7CS1 SOFTWARE PROJECT MANAGEMENT (Common to Comp. Engg. & Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Project Management: The management spectrum, the people, the product, the process, the project, the W^5HH principle, critical practices Metrics for Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, metrics for small organizations, establishing a software metrics program.
II	Estimation: Observations, Project planning Process, software scope and feasibility, resources, software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, estimation for Agile development and web engineering projects, the make/buy decision.
III	Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis. Risk Management: Reactive V/S proactive Risk Strategies, software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan **Quality Planning**: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management, Quantitative Quality Management Planning, Setting the Quality Goal, Estimating Defects for Other Stages, Quality Process Planning, Defect Prevention Planning.
IV	Quality Management: Quality Concepts, Software Quality assurances, software reviews, formal technical reviews, Formal approaches to SQA, Statistical Software Quality assurances, Change Management: software Configuration Management, The SCM repository, SCM Process, Configuration Management for Web Engineering
V	**Project Execution And Closure:** **Reviews.** The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and Follow-up, One-Person Review, Guidelines for Reviews in Projects, Data Collection, Analysis and Control Guidelines, Introduction of Reviews and the NAH Syndrome. **Project Monitoring and Control:** Project Tracking, Activities Tracking, Defect Tracking, Issues Tracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule, Monitoring Quality, Risk-Related Monitoring. **Project Closure:** Project Closure Analysis, The Role of Closure Analysis, Performing Closure Analysis.

Text/References:

1. R. S. Pressman, Software Engineering, TMH, 7th ed.
2. Pankaj Jalote, Software project management in practice, Addison-Wesley
3. B. Hughes & M. Cotterell, Software Project Management, TMH

7CS2 WIRELESS COMMUNICATION & NETWORKS (Common to Comp. Engg. & Info. Tech.)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Introduction to Wireless Communication Systems:** Evolution of mobile Radio Communications, Applications of mobile communication, Mobile Radio Systems Around the World, Example of Wireless Communication Systems, Second Generation(2G) Cellular Networks, Third Generation(3G) Wireless Networks, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems [3].Frequencies for radio transmission & regulations [1]. Introduction to signals, analog & digital data transmission, transmission impairments, effect of multipath propagation, type of fading & error compensation [2].
II	**Medium access control:** need for specialized MAC, hidden and exposed terminal, near and far terminals, MAC schemes: Fixed TDMA, Aloha, CSMA, DAMA, PRMA, reservation TDMA, MACA, polling, ISMA, CDMA- SAMA, comparisons [1]. **Telecommunication systems:** GSM: mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, new data services-HSCSD, introduction to GPRS [1,3].
III	**Wireless LAN:** advantages, disadvantages and design goals, infra red v/s radio transmission, infrastructure and ad-hoc network, IEEE 802.11: System architecture, protocol architecture, physical layer, medium access control layer, MAC management and functions, brief idea of - 802.11b, 802.11a, newer developments [1]. **HIPERLAN:** HIPERLAN 1, Bluetooth: user scenarios, architecture, radio layer, base band layer, link manager protocol, L2CAP, security, SDP, profiles, IEEE 802.15 [1].
IV	**Mobile network layer:** mobile IP - Goals, assumptions and requirements, entities and terminology, IP packets delivery, agent discovery, registration, tunneling and encapsulation, optimizations, reverse tunneling, DHCP. Mobile Ad hoc network – usage & routing- global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA) [1]. **Mobile transport layer:** Implications of mobility in Traditional TCP, classical TCP improvements: indirect TCP, snooping TCP, mobile TCP, fast retransmit/fast recovery, transmission/time-out freezing, selective retransmission, transaction-oriented TCP [1].
V	**Support for mobility:** File systems - Introduction to coda, little work, Ficus, MIo-NFS, rover. World wide web - hypertext transfer protocol, hypertext language, system architecture. Wireless Application Protocol - architecture, wireless datagram protocol, wireless transport layer security, wireless transaction protocol, wireless session protocol, wireless application environment, wireless markup language, WML Script, wireless telephony application, push architecture, push/pull services, example stacks with WAP1.x [1].

Text Books & References:

1. Mobile Communications, Schiller, 2nd Ed., Pearson.
2. Wireless Communications, Theodore S. Rappaport, 2nd Ed., PHI.
3. Wireless Communications, William Stallings, Prentice Hall
4. WIRELESS COMMUNICATIONS & NETWORKING, Vijay Garg, The Morgan Kaufmann Series in Networking

7CS3 COMPILER CONSTRUCTION (Comp. Engg.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Compiler, Translator, Interpreter definition, Phase of compiler introduction to one pass & Multipass compilers, Bootstrapping, Review of Finite automata lexical analyzer, Input, buffering, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.
II	Review of CFG Ambiguity of grammars, Introduction to parsing. Bottom up parsing Top down parsing techniques, Shift reduce parsing, Operator precedence parsing, Recursive descent parsing predictive parsers. LL grammars & passers error handling of LL parser. LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Introduction of automatic parser generator: YACC error handling in LR parsers.
III	Syntax directed definitions; Construction of syntax trees, L-attributed definitions, Top down translation. Specification of a type checker, Intermediate code forms using postfix notation and three address code, Representing TAC using triples and quadruples, Translation of assignment statement. Boolean e xpression and control structures.
IV	Storage organization, Storage allocation, Strategies, Activation records, Accessing local and non local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.
V	Definition of basic block control flow graphs, DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.

Text/References:

1. Aho, Ullman and Sethi: Compilers, Addison Wesley.

2. Holub, Compiler Design in C, PHI.

7CS4 COMPUTER AIDED DESIGN FOR VLSI (Comp. Engg.)

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	Complexity in microelectronic circuit design and Moore's Law, design styles -Full-custom design, standard-cell design, Programmable Logic Devices, Field Programmable Gate Arrays, Design Stages, Computer-Aided Synthesis and Optimizations, design flow and related problems.
II	Boolean functions and its representations – co-factor, unite, derivatives, consensus and smoothing; tabular representations and Binary Decision Diagram (BDD), OBDD, ROBDD and Bryant's reduction algorithm and ITE algorithm. Hardware abstract models – structures and logic networks, State diagram, data-flow and sequencing graphs, hierarchical sequencing graphs. Compilation and behavioral optimizations.
III	Architectural Synthesis – Circuit description and problem definition, temporal and spatial domain scheduling, synchronization problem. Scheduling algorithms - ASAP and ALAP scheduling algorithms, scheduling under constraints, relative scheduling, list scheduling heuristic. Scheduling in pipelined circuits.
IV	Resource Sharing & Binding in sequencing graphs for resource dominated circuits, sharing of registers and busses; binding variables to registers. Two-level logic optimization principles – definitions and exact logic minimizations. Positional cube notations, functions with multi-valued logic. List-oriented manipulations.
V	Physical Design. Floor planning – goals and objectives. Channel definition, I/O and power planning. Clock Planning. Placement – goals and objectives. Placement algorithms. Iterative improvement algorithms. Simulated Annealing. Timing-driven Placement. Global routing – goals and objectives. Global routing methods. Timing-driven global routing. Detailed Routing – goals and objectives. Left-edge algorithm. Constraints and routing graphs. Channel routing algorithms. Via minimization. Clock routing, power routing, circuit extraction and Design Rule Checking.

Text Books:

1. S.H. Gerez. Algorithms VLSI Design Automation. Wiley India. (Indian edition available.)
2. Michael John Sebastian Smith. Application-Specific Integrated Circuits. Addison-Wesley. (Low-priced edition is available.)
3. G.D. Micheli, Synthesis and optimization of digital circuits, TMH.

References:

1. http://www.fie-conference.org/fie98/papers/1002.pdf
2. S. Sait and H. Youssef. VLSI Physical Design Automation: Theory and Practice.

7CS5 COMPUTER GRAPHICS & MULTIMEDIA TECHNIQUES (Common to Comp. Engg. & Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Introduction:** Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive. Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).
II	**2D & 3D Co-ordinate system:** Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.
III	**Hidden Lines & Surfaces**: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms. **Curves and Splines**: Parametric and Non parametric Representations, Bezier curve, B-Spline Curves.
IV	**Rendering:** Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV
V	**Multimedia:** Multimedia components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural considerations, file formats. **Animation:** Introduction, Rules, problems and Animation techniques.

Text/References:

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.
4. Multimedia Information Networking, N.K.Sharda, PHI..

7CS6.1 ADVANCE DATABASE MANGEMENT SYSTEMS (Common to Comp. Engg. & Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Query Processing and Optimization**: Overview of Relational Query Optimization, System Catalog in a Relational DBMS, Alternative Plans, Translating SQL, Queries into Algebra, Estimating the Cost of a Plan, Relational Algebra Equivalences, Enumeration of Alternative Plans. [2]
II	**Object Database Systems**: Motivating Examples, Structured Data Types, Operations On Structured Data, Encapsulation and ADT's, Inheritance, Objects, OIDs and Reference Types, Database Design for an ORDBMS, ORDBMS Implementation Challenges, ORDBMS, Comparing RDBMS, OODBMS, and ORDBMS.
III	**Parallel and Distributed Databases**: Architectures for Parallel, Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Parallel Query Optimization, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Introduction to Distributed Transactions, Distributed Concurrency Control, Distributed Recovery. [2]
IV	**Database Security and Authorization**: Introduction to Database Security, Access Control, Discretionary Access Control- Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control- Multilevel Relations and Polyinstantiation, Covert Channels, DoD Security Levels, Additional Issues Related to Security- Role of the Database Administrator, Security in Statistical Databases, Encryption. [2]
V	**POSTGES**: POSTGRES user interfaces, sql variations and extensions, Transaction Management, Storage and Indexing, Query processing and optimizations, System Architectures. **XML:** Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application Program Interface to XML, Storage of XML Data, XML applications. [2]

Text/References

1. Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley,2000.
2. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
3. Ceri Pelagatti , Distributed Database: Principles and System - (McGraw Hill)
4. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
5. A. Silversatz, H. Korth and S. Sudarsan: Database Cocepts 5th edition, Mc-Graw Hills 2005.

7CS6.2 DATA MINING & WARE HOUSING (Comp. Engg.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.
II	**Concept Description:** Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases.
III	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis
IV	**Data Warehousing:** Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.
V	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Text Books & References:

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawai Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

7CS6.3 Data Compression Techniques (Comp. Engg.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Compression Techniques:** Lossless, lossy, measure of performance, modeling & coding. **Lossless compression:** Derivation of average information, data models, uniquely decodable codes with tests, prefix codes, Kraft-Mc Millan inequality. Huffman coding: Algorithms, minimum variance Huffman codes, optimality, length extended codes, adaptive coding, Rice codes, using Huffman codes for lossless image compression.
II	Arithmetic coding with application to lossless compression. **Dictionary Techniques:** LZ77, LZ78, LZW **Predictive coding:** Burrows-Wheeler Transform and move-to-front coding, JPEG-LS **Facsimile Encoding:** Run length, T.4 and T.6
III	**Lossy coding**- Mathematical preliminaries: Distortion criteria, conditional entropy, average mutual information, differential entropy, rate distortion theory, probability and linear system models. **Scalar quantization:** The quantization problem, uniform quantizer, Forward adaptive quantization, non-uniform quantization-Formal adopting quantization, companded Quantization **Vector quantization:** Introduction, advantages, The Linde-Ruzo-Grey algorithm, lattice vector quantization.
IV	**Differential encoding** – Introduction, Basic algorithm, Adaptive DPCM, Delta modulation, speech and image coding using delta modulation. Sampling in frequency and time domain, z-transform, DCT, DST, DWHT, quantization and coding of transform coefficient.
V	**Sub band coding:** Introduction, Filters, Basic algorithm, Design of Filter banks, G.722, MPEG. **Wavelet based compression:** Introduction, wavelets multi-resolution analysis and the scaling function implementation using filters.

Text Books & References:

1. Sayood K: Introduction to Data Compression: ELSEVIER 2005.

7CS7 COMPUTER GRAPHICS & MULTIMEDIA LAB (Common to Comp. Engg. & Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs.: 2**	**Examination Time = Four (4) Hours** **Maximum Marks = 50** **[Sessional /Mid-term (30) & End-term (20)]**

Objectives:

At the end of the semester, the students should have clearly understood and implemented the following:

1. To produce a single pixel and pre specified pattern on screen:
2. To implement features like changing background color, foreground color, resizing of window, repositioning of window:
3. To implement mid point algorithm to draw circle and ellipse:
4. Use the line drawing & circle drawing programs to draw composite objects containing only circle & lines. You can take shapes like a cart, car etc.
5. To Implement Clipping (various algorithms).
6. Simple fonts, graphical fonts, scalable fonts.
7. Input a polygon by drawing lines, use appropriate methods for filling and filling convex & concave polygons.

Suggested Platform/Tools:

1. For this lab, the students can choose any platform either Microsoft Windows or Linux.
2. Compilers & Libraries: Microsoft Platform- Visual Studio.Net, Linux – Xlib/OpenGL.
3. No turbo C/C++. No library function except the one required to put a single pixel on the screen.

Indicative List of Experiments:

1. Programs to produce a single pixel produce a pre specified pattern with features like changing background color, foreground color, resizing of window, repositioning of window must be demonstrated.
2. Use Mid Point algorithm to draw line between two points. The program must be independent of the slope i.e. lines of all slopes must be drawn.
3. Use Mid Point algorithm to draw ellipse. Implement circle drawing as a special case of ellipse. Extend this to draw arcs between points.
4. Programs to draw composite objects containing circles & lines, drawing lines thicker than one pixel, you can take shapes like a cart, car etc.
5. Programs to demonstrate text generation e.g. simple fonts, graphical fonts, and scalable fonts.
6. Programs to demonstrate filling algorithms eg. filling convex & concave polynomials. The program must be able to (i) input a polynomial by drawing lines (ii) determine whether convex or concave (iii) use appropriate methods for filling.
7. Programs to demonstrate clipping algorithms eg. program to clip a (i) line and (ii) polygon using Cohen-Sutherland Clipping algorithm(s), clipping lines, circles against a rectangular clip area.
8. Programs to demonstrate presentation of geometrical objects e.g. circle and rectangle with audio description i.e. size, color of boundary and interior etc. played synchronously one after another.

7CS8 VLSI PHYSICAL DESIGN LAB (Comp. Engg.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (45) & End-term (30)]**

VLSI Physical Design Automation is essentially the research, development and productization of algorithms and data structures related to the physical design process. The objective is to investigate optimal arrangements of devices on a plane (or in three dimensions) and efficient interconnection schemes between these devices to obtain the desired functionality and performance. Since space on a wafer is very expensive real estate, algorithms must use the space very efficiently to lower costs and improve yield. In addition, the arrangement of devices plays a key role in determining the performance of a chip. Algorithms for physical design must also ensure that the layout generated abides by all the rules required by the fabrication process. Fabrication rules establish the tolerance limits of the fabrication process. Finally, algorithms must be efficient and should be able to handle very large designs. Efficient algorithms not only lead to fast turn-around time, but also permit designers to make iterative improvements to the layouts. The VLSI physical design process manipulates very simple geometric objects, such as polygons and lines. As a result, physical design algorithms tend to be very intuitive in nature, and have significant overlap with graph algorithms and combinatorial optimization algorithms. In view of this observation, many consider physical design automation the study of graph theoretic and combinatorial algorithms for manipulation of geometric objects in two and three dimensions. However, a pure geometric point of view ignores the electrical (both digital and analog) aspect of the physical design problem. In a VLSI circuit, polygons and lines have inter-related electrical properties, which exhibit a very complex behavior and depend on a host of variables. Therefore, it is necessary to keep the electrical aspects of the geometric objects in perspective while developing algorithms for VLSI physical design automation. With the introduction of Very Deep Sub-Micron (VDSM), which provides very small features and allows dramatic increases in the clock frequency, the effect of electrical parameters on physical design will play a more dominant role in the design and development of new algorithms.

(Source: Algorithms For VLSI Physical Design Automation, by Naveed A. Sherwani).

The exercise should be such that the above objectives are met.

Automation tools such as Synopsis/ Cadence are available in the area. However, to begin, the students shall be assigned exercises on route optimization, placement & floor planning. Small circuits may be taken & algorithms implemented. At a later stage, the students may use tools and design more complex circuits.

7CS9 COMPILER DESIGN LAB (Comp. Engg.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of system programming concept. Lexical analysis, syntax analysis, semantics analysis, code optimization, code generation. Language specification and processing

2. Develop an Understanding of Scanning by using concept of Finite state automaton. Parse tree and syntax tree, Top down parsing (recursive decent parsing, LL (1) parser) Bottom up parsing (operator precedence parsing) .Managing symbol table, opcode table, literal table, pool table

3. Develop an Understanding of Intermediate code form: Three address code, Polish notation (Postfix strings)

4. Develop an Understanding of Allocation data structure. Heaps

5. Develop an Understanding about Language processor development tools: LEX, YACC. Language processing activities (Program generation and execution)

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

1. Write grammar for a fictitious language and create a lexical analyzer for the same.
2. Develop a lexical analyzer to recognize a few patterns in PASCAL and C (ex: identifiers, constants, comments, operators etc.)
3. Write a program to parse using Brute force technique of Top down parsing
4. Develop on LL (1) parser (Construct parse table also).
5. Develop an operator precedence parser (Construct parse table also)
6. Develop a recursive descent parser
7. Write a program for generating for various intermediate code forms

   i) Three address code ii) Polish notation
8. Write a program to simulate Heap storage allocation strategy
9. Generate Lexical analyzer using LEX
10. Generate YACC specification for a few syntactic categories
11. Given any intermediate code form implement code optimization techniques

Reference

V.V Das, Compiler Design using FLEX and YACC, PHI

8CS1 MOBILE COMPUTING (Comp. Engg.)

Units	Contents of the subject

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

I	**Mobile computing:** Definitions, adaptability issues (transparency, Environmental Constraints, application aware adaptation), mechanisms for adaptation and incorporating adaptations. **Mobility management:** mobility management, location management principle and techniques, Energy efficient network protocols, PCS location management Scheme, Energy efficient indexing on air and algorithm.
II	Data dissemination and management: challenges, Data dissemination, bandwidth allocation for publishing, broadcast disk scheduling, mobile cache maintenance schemes, Mobile Web Caching. Introduction to mobile middleware, Middleware for application development: adaptation. Mobile Agents- introduction, mobile agent computing, model, technologies, application to DBMS, Mobile Agent Security and Fault Tolerance using Distributed Transactions, Reliable Agent Transfer, Architecture of a Secure Agent System, Network Security Testing Using Mobile Agents, Network Security Testing Using Mobile Agents.
III	**Service Discovery Middleware:** Service Discovery & standardization Methods (Universally Unique Identifiers, Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing, security. Universal Plug and Play, Jini, Salutation.
IV	**Pervasive computing:** Introduction, Principles–Decentralization, Diversification, Connectivity, Simplicity, Pervasive Information Technology, Mobile Devices – Classification, Characteristics, Limitations, Smart Identification – Smart Card, Smart Label, Smart Tokens, Smart Sensors and Actuators, Smart Home.
V	Web Services, Web Service Architecture, WSDL, UDDI, SOAP, Web Service Security, Web Services for Remote Portals. Internet Portals – Functional Overview, Type – B2E Portals, Portal Infrastructure. **Standards:** DECT, TETRA, UMTS, IMT-2000, IrDA-Architecture & protocol stacks.

Text/References:

1. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, TMH.
2. Principles of mobile computing Hansmann & Merk., Springer
3. Mobile communications Jochen Schiller , Pearson
4. 802.11 wireless networks Matthew S.Gast, O'REILLY.

8CS2 INFORMATION SYSTEM SECURITY (Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem, Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field Elements of Information Theory: Entropy, redundancy of language, Key Equivocation & Unicity Distance, equivocation of a simple cryptographic system
II	Security Attacks: Active V/S Passive, Security Services, Security Mechanisms. Symmetric Cipher Model, Types of attacks on Encrypted messages. Classical Cipher Techniques: Caeser, Affine, Mono-alphabetic, Transposition, Poly-alphabetic Ciphers Private Key Cryptosystems: Block Cipher Principles, Fiestel Cipher, Concept of 'Confusion' and "Diffusion' in block ciphers, Product Ciphers, Lucifer Algorithm. DES Algorithm, DES modes of operations, IDEA. Differential & Linear Cryptanalysis (Introduction Only). S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design. Link Vis End-to-End Encryption, Key Distribution in Symmetric Encryption
III	Public Key Cryptosystems: Principles of Public Key Cryptosystems, Factorization, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using Public Key Cryptosystems. Discrete Logarithms, Diffie-Hellman Key Exchange.
IV	Message Authentication & Hashing: Birthday Paradox and General case of Duplications, Basic functions of Message Authentication and Hashing, Introduction to Hash & MAC algorithms. Digital Signatures: RSA Based, ElGamal Signatures, Undeniable Signatures. Authentication: Model of Authentication Systems, Impersonation, Substitution and spoofing games, Authentication schemes for mutual authentication based on shared secret, two-way public key, one-way public key, Mediated Authentication, One way Authentication.
V	X.509 Authentication Service: Certificates, Authentication Procedure, X.509 Version 3. E-Mail Security: PGP including management of keys in PGP, S/MIME. Network Security: IPSec, AH & ESP in Transport and Tunnel mode with multiple security associations (Key Management not Included). SSL (Protocols Only) Intrusion Detection: Audit Reports, Statistical Anomaly Detection, Rule based detection, honeypots, intrusion detection exchange formats. Password Protection: Lamport Hash, EKE Protocol.

Text/References:

1. Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition, Pearson Education, 2006.
2. Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

8CS3 DISTRIBUTED SYSTEMS (Comp. Engg.)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	**Distributed Systems:** Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model of distributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. **Systems Concepts and Architectures:** Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE).[1.2] **Theoretical issues in distributed systems:** Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.[2]
II	**Concurrent Processes and Programming:** Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Language not included).[1] **Inter-process Communication and Coordination:** Message Passing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies.[1]
III	**Distributed Process Scheduling:** A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed Process Implementation.[1] **Distributed File Systems:** Transparencies and Characteristics of DFS, DFS Design and implementation, Transaction Service and Concurrency Control, Data and File Replication.[1,2] **Case studies:** Sun network file systems, General Parallel file System and Window's file systems. Andrew and Coda File Systems [2,3]
IV	**Distributed Shared Memory:** Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems.[1] **Models of Distributed Computation:** Preliminaries, Causality, Distributed Snapshots, Modeling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection. [1]
V	**Distributed Agreement:** Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement.[1] **Replicated Data Management:** concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation.[1] **CORBA case study:** Introduction, Architecture, CORBA RMI, CORBA Services.[3]

Text Books:

1. Distributed operating systems and algorithm analysis by Randy Chow and T. Johnson, Pearson
2. Operating Systems A concept based approach by DM Dhamdhere, TMH
3. Distributed Systems- concepts and Design, Coulouris G., Dollimore J, and Kindberg T., Pearson

8CS4.1 Hardware Testing and Fault Tolerance (Comp. Engg.)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Overview of hardware testing. Reliability and Testing, Difference between Verification and Testing, Concepts of fault models, test pattern generation and fault coverage. Types of tests – exhaustive testing, pseudo-exhaustive testing, pseudo-random testing, and deterministic testing. Test Application. Design for Test. Testing Economics. Defects, Failures and Faults. How are physical defects modeled as faults. Stuck-at faults, Single stuck-at-faults multiple stuck-at faults, bridging faults, delay faults, transient faults.
II	Relation between VLSI Design and Testing. a) Design Representation for the purpose of testing – Representation in the form of mathematical equations, tabular format, graphs, Binary Decision Diagrams, Netlists, or HDL descriptions. b) Recap of VLSI Design Flow and where testing fits in the flow. Importance of Simulation and Fault Simulation. Compiled and event-driven simulation. Parallel and deductive fault simulation. Using fault simulation to estimate fault coverage and building a fault dictionary
III	Combinational Test Pattern Generation. D-algorithm. Critical Path Tracking. PODEM algorithm for test generation. Testing sequential circuits. Functional and deterministic ATPG for sequential circuits and the associated challenges. Motivation for Design for Testability. Test Points, Partitioning for Testability. Scan Testing. Scan Architectures. Cost of Scan Testing. Boundary Scan Testing. Board-level testing. Boundary-scan Architecture and various modes of operation.
IV	a) Built-in Self Test. Pseudo-random test generation. Response Compaction. Random pattern-resistant faults. BIST architectures – Circular BIST, BILBO, STUMPS. b) Testing of Memories – Fault models, Functional tests for memories, Memory BIST. c) Testing of microprocessors.
V	Hardware fault tolerance. Failure Rate, Reliability, Mean Time to Failure. Different kinds of redundancy schemes for fault-tolerance (Space, Time, and Information Redundancy). N-modular Redundancy. Watch Dog Processors, Byzantine Failures. Information Redundancy – parity codes, checksums, m-of-n codes. RAID architectures for disk storage systems. Fault tolerance in interconnection networks. Fault-tolerant routing techniques.

Text Book:

1. Samiha Mourad and Yervant Zorian. Principles of Electronic Systems. Wiley Student Editon. [Available in Indian Edition].
2. Koren and C. Mani Krishna. Fault-Tolerant Systems. Elsevier. (Indian Edition Available.)

Text/References:

1. Abramovici, M., Breuer, M. A. and Friedman, A. D. Digital systems testing and testable design. IEEE press (Indian edition available through Jayco Publishing house), 2001.

2. Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits by Bushnell and Agrawal, Springer, 2000.

8CS4.2 REAL TIME SYSTEMS (Comp. Engg.)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	**Introduction:** Definition, Typical Real Time Applications, concept of tasks, types of tasks and real time systems, block diagram of RTS, and tasks parameters -Release Times, execution time, period, Deadlines, and Timing Constraints etc. RTS requirements.
II	**Reference Models for Real Time Systems:** processors and Resources, Temporal Parameters of Real-Time Workload, Periodic and Aperiodic Task Model, Precedence Constrains and Data Dependency, Other Types of Dependencies, Functional Parameters, Resource Parameters. **Real Time Scheduling:** classification of Real Time Scheduling, scheduling criteria, performance metrics, schedulability analysis, Introduction to Clock Driven scheduling, Weighted Round Robin Approach and Priority Driven Approach. Dynamic Versus Static systems, Offline Versus Online Scheduling.
III	**Periodic tasks scheduling:** Clock Driven Scheduling – definition, notations and assumption, scheduler concepts, general scheduling structure, cyclic executives. **Priority Driven Scheduling;** notations and assumption, fixed priority verses dynamic priority, fixed priority scheduling algorithms (RM and DM) and their schedulability analysis, concept of schedulability tests – Inexact and exact schedulability tests for RM and DM, Optimality of the RM and DM algorithms, practical factors.
IV	**Aperiodic task scheduling;** assumption and approaches, server based and non-server based fixed priority scheduling algorithms – polling server, deferrable server , simple sporadic server, priority exchange, extended priority exchange, slack stealing. Introduction to scheduling of flexible computations –flexible applications, imprecise computation model and firm deadline model.
V	**Resources Access Control:** Assumptions on Resources and their usage, Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, priority inversion problem, need of new resource synchronization primitives/protocols for RTS, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority- Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

Text & References:

1. J.W.S.Liu: Real-Time Systems, Pearson Education Asia
2. P.D.Laurence, K.Mauch: Real-time Microcomputer System Design, An Introduction, McGraw Hill
3. C.M. Krisna & K. G. Shim- Real time systems- TMH

8CS4.3 DIGITAL IMAGE PROCESSING (Common to Comp. Engg. & Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Image Representation, Two-Dimensional Systems, Two-Dimensional Fourier Transform, Image Stochastic Characterization, Psychophysical Vision Properties, Light Perception, Eye Physiology, Visual Phenomena, Monochrome Vision Model, Color Vision Model, photometry.
II	Image Sampling and Reconstruction Concepts, Image Sampling Systems, Image Reconstruction Systems, Discrete Image Mathematical Representation, Vector-Space Image Representation, Generalized Two-Dimensional Linear Operator, Image Statistical Characterization, Image Probability Density Models, Linear Operator Statistical Representation, Image Quantization, Scalar Quantization, Processing Quantized Variables, Monochrome Image Quantization.
III	Superposition and Convolution: Finite-Area Superposition and Convolution, Sampled Image Superposition and Convolution, Superposition and Convolution Operator Relationships, 8 Unitary Transforms, General Unitary Transforms, Fourier Transform, Cosine, Sine, and Hartley Transforms, Hadamard, Haar, Linear Processing Techniques, Transform Domain Processing, Transform Domain Superposition.
IV	IMAGE IMPROVEMENT: Image Enhancement, Contrast Manipulation, Histogram Modification, Noise Cleaning, Edge Crispening, Image Restoration Models, General Image Restoration Models, Optical Systems Models, Photographic Process Models, Discrete Image Restoration Models, Point and Spatial Image Restoration Techniques, Sensor and Display Point Nonlinearity Correction, Continuous Image Spatial Filtering Restoration, Statistical Estimation Spatial Image Restoration, Geometrical Image Modification, Translation, Minification, Magnification, and Rotation, Perspective Transformation, Camera Imaging Model,
V	Morphological Image Processing, Binary Image Connectivity, 6 Gray Scale Image Morphological Operations, Edge Detection, Edge, Line, and Spot Models, First-Order Derivative Edge Detection, Second-Order Derivative Edge Detection, Image Feature Extraction: Image Feature Evaluation, Amplitude Features, Transform Coefficient Features, Texture Definition, Image Segmentation , Amplitude Segmentation Methods, Clustering Segmentation Methods, Region Segmentation Methods, Boundary Detection,

Text/References

1. DIGITAL IMAGE PROCESSING: PIKS Inside, Third Edition, WILLIAM K. PRATT, PixelSoft, Inc., Los Altos, California, ISBN: 9780471374077

2. Anil Jain: Digital Image Processing,

3. Gonzalez Woods: Image Processing

8CS5 UNIX NETWORK PROGRAMMING & SIMULATION LAB (Comp. Engg.)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

Objectives:

At the end of course, the students should be able to

- Understand various distributions of Unix viz. BSD, POSIX etc.
- Write client/server applications involving unix sockets involving TCP or UDP involving iterative or concurrent server.
- Understand IPV4 & IPV6 interoperability issues
- Use fork( ) system call.
- Understand the network simulator NS2 and Simulate routing algorithm on NS2 (Available on http://www.isi.edu/nsnam/ns/).

Suggested Platform: For Socket Programming- Linux, For NS2 Any of Microsoft Windows or Linux (In case of Microsoft, Virtual environment cygwin will also be required).

Suggested Exercises

S.No.	**List of Experiments**
1.	Write two programs in C: hello_client and hello_server • The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection • The client connects to the server, sends the string “Hello, world!”, then closes the connection
2.	Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
3.	Repeat Exercises 1 & 2 for UDP.
4.	Repeat Exercise 2 with multiplexed I/O operations
5.	Simulate Bellman-Ford Routing algorithm in NS2

References:

- **Stevens, Unix Network Programming, Vol-I**

8CS6 FPGA LAB. (Comp. Engg.)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1.	Fundamental Theory Introduction to DSP architectures and programming Sampling Theory, Analog-to-Digital Converter (ADC), Digital-to-Analog Converter (DAC), and Quantization; Decimation, Interpolation, Convolution, Simple Moving Average; Periodic Signals and harmonics; Fourier Transform (DFT/FFT), Spectral Analysis, and time/spectrum representations; FIR and IIR Filters;
2.	Design (Simulation) using MATLAB/ Simulink Simulate the lab exercises using MATLAB/Simulink
3.	Implementation using pure DSP, pure FPGA and Hybrid DSP/FPGA platforms Digital Communications: On-Off- Keying (OOK), BPSK modulation, and a simple transceiver design Adaptive Filtering: Echo/Noise Cancellation, Least Mean Square (LMS) algorithm (2 weeks) Wireless Communications: Channel coding/decoding, Equalization, Simple Detection Algorithm, OFDM Speech Processing: Prediction Algorithms, Speech Classification and Synthesis

8CS7 Seminar on Information Technology Acts (Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Computer Engg. **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (2) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

Course Objectives:

1. Study the acts dealing with the cyber crimes in different countries viz., India, USA, European Union.
2. Study the Intellectual Property Rights and the acts dealing with these rights.
3. Study the Copyright acts with reference to publishing the material on the web.

Students are expected to prepare reports on:

- Various acts dealing with cyber crimes in the countries.
- what constitutes a cyber crime in the country ?
- Definitions of electronic documents, evidences, the approved algorithms etc.
- Investigation methods.
- Intellectual Property, rights of the creator of the property and legal framework dealing with these rights.
- Similarly on Copyright acts.

Further, every student is required to deliver a seminar on a case study involving cyber crimes/ Intellectual Property, Copyright acts. The seminar shall focus on the “methodology and tools used in the investigation, and enforcement of the applicable acts.”. The seminar may also be presented on new ways of committing cyber crimes particularly Phishing, botnet etc.

The corresponding acts are the reference material.