protocol.

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**PART- B**

**UNIT 5**

**6 Hours**

**Routing – 2:** Hybrid routing protocol, Routing protocols with effective

flooding mechanisms, Hierarchical routing protocols, Power aware routing

protocols

**UNIT 6** **7 Hours**

**Transport Layer:** Transport layer protocols for Ad hoc wireless Networks:Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks, Other transport layer protocols for Ad hoc wireless Networks.

**UNIT 7** **6 Hours**

**Security :** Security: Security in wireless Ad hoc wireless Networks, Networksecurity requirements, Issues & challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.

**UNIT 8 7 Hours QoS:** Quality of service in Ad hoc wireless Networks: Introduction, Issues

and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions, network layer solutions.

**Text Books:**

1. C. Siva Ram Murthy & B. S. Manoj: Ad hoc Wireless Networks, 2nd Edition, Pearson Education, 2005

**Reference Books:**

1. Ozan K. Tonguz and Gianguigi Ferrari: Ad hoc Wireless Networks, John Wiley, 2007.
2. Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du: Ad hoc Wireless Networking, Kluwer Academic Publishers, 2004.
3. C.K. Toh: Adhoc Mobile Wireless Networks- Protocols and Systems, Pearson Education, 2002.

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**SOFTWARE TESTING**

**Subject Code: 10CS842**

**Hours/Week: 4**

**Total Hours: 52**

**I.A. Marks: 25**

**Exam Marks: 100**

**Exam Hours: 3**

**PART – A**

**UNIT 1** **6 Hours**

**A Perspective on Testing, Examples:** Basic definitions, Test cases, Insightsfrom a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudocode, The triangle problem, The NextDate function, The commission problem, The SATM (Simple Automatic Teller Machine) problem, The currency converter, Saturn windshield wiper.

**UNIT 2** **7 Hours**

**Boundary Value Testing, Equivalence Class Testing, Decision Table-Based Testing:** Boundary value analysis, Robustness testing, Worst-casetesting, Special value testing, Examples, Random testing, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations.

**UNIT 3** **7 Hours**

**Path Testing, Data Flow Testing:** DD paths, Test coverage metrics, Basispath testing, guidelines and observations. Definition-Use testing, Slice-based testing, Guidelines and observations.

**UNIT 4** **6 Hours**

**Levels of Testing, Integration Testing:** Traditional view of testing levels,Alternative life-cycle models, The SATM system, Separating integration and system testing. A closer look at the SATM system, Decomposition-based, call graph-based, Path-based integrations.

**PART – B**

**UNIT 5** **7 Hours**

**System Testing, Interaction Testing:** Threads, Basic concepts forrequirements specification, Finding threads, Structural strategies and functional strategies for thread testing, SATM test threads, System testing guidelines, ASF (Atomic System Functions) testing example. Context of

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interaction, A taxonomy of interactions, Interaction, composition, and determinism, Client/Server Testing,.

**UNIT 6** **7 Hours**

**Process Framework:** Validation and verification, Degrees of freedom,Varieties of software. Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback. The quality process, Planning and monitoring, Quality goals, Dependability properties, Analysis, Testing, Improving the process, Organizational factors.

**UNIT 7** **6 Hours**

**Fault-Based Testing, Test Execution:** Overview, Assumptions in fault-based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis. Test Execution: Overview, from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles, Capture and replay.

**UNIT 8** **6 Hours**

**Planning and Monitoring the Process, Documenting Analysis and Test:** Quality and process, Test and analysis strategies and plans, Risk planning, Monitoring the process, Improving the process, The quality team, Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports.

**TEXT BOOKS:**

1. Paul C. Jorgensen: Software Testing, A Craftsman’s Approach, 3rd Edition, Auerbach Publications, 2008.

(Listed topics only from Chapters 1, 2, 5, 6, 7, 9, 10, 12, 1314, 15)

1. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009.

(Listed topics only from Chapters 2, 3, 4, 16, 17, 20, 24)

**REFERENCE BOOKS:**

1. Aditya P Mathur**:** Foundations of Software Testing, Pearson Education, 2008.
2. Srinivasan Desikan, Gopalaswamy Ramesh: Software Testing Principles and Practices, 2nd Edition, Pearson Education, 2007.
3. Brian Marrick: The Craft of Software Testing, Pearson Education, 1995.

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**ARM BASED SYSTEM DESIGN**

**Subject Code: 10CS843**

**Hours/Week: 4**

**Total Hours: 52**

**I.A. Marks: 25**

**Exam Marks: 100**

**Exam Hours: 3**

**PART – A**

**UNIT 1** **6 Hours**

**Introduction:** The RISC design philosophy; The ARN design philosophy;Embedded system hardware and software.ARM processor fundamentals: Registers; Current Program Status Register; Pipeline; Exceptions, interrupts and the Vector Table; Core extensions; Architecture revisions; ARM processor families.

**UNIT 2** **7 Hours**

**ARM Instruction Set and Thumb Instruction Set:** ARM instruction set:Data processing instructions; Branch instructions; Load-store instructions; Software interrupt instruction; Program Status Register functions; Loading constants; ARMv5E extensions; Conditional execution.Thumb instruction set: Thumb register usage; ARM –Thumb interworking; Other branch instructions; Data processing instructions; Single-Register Load-Store instructions; Multiple-Register Load-Store instructions; Stack instructions; Software interrupt instruction.

**UNIT 3** **6 Hours**

**Writing and Optimizing ARM Assembly Code:** Writing assembly code;Profiling and cycle counting; Instruction scheduling; Register allocation; Conditional execution; Looping constructs; Bit manipulation; Efficient switches; Handling unaligned data.

**UNIT 4** **7 Hours**

**Optimized Primitives:** Double-precision integer multiplication; Integernormalization and count leading zeros; Division; Square roots; Transcendental functions; Endian reversal and bit operations; Saturated and rounded arithmetic; Random number generation.

**PART - B**

**UNIT 5**

**7 Hours**

**Exception and Interrupt Handling:** Exception handling; Interrupts andinterrupt handling schemes

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**UNIT 6 7 Hours Caches :** The memory hierarchy and the cache memory; Cache architecture;

Cache policy; Coprocessor 15 and cache; Flusing and cleaning cache memory; Cache lockdown; Caches and software performance.

**UNIT 7** **6 Hours**

**Memory – 1:** Memory Protection Units: Protected regions; Initializing theMPU, cache and write buffer; Demonstration of an MPU system. Memory Management Units: Moving from MPU to an MMU; How virtual memory works; Details of the ARM MMU.

**UNIT 8** **6 Hours**

**Memory – 2:** Page tables; The translation lookaside buffer; Domains andmemory access permission; The caches and write buffer; Coprocessor 15 and MMU configuration; The fast context switch extension.

**Text Books:**

1. Andrew N. Sloss, Dominic Symes, Chris Wright: ARM System Developer’s Guide – Designing and Optimizing System Software, Elsevier, 2004.

**Reference Books:**

1. David Seal (Editor): ARM Architecture Reference Manual, 2nd Edition, Addison-Wesley, 2001.
2. Steve Furber: ARM System-on-Chip Architecture, 2nd Edition, Addison-Wesley, 2000.

**SERVICES ORIENTED ARCHITECTURE**

**Subject Code: 10CS844**

**Hours/Week: 4**

**Total Hours: 52**

**I.A. Marks: 25**

**Exam Marks: 100**

**Exam Hours: 3**

**PART – A**

**UNIT 1** **7 Hours**

**Introduction o SOA, Evolution of SOA:** Fundamental SOA; CommonCharacteristics of contemporary SOA; Common tangible benefits of SOA;An SOA timeline (from XML to Web services to SOA); The continuing evolution of SOA (Standards organizations and Contributing vendors); The roots of SOA (comparing SOA to Past architectures).

120

**UNIT 2** **6 Hours**

**Web Services and Primitive SOA :** The Web services framework; Services(as Web services); Service descriptions (with WSDL); Messaging (with SOAP).

**UNIT 3 6 Hours Web Services and Contemporary SOA – 1:** Message exchange patterns;Service activity; Coordination; Atomic Transactions; Business activities; Orchestration; Choreography

**UNIT 4 7 Hours Web Services and Contemporary SOA – 2:** Addressing; Reliable

messaging; Correlation; Polices; Metadata exchange; Security; Notification and eventing

**PART – B**

**UNIT 5** **7 Hours**

**Principles of Service – Orientation:** Services-orientation and the enterprise;Anatomy of a service-oriented architecture; Common Principles of Service-orientation; How service orientation principles inter-relate; Service-orientation and object-orientation; Native Web service support for service-orientation principles.

**UNIT 6** **6 Hours**

**Service Layers:** Service-orientation and contemporary SOA; Service layerabstraction; Application service layer, Business service layer, Orchestration service layer; Agnostic services; Service layer configuration scenarios

**UNIT 7** **7 Hours**

**Business Process Design:** WS-BPEL language basics; WS-Coordinationoverview; Service-oriented business process design; WS-addressing language basics; WS-Reliable Messaging language basics

**UNIT 8** **6 Hours**

**SOA Platforms:** SOA platform basics; SOA support in J2EE; SOA support in.NET; Integration considerations

**Text Books:**

1. Thomas Erl: Service-Oriented Architecture – Concept s, Technology, and Design, Pearson Education, 2005.

**Reference Books:**

1. Eric Newcomer, Greg Lomow: Understanding SOA with Web Services, Pearson Education, 2005.

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**Clouds, Grids, and Clusters**

**Subject Code: 10CS845**

**Hours/Week: 4**

**Total Hours: 52**

**I.A. Marks: 25**

**Exam Marks: 100**

**Exam Hours: 3**

**PART – A**

**UNIT - 1 6 Hours Introduction:** Overview of Cloud Computing, Applications, Intranets and

the Cloud, When can cloud Computing be used? Benefits and limitations, Security concerns, Regulatory issues

**UNIT - 2 6 Hours Business Case for Cloud, Examples of Cloud Services:** Cloud computing

services, Help to the business, Deleting the data center. Examples: Google, Microsoft, IBM, Salesforce.com and its uses, Cloud at Thomson Reuters.

**UNIT - 3**

**Technology, Cloud Storage, Standards:**

**7 Hours**

Cloud Computing Technology:

Clients, Security, Network, Services.

Overview of Cloud storage, Some providers of Cloud storage. Standards:

Applications, Clients, Infrastructure, Service.

**UNIT - 4** **7 Hours**

**Other issues:** Overview of SaaS (Software as a Service), Driving forces,Company offerings: Google, Microsoft, IBM. Software plus Service: Overview, Mobile device integration Local Clouds, Thin Clients, Migrating to the Cloud: Virtualization, Server solutions, Thin clients, Cloud services for individuals, mid-markets, and enterprises, Migration.

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| **PART - B** |  |
| **UNIT - 5** | **7 Hours** |
| **GRID Computing – 1:** Introduction: Data Center, The Grid and the | |
| Distributed/ High Performance Computing, | Cluster Computing and Grid |

Computing, Metacomputing – the Precursor of Grid Co mputing, Scientific, Business and e-Governance Grids, Web services and Grid Computing, Business Computing and the Grid – a Potential Win w in Situation, e-Governance and the Grid. Technologies and Architectures for Grid Computing: Clustering and Grid Computing, Issues in Data Grids, Key Functional Requirements in Grid Computing, Standards for Grid Computing , Recent Technological Trends in Large Data Grids.OGSA and WSRF: OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF (Web

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Services Resource Framework), Resource Approach to Stateful Services, WSRF Specification.

The Grid and the Database: Issues in Database Integration with the Grid, The Requirements of a Grid enabled database, Storage Request Broker (SRB), How to integrate the Database with the Grid? The Architecture of OGSA-DAI for Offering Grid Database Services

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| **UNIT - 6** |  |  | **6 Hours** |
| **GRID Computing – 2:** World Wide Grid Computing Activites, | | | |
| Organizations | and | Projects: Standards Organizations, | Organizations |
| Developing Grid Computing Tool Kits, Framework and Middleware, Grid | | | |
| Projects and Organizations Building and Using Grid Based Solutions.Web | | | |
| Services and | the | Service Oriented Architecture (SOA): | History and |

Background, Service Oriented Architecture, How a Web Service Works, SOAP and WSDL, Description, Creating Web Services, Server Side. Globus Toolkit: History of Globus Toolkit, Versions of Globus Toolkit, Applications of GT4 – cases, GT4 – Approaches and Benefits, Infr astructure Management, Monitoring and Discovery, Security, Data, Choreography and Coordination,

Main Features of GT4 Functionality – a Summary, GT4 Architecture, GT4 Command Line Programs, GT4 Containers.

**UNIT - 7** **7 Hours**

**Cluster Computing – 1:** Introduction: What is Cluster Computing,Approaches to Parallel Computing, How to Achieve Low Cost Parallel Computing through Clusters, Definition and Architecture of a Cluster, What is the Functionality a Cluster can offer? Categories of Clusters Cluster Middleware: Levels and Layers of Single System Image (SSI), Cluster Middleware Design Objectives, Resource Management and Scheduling, Cluster Programming Environment and Tools. Early Cluster Architectures and High Throughput Computing Clusters: Early Cluster Architectures, High Throughput Computing Clusters, Condor. Setting up and Administering a Cluster: How to set up a Simple Cluster? Design considerations for the Front End of a Cluster, Setting up nodes, Clusters of Clusters or Metaclusters, System Monitoring, Directory Services inside the Clusters & DCE, Global Clocks Sync, Administering heterogeneous Clusters.

**UNIT - 8** **6 Hours**

**Cluster Computing – 2:** Cluster Technology for High Availability: HighlyAvailable Clusters, High Availability Parallel Computing, Mission Critical (or Business Critical or Business Continuity) Applications, Types of Failures and Errors, Cluster Architectures and Configurations for High Availability, Faults and Error Detection, Failure Recovery, Failover / Recovery Clusters. Performance Model and Simulation: Performance Measures and Metrics, Profit Effectiveness of Parallel Computing through Clusters. Process Scheduling, Load Sharing and Load Balancing: Job Management System

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(JMS) Resource Management System (RMS), Queues, Hosts, Resources, Jobs and Policies, Policies for Resource Utilization, Scheduling Policies Load Sharing and Load Balancing, Strategies for Load Balancing, Modeling Parameters Case Studies of Cluster Systems: Beowulf, PARAM.

**Text Books:**

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter: Cloud Computing, A Practical Approach, McGraw Fill, 2010.
2. Prabhu: Grid and Cluster Computing, PHI, 2008.

**Reference Books:**

1. Joshy Joseph, Craig Fellenstein: Grid Computing, Pearson Education, 2007.
2. Internet Resources

**MULTI-CORE ARCHITECTURE AND PROGRAMMING**

**Subject Code: 10CS846**

**Hours/Week : 04**

**Total Hours : 52**

**I.A. Marks : 25**

**Exam Hours: 03**

**Exam Marks: 100**

**PART - A**

**UNIT 1**

**Introduction**

**7 Hours**

The power and potential of parallelism, Examining sequential and parallel programs, Parallelism using multiple instruction streams, The Goals: Scalability and performance portability, Balancing machine specifics with portability, A look at six parallel computers: Chip multiprocessors, Symmetric multiprocessor architectures, Heterogeneous chip designs, Clusters, Supercomputers, Observations from the six parallel computers.

**UNIT 2 6 Hours Reasoning about Performance**

Motivation and basic concepts, Sources of performance loss, Parallel structure, Performance trade-offs, Measuring performance, Scalable performance.

**UNIT 3 6 Hours Examples of Multi-Core Architectures**

Introduction to Intel Architecture, How an Intel Architecture System works, Basic Components of the Intel Core 2 Duo Processor: The CPU, Memory Controller, I/O Controller; Intel Core i7: Architecture, The Intel Core i7 Processor, Intel QuickPath Interconnect, The SCH; Intel Atom Architecture.

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Introduction to Texas Instruments’ Multi-Core Multilayer SoC architecture for communications, infrastructure equipment

**UNIT 4**

**Parallel Algorithm Design**

**7 Hours**

Introduction, The Task / Channel model, Foster’s design methodology, Examples: Boundary value problem, Finding the maximum, The n-Body problem, Adding data input.

**PART – B**

**UNIT 5**

**7 Hours**

**Parallel Programming – 1 (Using OpenMP)**

Designing for threads: Task decomposition, Data decomposition, Data flow decomposition, Implications of different decompositions; Challenges in decomposition, Parallel programming patters, A motivating problem: Error diffusion.

Threading and Parallel Programming Constructs: Synchronization, Critical

sections, Deadlocks, Synchronization primitives: Semaphores, Locks, Condition variables; Messages, Flow Control-Based concepts: Fence, Barrier; Implementation-Dependent threading issues.

**UNIT 6 6 Hours Parallel Programming – 2 (Using OpenMP)**

Introduction, The shared-memory model, Parallel *for* loops, Declaring private variables, Critical sections, Reductions, Performance improvements, More general data parallelism, Functional parallelism.

**UNIT 7 7 Hours Solutions to Common Parallel Programming Problems**

Too many threads, Data races, deadlocks, and live locks, Heavily contended locks, Non-blocking algorithms, Thread-safe functions and libraries, Memory issues, Cache-related issues, Avoiding pipeline stalls, Data organization for high performance.

**UNIT 8 6 Hours Threading in the Processor**

Single-Core Processors: Processor architecture fundamentals, Comparing Superscalar and EPIC architectures.

Multi-Core Processors: Hardware-based threading, Hyper-threading technology, Multi-Core processors, Multiple processor interactions, Power consumption, Beyond multi-core architecture.

**NOTE:** In order to acquire a sound understanding of the subject, it isdesirable for the students to work in the laboratory using OpenMP. The

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hands-on experience would reinforce the concepts learnt in theory. Problems similar to the ones solved in the Algorithms Laboratory can be solved and issues like speed-up achieved can be analyzed in depth. Several free tools are available from companies like INTEL to facilitate such a study.

**Text Books:**

1. Calvin Lin, Lawrence Snyder: Principles of Parallel Programming, Pearson Education, 2009.

(Listed topics only from Chapters 1, 2, 3)

1. Michael J. Quinn: Parallel Programming in C with MPI and OpenMP, Tata McGraw Hill, 2004.

(Listed topics only from Chapters 3, 17)

1. Shameem Akhter, Jason Roberts: Multi-Core Programming, Increasing Performance through Software Multithreading, Intel Press, 2006.

(Listed topics only from Chapters 3, 4, 7, 9, 10)

1. Web resources for Example Architectures of INTEL and Texas Instruments: http://download.intel.com/design/intarch/papers/321087.pdf ; http://focus.ti.com/lit/wp/spry133/spry133.pdf

**Reference Books:**

1. Introduction to Parallel Computing – Ananth Grama e t. al., Pearson Education, 2009.
2. Reinders : Intel Threading Building Blocks, O’reilly – 2005
3. David Culler et. al.: Parallel Computer Architecture: A Hardware/Software Approach, Elsevier, 2006.
4. Richard Gerber, Aart J.C. Bik, Kevin B. Smith, Xinmin Tian: Software Optimization Cookbook, High-Performance Recipes for IA-32 Platforms, 2nd Edition, Intel Press, 2006.

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