Solapur University, Solapur

Revised Structure of B. E. (Computer Science & Engg.) Part – I & Part –II w.e.f. July 2010

Part – I

Sr. No	Name Of the Subject	L	T	P	Paper	T/W	OE	POE	Total
1	Advanced Computer Architecture	4	-	-	100	-	-	-	100
2	Network Security	4	-	2	100	25	-	-	125
3	Distributed System	4	-	2	100	25	-	50	175
4	Elective – I	4	-	-	100	-	-	-	100
5	VC ++	2	-	4	-	25	-	50	75
6	Project – I	-	-	4	-	25	75	-	100
7	Industry Institute Interaction	-	-	-	-	25	-	-	25
	Total	18	-	12	400	125	75	100	700

Part – II

Sr. No	Name Of the Subject	L	T	P	Paper	T/W	OE	POE	Total
1	Advanced Data Base System	4	-	2	100	25	-	50	175
2	Mobile Computing	4	-	-	100	-	-	-	100
3	Principles of Mgmt. & Engineering Economics	3	-	-	100	-	-	-	100
4	Elective – II	4	-	-	100	-	-	-	100
5	Web Technology	3	-	4	-	25	-	50	75
6	Project – II	-	-	6	-	50	-	100	150
	Total	18	-	12	400	100	-	150	700

Elective – I

1. Artificial Neural Network
2. Object Oriented Modeling & Design
3 Expert Systems
4. Digital Signal Processing
5. Information Retrieval
6. Embedded Systems
7. Human Computer Interface

Elective – II

1. Data Mining
2. Software Testing & Quality Assurance
3. Bioinformatics.
4. Image processing
5. Pattern Recognition
6. VLSI Technology

Note :

1. Minimum strength of the Students for Electives be 15.

2. The batch size for the practical/tutorials be of 15 students. On forming the batches, if the strength of remaining students exceeds 7 students, then a new batch may be formed. For Project the group shall be about 4 students.

B.E. (Computer Science & Engg.) Part-I

1. Advanced Computer Architecture

Lectures: 4 Hours / week **Theory: 100 marks**

Section – I

1. **Advanced Pipelining:** (**7**)
   Instruction Level Parallelism: Concepts and Challenges, overcoming data hazards with dynamic scheduling, reducing branch penalties with dynamic hardware prediction.

2. **Instruction Level Parallelism:** **(6)**
   Taking advantages of more ILP with multiple issue, compiler support for exploring ILP, Hardware support for extracting more parallelism, studies of ILP.

3. **Vector Processing:** **(7)**
   Why Vector processor? , Basic vector architecture, two real world issues: Vector length and stride, effectiveness of compiler vectorization, enhancing vector performance.

Section – II

4. **Interconnection Networks :** **(7)**
   Tightly and loosely coupled architectures, cluster computing as an application of loosely coupled architecture, various topologies, Static and dynamic types of networks with examples.

5. **Dataflow Architecture:** **(6)**
   Concepts of dataflow computing, static and dynamic architectures, dataflow operators, dataflow language properties, advantages and potential problems.

6. **Multiprocessors:** **(7)**
   Introduction, characteristics of application domains centralized shared memory architecture, distributed shared memory architecture, synchronization, models of memory consistency

Text Books:

1. Computer Architecture A Quantitative Approach – John L. Hennessy and David A. Patterrson.
2. Advanced Computer Architecture – Kai Hwang.
3. Advanced Computer Architecture and Parallel Processing - Kai Hwang and Briggs.

Reference Books:

1. Computer organization – Hamacher Zaky – MGH
2. Advanced Computer Architectures A design space approach – Sima, Fountain, Kacsuk- Pearson
3. Computer Organization and Architecture-An Integrated Approach – Miles Murdocca, Vincent Heuring – Wiley India (For Multiple Choice Questions)

Course Objective :

- To impart good theoretical knowledge of advanced systems that will prepare them to learn all system level subjects that will be useful in developing system level design for optimum performance.

- To make students aware with new technologies used in current architectures to meet the challenges of changing scenario in IT Sector at national & international level.

B.E. (Computer Science & Engg.) Part-II

2. Advanced Database System

Lectures: 4 Hrs. /Week **Theory: 100 Marks**

Practicals : 2 Hrs./Week **T/W : 25 Marks**

POE : 50 Marks

Section I

1. **Database Systems architectures** (10)

   Centralized & C/S architectures, Server systems, Distributed systems, Distributed databases – Homogeneous & heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases .

2. **Parallel Databases** (6)

   Integrated, I/O parallelism, Interquery parallelism, Intraquery parallelism, Intraoperation parallelism, Interoperation parallelism, Design of parallel systems.

3. **Object Database System** (6)

   Overview, Complex Data Types, Structured Types and Inheritance in SQL, Table inheritance, Array and Multisets Types in SQL, Object Identity and Reference Types in SQL, Implementing O-R features, Persistent Programming Languages, Object Oriented versus Object Relational

Section II

4. **Data Analysis and Mining** (6)

   Decision Support Systems, Spatial databases, Temporal Databases, Data analysis and OLAP, Data Warehousing, Data Mining

5. **Query Processing and Optimization:** (6)

   Overview of Query Processing, Measures of query coat, Selection operation, join operation, Other operation, Overview of Query optimization, Introduction to Transformation of Relational Expressions, choice of evaluation plans, Materialized views.

6. **Advanced Application Development** (6)

   Performance Tuning, Performance Benchmark, Standardization, Application Migration

7. **Advanced Transaction Processing** (4)

   Transaction processing monitors, Transactional Workflows, E-commerce, Main Memory Databases, Real Time Transaction Systems, Long Duration Transactions, Transaction Management in Multidatabases

Text Book :

1. Database System Concepts – Abrham Silbertschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill

Reference Book :

Practicals:

Minimum 8 assignments based on above topics.

Course Objective

Having introduced to databases, it is necessary to have a deeper approach in to databases, advanced techniques and tools. This course covers the state-of-the-art techniques to be made known to the students of final year.

B.E. (Computer Science & Engg.) Part-I

3. Distributed Systems

Lectures : 4 Hrs/Week **Theory : 100 Marks**
Practicals : 2 Hrs/Week **Term Work : 25 Marks**
POE : 50 Marks.

Section – I

1. **Fundamentals :** (6)
   Distributed Computing System, its models,Popularity,Distributed operating System,Issues in Designing Distributed Operating system

2. **2. Message Passing:** (7)
   Introduction,Desirable features,Synchronization,Buffering,Multidatagram Messages,Encoding & Decoding of Message data, Failure handling, Group communication:one to Many, many to one

3. **3 Remote Procedure Calls** (6)
   Introduction,RPC Model,RPC mechanism,Stub generation,RPC messages, Marshaling arguments & results,communication Protocols for RPCs client server binding , Exception Handling

Section-II

4. **Process Management:** (6)
   Introduction, Process migration, its desirable features, Process migration mechanisms, advantages of process migration, Threads, models for thread organization, Thread synchronization & scheduling.

4. **Synchronization in distributed Systems :** (7)
   Clock Synchronization, Event ordering,Mutual Exclusion,Deadlock,Election Algorithms

5. **Distributed File Systems :**
   Introduction,Desirable features of DFS,File models,File accessing models,File-Sharing semantics,File-caching schemes,File replication,Fault Tolerance.(7)

6. **Distributed Operating Systems** : (8)
   Case studies – Mach, Chorus , Unix emulation in Mach & Chorus.

Books :

1. Distributed Operating Systems – concepts & design – P.K. Sinha(PHI)

Reference:

1. Distributed Systems – Principles & Paradigms… A.S. Tanenbaum & Maarten Van Steen (PHI)

Term Work : It should consist of 8-10 experiments based on the above topics.

Course Objective: This course is designed to provide the fundamental concepts of Distributed operating systems, its design issues, its various communication techniques, process management, message passing for IPC, synchronization techniques, distributed file systems &case studies of some Distributed Operating systems.

B.E. (Computer Science & Engg.) Part-I
4. Elective I
1. Artificial Neural Networks

Lectures: 4 Hours/week **Theory: 100 Marks**

Section – I

1) Introduction : 4 hrs.
Biological neuron, Models of artificial neural networks, neural processing, neural network learning rules,

2) Learning & adaptation : 5 hrs.
Classification Neural learning rules-Hebbian, perceptron, Delta, Widrow Hoof, Winner take all outstar learning rule.

3) Perceptron : 4 hrs.
Discrete perception as a classifier, Decision and discrimenant functions, Linearly non separable patterns. Perceptron training for two class and multiclass dichotomizer.

4) Multilayer networks : 4 hrs.
Delta learning rule for multiperceptron layer, Generalized Delta learning rule, Feed forward recall and error back-propagation, Training algorithm.

5) Performance : 4 hrs.
Madeline, Network pruning, Marchands, Neural tree and filing algorithm, Prediction network.

Section – II

6) Unsupervised learning : 5 hrs.
Winner take all networks, Hamming networks, Max net, competitive learning K-means clustering and LVQ algorithms, Adaptive resonance theory, ARTI, ALGORITHM, SELF ORGANIZING Kohanens map, Naocognitron.

7) Associative memories : 5 hrs.
Non iterative procedures for association hop field networks, Discrete Hop field Networks storage capacity of Hop field networks. Continuous Hop field networks. Brain state in a box (B B networks Boltzmann machines Hetero associations.

8) Optimization techniques: 5 hrs.
Optimization using Hop field networks. Traveling salesperson problem, Iterated gradient descent techniques. Simulated annealing technique, Random search technique genetic algorithm for optimization problems.

9) Application of ANN : 4 hrs.
Character recognition, Speech recognition, Signature verification application, Human face recognition.

Text Books : -

1 Introduction to Artificial Neural Systems – Zurada (JAICO)
2 Elements of Artificial Neural Networks – Mehrotra, Hohan, Ranka (PENRAM)
3 Introduction to Artificial Neural Networks – B. Yegnanarayana (PHI)

Ref. Books :
1. An introduction to ANN by Anderson (PHI)
2. Neural Networks a comprehensive foundation by Haykin (PHI)
3. Elements of ANN by Mohan Ranka (Pearam Internatiional)

Course Objectives:
This preliminary course of Artificial Neural Network enables a student to understand basic elements of Artificial Neural Network and make him use the same to develop higher level strategies for the betterment of the output established through this network. It helps a student to design and develop real world problems using neural computations.

B.E. (Computer Science & Engg.) Part-I
4. Elective I
2. Object Oriented Modeling And Design

Lectures: 4 hrs/week **Theory: 100 Marks**

Section-I

1. Introduction: 4 hrs
Object Oriented development and themes, evidence for usefulness, modeling as a Design Technique.

2. Object Modeling: 6 hrs
Objects, classes, links and associations, generalization and inheritance, grouping constructs, aggregation, abstract classes, generalization as extension and restriction, multiple inheritance, metadata, candidate keys and inheritance.

3. Dynamic and Functional Modeling: 6 hrs
Events, states, operations, concurrency, nested state diagrams, advanced dynamic modeling concepts, relation of object and dynamic models, DFD, relation of functional to object and dynamic models

4. Implementation of OMT 6 hrs
Use of programming language and database system, Object oriented style, feature of object-oriented languages, Applications of OMT like object diagram compiler, Computer animation

Section-II

5. Structural Modeling using UML: 6 hrs
Classes, Relationships, Common mechanisms. Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram

6. Behavioral Modeling using UML: 6 hrs
Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams.

7. Architectural Modeling using UML: 6 hrs
Components, Deployment, Collaboration, Patterns and Frame works, Component diagrams and Deployment Diagrams

Text Books:
1. Object oriented Modeling and Design: Rambaugh, Premerlani, Eddy, Lorenson (PHI)
2. The Unified Modeling Language User Guide: Grady Booch, Jeams Rambaugh, Ivar Jacotson (Addison Wesley)

Reference:
Practical Object Oriented Design with UML – Mark Priestley.
1. UML-In a Nut Shell – Sinon Alhair

Course Objectives : To introduce a student with two base methodologies of modeling design in an object oriented scenario namely Object Modeling Technique and Unified modeling language. It enables a student to model and design real world problems.

B.E. (Computer Science & Engg.) Part-I

4. Elective I

3) Expert systems

Lectures : 4 Hrs **Theory : 100 Marks**

Section – I

1) Basics of expert systems : 8 hrs.

Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Types of Knowledge-Based Decision Support Systems, Basic Concepts of Expert Systems, Structure of Expert Systems, The Human element in Expert System, How Expert Systems Work, Benefits of Expert Systems, Types of Expert Systems, Expert Systems and the Internet/Intranets/Web.

2) Knowledge Acquisition and validation. 8 hrs.

Knowledge Engineering, Scope of Knowledge, Difficulties in Knowledge Acquisition, Methods of Knowledge Acquisition : An overview ,Tracking Methods , Expert Driven Methods, Machine Learning: Rule Induction, Case-Based Reasoning, Neural Computing&Intelligent Agents, Knowledge Acquisition from Multiple Experts, Analyzing, Coding, Documenting and Diagramming, Knowledge Acquisition and the Internet/Intranets.

3) Knowledge Representation. 8 hrs.

Introduction, Representation in Logic and other Schemas , Semantic Networks, Production Rules, Frames, Multiple Knowledge Representation, Experimental Knowledge Representations , Representing Uncertainty: An overview STRIPS planner, operator tables and means-end analysis ,study of sub goaling, knowledge base, control structure and evaluationw.r.t. MYCIN.

Section – II

4) Inference Techniques. 8 hrs.

Reasoning in Artificial Intelligence, Inferencing with Rules: Forward and Backward Chaining, The inference Tree, Inferencing with frames, Model-Based Reasoning, Case-Based Reasoning, Inferencing with Uncertainty, Representing Uncertainty, Probabilities and Related Approaches, Theory of Certainty (Certainty Factors), Approximate Reasoning Using fuzzy Logic.

5) Intelligent S/W Agents and Creativity. 8 hrs.

Intelligent Agents: An overview, Characteristics of Agents, Single Task, Why Intelligent Agents? , Classification and Types of Agents, Internet-Based Software Agents, Electronic Commerce Agents.

6) Tools for building expert systems. 8 hrs.

Overview, shells, shells to tasks, inflexibility, constraints of production rule languages, multiple paradigm programming environments, software tools, the blackboard environment, tracing dependencies using TMS, Non monotonic justification brief functions, concept only of case based reasoning and hybrid systems.

Text books :

1. Decision support & Intelligent systems 6th Edition by Efram Turban, Jay E. Aronson(Pearson Education)
2. Introduction to Expert Systems- Peter Jackson (Addison Wesley)(Pearson Education)Asia

Ref. Books :

1.. Artificial Intelligent by Patric H. Winston
2. Expert Systems- Principles and Practice A Bonnet,JP Haton, J-M Troung NGOC (Prentice Hall)
3. Decision support and Expert Systems- Management Support Systems Efrain Turban(Macmillan Publishing Company)
4. A practical Guide to Designing Expert Systems-Sholon M. Weiss and casimir A Kulikowski(Rowmann Allanheld)

Course Objectives : This course aims at Introducing a student to expert systems . It revisits knowledge ,acquisition, validation, representation and inferencing techniques. A student is made acquainted with the tools for building expert systems to be used in real world application

B.E. (Computer Science & Engg.) Part-I
4. Elective I
4. Digital Signal Processing

Lectures : 4 Hrs/ Week **Theory: 100 Marks**

SECTION - I

1: Discrete time signals & system: 6 Hrs
Discrete time signal: sequences; discrete time system, classification; linear time invariant Systems, its properties; frequency domain representation of discrete time signals and systems; symmetry properties of the fourier transform, fourier transform theorems.

2: Z TRANSFORM : 5 Hrs
Defintion and properties, the region of convergence; bilateral Z transform, inverse Z transform; Z transform properties.

3: DISCRETE FOURIER TRANSFORM: 8 Hrs
Representation of periodic sequence: the discrete fourier series- properties; sampling in time and frequency domain; fourier representation of finite duration sequences; the discrete fourier transform-properties; linear convolution usinf the DFT; 2 dimensional DFT; discrete time fourier transform.

4: REALISATION OF DIGITAL LINEAR SYSTEMS: 5 Hrs
Introduction, basic realization, block diagram & the signal flow graph; basic structures For IIR & FIR systems.

SECTION - II

5: DIGITAL FILTER DESIGN TECHNIQUES: 7 Hrs
Design of IIR digital filters from analogue filters; properties of FIR digital filters; Design of FIR filters using windows; comparison of IIR and FIR filters, linear phase Filters.

6: COMPUTATION OF THE DISCRETE FOURIER TRANSFORMS: 7 Hrs
Decimation in time algorithms; decimation in frequency Algorithms; FFT algorithms for an N composite number ; General computational Considerations in FFT algorithms; chirps Z transform algorithm.

7: DISCRETE HILBERT TRANSFORM: 5 Hrs
Real and imaginary part sufficiency for casual sequences; minimum phase condition;
Hilbert transform relations for the DFT and the complex sequences.

8: DSP PROCESSORS 3 Hrs
TMS 320 Architecture, Applications

BOOKS:
TEXT BOOKS:
1: Oppenhiem Schaffer," DISCRETE TIME SIGNAL PROCESSING "(PHI),2001
2: Proakis J.G ," INTRODUCTION TO DIGITAL SIGNAL PROCESSING" (PHI),1997
3. TMS 320 Data sheet and Manual

Course Objectives : To introduce a student to analyses Digitals inn time and frequency domains and to use. Digital Signal Processors to create applications where signal transformations are required.

B.E. (Computer Science & Engg.) Part-I
4. Elective I
5. Information Retrieval

Lectures: 4 Hrs/week **Theory : 100 Marks**

Section – I

1. **Information Retrieval & IR Models :** (6)
Information retrieval and data retrieval, Information retrieval process, A Formal Characterization of IR Models, Classic Information Retrieval, Structured Text Retrieval Models, Models For Browsing, Retrieval Performance Evaluation-Recall and Precision

2. **Query Languages:** (4)
Keyword based querying, Pattern Matching, Structural Queries.

3. **Text and Multimedia Languages and Properties :** (4)
Text data & formats, Multimedia Data & formats.

4. **Indexing and Searching :** (5)
Inverted Files and Indices for text search, Boolean Queries, Sequential searching, Pattern Matching, Structural Queries.

Section – II

5. **Multimedia IR - Models and Languages :** (4)
Data Modeling & Query Languages.

6. **Multimedia IR - Indexing and Searching :** (5)
A generic multimedia indexing approaches, One dimensional time series, Two Dimensional color images, Automatic Feature Extraction.

7. **Searching the Web:** (6)
Search Engines ,Browsing, Metasearchers, Searching using Hyperlinks

8. **Digital Libraries :** (4)
Architectural issues of Digital Libraries, Document models, Representation, and Access.

Text Book -

1. Modern Information Retrieval - Ricardo Baeza-Yates and Berthier Ribeiro-Neto - Pearson Education (Low Price Edition)

Reference :

1 www.dcc.ufmg.br/irbook or sunsite.dcc.uchile.cl/irbook
2 http://nlp.stanford.edu/IR-book/information-retrieval-book.html
3 Information Storage and Retrieval- Robert R Korthage, WILEY-INDIA

Course Objectives : This course introduces students with the principles of information retrieval from text, multimedia and web . During the course students has to undergo different mathematical models and algorithms for the same.

B.E. (Computer Science & Engg.) Part-I
4. Elective I
6. Embedded Systems

Lectures: 4 Hrs / Week **Theory: 100 Marks**

Objective: Embedded system tools and products are evolving rapidly. This course deals with various approaches to building embedded systems. It introduces unified view of hardware and software. The aim of this course is to make the students aware of the various applications of embedded systems.

Pre-requisites: Microprocessors, Microcontrollers and C Programming

Section – I

1. An overview of embedded systems: (8)
Introduction to embedded systems, Categories and requirements of embedded systems, Challenges and issues related to embedded software development, Hardware/Software co-design, Introduction to IC technology, Introduction to design technology

2. Embedded Software development: (8)
Concepts of concurrency, processes, threads, mutual exclusion and inter-process communication, Models and languages for embedded software, Synchronous approach to embedded system design, Scheduling paradigms, Scheduling algorithms

3. Real Time Operating System: Introduction to RTOS, Basic design using RTOS (4)

SECTION-II

4. Parallel Interface Standards: (8)
Various methods of interfacing, Parallel I/O interface, IEEE 1284, ISA, PCI, Parallel Prot interface with keyboard, switches and display units.

5. Serial Interface Standards: IEEE 1394, USB, I2C, SPI, UART. (8)

6. Case studies and Applications of embedded systems: (4)
Case Studies of: Digital Camera, Coffee wending machine, Network Router

Text Books:
1. Raj Kamal, “Embedded Systems”, TMH
2. Vahid ,”Embedded System” WILLY INDIA
3. Muhammad Ali Mazidi and Janice Gillispie Mazidi, “The 8051Microcontroller and Embedded Systems", Pearson Education

Referance:
1. K.V.K.Prasad, ”Embedded Real time systems” Willy India
2. David E. Simon, “An Embedded Software Primer ", Pearson Education

B.E. (Computer Science & Engg.) Part-I

4. Elective I

7. Human Computer Interface

Lectures :4 Hours/week **Theory: 100 Marks**

Section I

1. **Human Computer Interface** **:** Introduction , Brief History . (4)
2. **User Interface Design** **:** Models , Principles, Practices (4)
3. **Direct Manipulation** **:** Overview, Scope, Application (4)
4. **Cognitive Framework of HCI** : Perception & Representation, Attention and Interface Design, Memory in Interface Design, Knowledge Representation (12)

Section II

5. **User Modelling** : Interaction with Natural Languages, Next Generation Interface (4)
6. **Evaluation**: UI Evaluation : Introduction, Cognitive Walkthrough (20)

   Heuristic Evaluation

   Evaluation with Cognitive Models

   Evaluation with Users

   Model-based Evaluation

Textbooks :

1. *Human-Computer Interaction*, 3rd edition, by Dix, Finlay, Abowd and Beale, Prentice Hall, 2003.

Course Objectives : To introduce a student to human computer interfaces, their designs , applications, cognitive frame work and to use them in modeling and interaction with natural languages to develop next generation interfaces for real world problems .

B.E. (Computer Science & Engg.) Part-I

5. Visual C++

Lectures : 2 Hrs/Week **T/W : 25 Marks**

Practical : 4 Hrs /Week **POE : 50 Marks.**

1. Introduction to Windows Operating system. Developing window application in SDK. Detail study of Windows messages. (2)

2. Introduction to GDI –understanding DC, scrollbars, drawing lines, dots, GDI mapping modes, drawing filled areas. (4)

3. Working with keyboard & mouse – understanding keyboard &mouse basics, keyboard messages, mouse messages, capturing mouse (2)

4. Working with Window controls – study of various buttons, study of controls, edit box, scrollbars list box etc. (2)

5. Working with menus – adding icons, cursor, custom resources, adding menus to application, enabling disabling menu items. (2)

6. Working with Dialog boxes – modal dialog box ,modeless dialog box, common dialog box (3)

7. Working with clip board – standard data formats, memory allocation, transferring data to the clip board, getting data from clipboard. (2)

8. Developing Multiple Document Interface (MDI) & Dynamic Linked Libraries (DLL) (2)

9. Introduction to MFC. Creating SDI application. (1)

10. Implementation of View and Documents. (2)
    Defining and initializing view class data members, Storing and deleting the document data, scrolling and splitting views.

11. Study of Documents & Views (2)
    Understanding document template, using documents & views together

Text Books :

1. Programming Windows fifth edition by Charles Petzold Microsoft press
2. Mastering Visual C++ 6.0 –Michael J. Young – Techmedia

Reference Books :

1. Programming Visual C++ by david Kruglinski,shepherd,Wingo Microsoft press
2. Complete Reference VC++ 6 – Pappas Murray (TMGH).
3. MFC Programming from the ground up by Herbert Schildt (TMH)
4. Visual C++ Programming vol – I by Yashwant kanetkar

Course Objective:

There are two objective of the course

1. It helps to focus on totally new and different software development ie. Windows GUI Programming.
2. To get acquainted with core working of Window Message Processing and Window API

List of Practical

1. Study of Different Windows Operating System
2. Write a skeleton program for creating any application window.
3. Study and Implementation of various GDI functions.
4. Implementation of Keyboard and mouse messages
5. Implementation of Shopping cart using child window controls.
6. Study and implementation of resources : cursors, icon and string table
7. Implementation of menus and dialog boxes and implement its messages.
8. Create a DLL for matrix addition , multiplication and substraction.
9. Create a window using MFC
10. Create a MDI application.

B.E. (Computer Science & Engg.) Part-I
6. Project -I

Practical : 4Hrs/Week **Term Work : 25**

Oral : 75

1. A project group shall be about 4 students.
2. Students have to study existing system, problems in existing system, proposed system, its definition, scope, design, introduction to programming tools, hardware and software platforms, planning, activity charts, planning for testing, test case design etc.
3. Project leader should maintain the progress register in which each members weekly contribution should be written and the guide will countersign the same.
4. A project design report will be submitted as a term work document at the end of semester.

B.E. (Computer Science & Engg.) Part-I

7. Industry Institute Interaction

Term Work : 25

The student should attend an industrial training arranged at Industry or Institute and should complete a mini project on the technology on which training was given. A report regarding satisfactory completion of the training should be submitted to the college by competent authority from Industry / Institute. The evaluation of Term Work will be carried out by a panel of Examiners decided by the institute.

B.E. (Computer Science & Engg.) Part-II

1. Network security

Lectures: 4 Hrs/Week **Theory: 100 Marks**

Practical 2 Hrs/Week **Term Work : 25 Marks**

Section – I

1) Symmetric Ciphers: 6 hrs.

Overview – Services, Mechanism and Attacks, the SI Security. Architecture, A model for network security Classical Encryption techniques – Symmetric Cipher model, Substitution. Techniques, Transposition techniques, Rotor Machines, Steganography.

2) Block Cipher and Data Encryption Standard: 6 hrs.

Simplified DES, Block. Chiper principles, The Data Encryption Standard, The strength of DES,Differential and Linear Cryptanalysis, Block Cipher design principles, Block Cipher mode of Operation.

3) Public Key Cryptography: 5 hrs.

Public Key Cryptography and RSA – Principles of Public Key Cryptosystems, The RSA Algorithm Key management; other public key cryptosystems – Key Management, Diffe-Hellman Key Exchange, Elliptical Curve Arithmetic, Elliptical curve Cryptography

4) Message Authentication and HASH Functions: 6 hrs.

Authentication requirements, Authentication Functions, Message Authentication Codes, Hash Functions, security of Hash Functions and MACS Digital Signatures and Authentication Protocols–Digital Signatures, Authentication Protocols, Digital Signature Standard.

Section – II

5) Authentication Applications and Electronic Mail Security: 6 hrs.

Authentication Applications – Kerberos, X.500 Authentication Service Electronic Mail Security – Pretty Good Privacy, S/MIME

6) IP Security: 6 hrs.

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating security payload, Combining Security Associations, Key Management ,Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction.

7) Web Security: 6 hrs.

Privacy on internet, Privacy consideration in web services, Privacy in semantic Web, Privacy consideration in the use of Context-Sensitive Technologies, Security and privacy aspect of service oriented architectures.

8) System Security: 4 hrs.

Intruders – Intruders, Intruder detection, Password Management, Malicious Software – Viruses and Related Threats, Virus Countermeasures, Firewall design principles, Trusted system.

Text Book:

1.Williams Stallings–Cryptography and Network security principles and practices. Pearson Education (LPE)
2.Nina Godbbole --Information systems security-Security management, metrics, frameworks and best practices(WILEY)

Reference Books:

1 Menezes, A.J., P.C.Van Oorschot, and S.A.Vanstone, “Handbook of Applied Cryptography”
2 Schneir, Bruce, “Applied Cryptography: Protocols and Algorithms”

Course Objectives:

This preliminary course of Network security enables a student to understand basic elements of security in the network, internet and web technology .Keeping data, information and, knowledge secure from intruders and competitors. To achieve this understanding information and communication systems from a security viewpoint. It has provided aspects of information systems, their corresponding security risks and how to embark on a strategic approach to reducing and preferably, eliminating those risks. This is relevant to industry practice helps a student to design and develop real world problems.

B.E. (Computer Science & Engg.) Part-II
2. Mobile Computing

Lectures: 4 Hrs/Week **Theory: 100 Marks**

Section – I

1. **Introduction to wireless communication:** (2)
   Introduction, Need and Applications of wireless communication, Mobile and wireless devices.

2. **Wireless transmission** : (5)
   Frequencies for radio transmission, signals, antennas, signal propagation, Multiplexing, Modulation, Spread spectrum and Cellular systems.

3. **Medium Access Control** : (5)
   Specialized MAC, SDMA, FDMA, TDMA and CDMA.

4. **Telecommunication Systems** : (10)
   GSM– Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, New data services

Section – II

5. **Wireless LAN** : (10)
   Introduction, Infrared v/s Radio transmission, Infrastructure and ad-hoc networks, IEEE 802.11, HIPERLAN, Blue Tooth.

6. **Mobile Network Layer** : (5)
   Mobile IP, DHCP.

7. **Mobile Transport Layer** : (6)
   Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and selective retransmission & recovery, Transaction oriented TCP.

Books :

1. Mobile Communications – Jochen Schiller-II Edition (Addison-Wesley).
2. Wireless LAN – Peter T. Davis, Craig R. Mc Guffin (MGH International Edn).
3. The Wireless Application Protocol – Sandeep Singhal, Jari Alvinen and Group (Addison-Wesley).

Term Work : It should consist of 8-10 assignments on above topics with emphasis on designing & solving problems on above mentioned topics.

Course Objective of Mobile Computing

- To give good theoretical background that will prepare them to learn the state-of-the-art technology of mobile communication that will be useful in developing a successful professional career.
- To introduce students with new technology used in Mobile Communication to meet the challenges of changing scenario in IT Sector at national & international level

B.E. (Comp. Science & Engineering) Part II
3. PRINCIPLES OF MANAGEMENT & ENGGINEERING ECONOMICS

Theory : 100 Marks Lectures : 3 Hr./Week

SECTION I : Principles of Management

1. Forms of business organization
   Introduction, Types of Business Organisations, Private companies, Partnership organization, joint stock companies, private and public Ltd. Companies, Co-operative society, Govt. Department organization, public corporation, Government Corporation
2. Functions of Management
   Planning, Types of planning, strategic planning, organizing, stuffing, directing leadership, communication, motivation, supervision, controlling, coordinating
3. Organisation Structure
   Introduction, Characteristic, departmentalism, Authority,span of control, matching of job, direction of labour, lateral relationship, delegation, policies, objectives, goals & mission ,chain of command, types of organization structure, line or scalar, staff & functions, committee organization, organization chart.
4. Organisation Behaviour
   Motivation, types of motives, work motivation approaches, the content theory of work motivation, process theory of work motivation, contemptory theory of work motivation
5. Group Dynamics
   Definition, classification of groups, nature of work group, stages of group development, group cohesiveness, Group performance, group norms, work teams, types of teams

SECTION II : Engineering Economics

1. Terminology & Basic concepts technology :
   Terminology : Microeconomics, macroeconomics, wealth, goods, wants, value, value ahead price, capital money income, margin, utility etc.
   Basic concepts: Demand & supply, Theory of demand and supply, price mechanism, production, factors of production, land, labour, capital and organisation.
2. Break even Analysis
   Fixed & variable cost,
   Break even point : Theory , mathematical & graphical method, non-linear break even analysis, numerical problems, Method of lowering break even point.
   Applications of break even analysis & numerical problems based on above.
3. Indian financial system
   Banking : Duties & commercial bank systems, public sector bank, clearing flowers, finance from bank.

Text Books :

1. Industrial Engineering & Management – O.P. Khanna
2. Industrial Organisation & Management – Benga & Sharma
3. Organisational Behaviour 10th edition – Fred Luthans
4. Organisational Behaviour, 9th Edition – Stephen P. Robbins

B.E. (Computer Science & Engg.) Part-II
4. Elective – II

1) DATA MINING

Lectures : 4 Hrs. /Week **Theory :100 Marks**

Section I

1**.INTRODUCTION** :What is data mining, Data mining-On what kind of data, data mining functionalities, data mining applications, classification, major issues in data mining, data mining tools, KDD.

2**.DATA PRE-PROCESSING :**Need of pre-processing, Data cleaning, Data integration & transformation, data reduction, Discretization & concept hierarchy generation

3.**Clasification –** Introduction, stastical Based algorithms,Distance based algorithms,Distance based algorithms, rule based algorithms

4**.Clustering :**

Introduction, Similarity and Distance meaures, Outliers, Hierarchical algorithms, partional Algorithms, Clustering large Databases. Partitonal Algorithms,

5. **Association Rules, Introduction, Large Item sets and basic algorithms.**

6. **Advanced Topics :**

Web Mining, Introduction, Web content Mining, Web structure Mining, Web Usage Mining Spatial Mining, Introduction ,Spatial Data Overview, primities, Rules, Classification Temporal Mining-Introduction, Modelling Temporal events, Pattern detection, Sequence, Temporal association rules.

7. **RECENT TRENDS**
Application , System Product and research prototypes, Multimedia data Mining Indexing of multimedia material , compression, space modelling

BOOKS :
1. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman, 2001.
2. Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education 2004.
3. Sam Anahory, Dennis Murry, “Data Warehousing in the real world”, Pearson Education 2003.
4. David Hand, Heikki Manila, Padhraic Symth, “Principles of Data Mining”, PHI 2004.
4. W.H.Inmon, “Building the Data Warehouse”, 3rd Edition, Wiley, 2003.

Course Objectives : This course introduces a student with the basic techniques of mining data and how it can be used to develop application and analyse real world problems.

B.E. (Computer Science & Engg.) Part-II
4. Elective-II
2) Software Testing & Quality Assurance

Lectures : 4 Hrs./Week **Theory: 100 Marks**

Section-I

1) Basic Concepts and Preliminaries 6 hrs.

Quality Revolution, Software Quality, Role of Testing, Verification and Validation, Failure, Error, Fault, and Defect, Notion of Software Reliability, Objectives of Testing, What is a Test Case? , Expected outcome, Concept of Complete Testing, Central Issues in Testing, Testing Activities, Test Levels, White-Box and Black-Box Testing, Test Planning and Design Test tools and Automation

2) Software measurement & metrics data collection 6 hrs.

Measurement in software engineering, classifying software measures, applying the framework, software measurement validation. Definition, storing, extraction and collection of data, analyzing software measurement data analyzing results of experiments, simple analysis techniques, more advanced methods, Overview of statistical test.

3) Software Engineering Measurement 4 hrs.

Size: software size, length, reuse, functionality, complexity. Structure: Types of structure measure, control flow structure, Modularity and information flow attributes, Object oriented metrics, Data structures.

Section-II

4) Software Testing Techniques: 8hrs

Unit Testing, Control Flow Testing, Data Flow Testing, Domain Testing, System Integration, System test Categories, Functional Testing, System Test Design, System Test Planning and Automation, System Test Execution, Acceptance Testing

5) Software Reliability 8 hrs.

Definitions of Software Reliability, Factors Influencing Software Reliability Applications of software Reliability, operational Profiles, Reliability Models Test Groups, Software Quality Assurance Groups, Effective Staffing of Test Engineers, Recruiting Test Engineers, Retaining Test Engineers, Team Building

6) Software Quality 4 hrs.

Five Views of Software Quality, McCalls Quality Factors and Criteria,
ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard.

Text Books:

1) Software Testing and Quality Assurance: Theory and Practice, Sagar Naik, Piyu Tripathy ISBN:978-0-471-78911-6, Wiley publications
2) Software Metrics – A rigorous & practical approach
   - Norman Fenton, Shari Lawrence Pfleeger (THOMSON – BROOKS)

Reference Books:

1) Software Testing – A practical approach, Er.Rajiv Chopra (S.K.KATARIA & SONS)
2) Software Requirement & Estimation – Swapna Kishore, Rajesh Naik.
3) Stephen H. Kan, "Metrics & Models in Software Quality Engineering", Pearson Education, ISBN 81-297-0175-8.
4) Ramesh, Bhattiprolu, "Software Maintenance", Tata McGraw Hill, ISBN 0-07-048345-0

Course Objectives for Software Testing & Quality Assurance

This course should result in
Understanding the principles of development of software required to build applications.
Demonstrate the features of software used at system level.
Create software that are interface between Hardware & User.

B.E. (Computer Science & Engg.) Part-II
4. Elective-II
3. Bioinformatics

Lectures: 4 Hrs/week **Marks:100**

Section I

1. Introduction to Bioinformatics (4)
Introduction, Historical overview, Bioinformatics Applications, Tools for web search, Basic concepts-Protein and amino acid, DNA and RNA, Data mining of biological databases.

2. Bioinformatics Databases: (10)
Introduction, Primary & Secondary database, GenBank Flat File dissection, GCG, ACDEB
Introduction to structures, PDB, MMDB, Structure file formats, Visualizing structural information, Database structure viewers.

1. The Biological Databases and NCBI Database: (05)
Integrated information retrieval: The entrez system, sequence databases beyond NCBI, Medical Databases, SeqIDS, Bioseq: Sequences, Bioseqsets: Collections of sequences, Seq. Annot: Annotating the sequence, Seqdiscr: Describing the sequence

3. Sequence and Multiple Alignment and Database Searching: (05)
Introduction, Evolutionary basis of sequence alignment, Optimal alignment methods, Substitution scores & gap penalties, Statistical significance of alignments, Progressive alignment methods, Motifs and patterns, Hocks, MOST, Probe, Presentation methods, Abscript
,Database similarity searching, FASTA, BLAST, Low complexity regions, Repetitive elements

4. Phylogenetics: (05)
Why phylogenectics, Elements of phylogenetic models, data analysis: Alignment, substitution model building, tree building and tree evaluation, building methods, searching for trees, hooting trees, Evaluating trees and data, Computer tools for phylogenetic analysis-Distances, Growtree,Paup,Phylip.

SECTION II

5. Predictive Methods Using Nucleotide Sequence: (06)
Framework, marking repetitive
DNA, Database search, Codon bias detection, Detecting function sites in the DM,
Integrated gene passing, Finding tRMA genes

6. Predictive methods Using Protein Sequences: (08)
Protein identity based on composition, Propsearch, Physical properties based on sequences, secondary structure and folding classes, Sspread sopma, Specialized structures of features, Tertiary structure,

7. Genome Mapping: (05)
Different types of maps: physical, genetical, etc. Synteny, Human genome project, Application of genome mapping, Chromosome maps.

8. Submitting DNA Sequences to the Databases: (05)
Introduction, Where to submit, What to submit, How to submit on the world wide web, How to submit with sequin.

Text Book :

1. Bioinformatics: A practical guide to the analysis of genes and proteins A.D. Baxevanis and B.F.F. Ouellette (Eds). 2002 John Wiley and Sons.
2. Bioinformatics: Sequence and Genome Analysis by D.W. Mount, 2001, Cold Spring Harbor Laboratory Press.
3. S.C. Rastogi, Namita Mendirata, Parag Rastogi ‘’Bioinformatics concepts Skills and application, CBS publisher

Reference Book:

1. Introduction to bioinformatics: a theoretical and practical approach ,By Stephen A. Krawetz, David D. Womble

2. Discovering Genomics proteomics and Bioinformatics by A. Malcolm Campbell and L.J. Heyer

Objective:

To have a basic understanding of how the collection of individual nucleotide bases drives the engine of life, large amounts of sequence data must be collected and stored in a way that these data can be searched and analyzed easily by the bioinformatics

B.E. (Computer Science & Engg.) Part-II
4. Elective-II
4. Image Processing

Lectures: 4 Hrs / Week **Theory: 100 Marks**

Section – I

1. **Image , digitized image & it's properties :** **8**
Elements of visual perception & its attributes,
Digitised Image - image function, mathematical representation.
Image digitization - Sampling & Quantization,
Properties - distance , pixel adjacency, region, background, holes, brightness, segmentation, border, edge , convex hull , histograms, color, Noise.
Image analysis - Level of image data Representation Traditional & hierarchial data structure.

2) Image pre – processing : **6**
Brightness transformation, geometric transformation, Local Processing, Image smoothing and edge detection, Introduction to Image restoration.

3) Image enhancement in special domain : **6**
Threshold, Edge-based segmentation, Edge relaxation, Border tracing, Hough transform. Region-based segmentation, Region merging, Region splitting, Split & Merge.

Section – II

4) Image Enhancement in frequency domain : **7**
Fourier Transform,1-D & 2-D, DFT, Handmard Transform , Discrete Cosine Transforms, Introduction to Wavelet Transform, Application of Image transform.

5) Space reorientation and Detection: **7**
Region Identification, Contour-based representation. Chain codes, B-Spline reorientation, Region –based representation, moments, Convex Hull.

6) Image Compression : **6**
Redundancy & fidelity criteria , Error free compression, Methods of compression, standards, Binary , continuous tone still, Video.

Text Book :
1) Computer vision & Image processing - by Milan Sonaka.
2) Digital Image Processing - by Gonzalez (Addision Wesley)

Reference:
3) Elements of Digital Image Processing & Computer Vision – by Andrew Low(MGH)
4) Digital Image Processing - Pratt.
5) Fundamentals of digital Image Processing – by A. K. Jain

Objective: This syllabus is designed to explore several image processing techniques, and learn to improve images with them. Extract quantitative data from images.

B.E. (Computer Science & Engg.) Part-II
4. Elective-II
5) Pattern Recognition

Lectures : 4 Hrs/week **Theory :100 Marks**

Section - I

1.Introduction : (6)
The Information-Handling Problem , Basic Concepts of Pattern Recognition, Fundamental Problems in Pattern Recognition System Design, Design Concepts and Methodologies ,Examples of Automatic Pattern Recognition Systems, A Simple Automatic Pattern Recognition , Model

2.Decision Functions : (6)
Introduction ,Linear Decision Functions Generalized Decision Functions ,Pattern Space and Weight Space, Geometrical Properties Implementation of Decision Functions, Functions of several variables.

3.Pattern Classification by Distance Functions (6)
Introduction , Minimum-Distance Pattern Classification, Cluster Seeking, Unsupervised Pattern Recognition.

4.Pattern Classification by Likelihood Functions (6)
Introduction, Pattern Classification as a Statistical. Decision Problem. Bayes Classifier for Normal Patterns , Error Probabilities, A Family of Important Probability Density Functions, Estimation of Probability Density Functions.

Section - II

5. Trainable Pattern Classifiers-The Deterministic Approach (6)
Introduction, The Perceptron Approach, Derivation of Pattern Classification Algorithms, Multicategory Classification,, Learning and Generalization, The Potential Function Approach.

6. Trainable Pattern Classifiers-The Statistical Approach . (6)
Introduction, Stochastic Approximation Methods ,Derivation of Pattern Classification Algorithms, The method of Potential Functions.

7.PatternPreprocessing and Feature Selection (6)
Introduction, Distance Measures ,Clustering Transformations and Feature Ordering Clustering in Feature Selection, Feature Selection Through Entropy Minimization Feature Selection Through Orthogonal Expansions Feature Selection Through functional Approximation, Divergence Concept, Feature Selection Through Divergence Maximization, Binary Feature Selection.

8. Syntactic Pattern Recognition (6)
Introduction, Concepts From Formal Language Theory, Formulation of the Syntactic Pattern Recognition Problem , Syntactic Pattern Description, Recognition Grammars, Statistical Considerations, Learning and Grammatical inference, Automata as Pattern Recognizers.

Text Book : Pattern Recognition Principles by Julius T. Tou, Rafael C. Gonzalez (Addison Wesley Publishing Company)

Ref. Book : 1. Pattern Recognition & Image Analysis by Earl Gose & Richard Johnson Baugh Steve Jost (PHI)
2. Syntactic Pattern Recognition & Applications by K. S. FU (PHI)
3. Pattern Recognition - Statistical Structural & Neural Approaches by Robert Schalkoff (Wiley India Edition)

Course Objectives : This course introduces students with the principles of pattern recognition required for identifying and analyzing patterns from the real world data . It involves techniques for pattern classification, preprocessing feature selection and syntactic pattern recognition.

B.E. (Computer Science & Engg.) Part-II

4. Elective-II

6) VLSI TECHNOLOGY

Lectures : 4 hrs / week **Theory : 100 Marks**

Section – I

1.Digital Design:
Characteristics (Power dissipation ,Noise margin ,Fan in, Fan out) , Single channel MOS inverter, CMOS inverters, CMOS gates, Transmission gates , Delays and loading consideration. **(6)**

2.Finite State Machines:
Sequential and combitional circuit design , Moore and Mealy machine, Design examples using PLD's- Barrel shifter ,Synchronous controllers, Timing considerations. **(8)**

3.Architecture of VLSI processors:
CPLD and FPGA, ARM/SPARTAN, The architecture of above in Xilinx and Altera with specifications, block diagram and their comparison. Multiplex & demultiplex keyboard and display interface. **(9)**

Section-II

4.VHDL: **(9)**
Introduction, entity, architecture , configuration/behavior, package declaration, data objects, data types, operators, attributes. Statements: process, variable ,signal ,wait ,if then, when, null next, exit. Overloading , VHDL code for various sequential , combinational circuit , state machines. Multiplexed and non multiplexed keyboard and display interface.

5.EDA Tools: **(8)**
Information on a complete tool from design entry to place and route with optimization considerations, Information to EDA tools for simulation and synthesis, Design of Test bench.

Text book:
1.VLSI Design Techniques for analog and digital circuits
Randall L. Geiger ,Phillip E. Allen, Noel R.Strader
2.VHDL primer ,J.Bhasker.
3.Digital Design- principles and practices ,Wakerly .
4.VHDL Analysis and Modeling of digital systems , Navabi.
5.Xilinx manual

Course Objective : To introduce students with the basic architecture of VLSI processors. To use VHLD to analyze and model digital systems and to use EDA tools for simulation, synthesis and Design of applications.

B.E. (Computer Science & Engg.) Part-II

5. Web Technology

Lectures: 3Hrs / Week **Term Work: 25 Marks**
Practical : 4 Hrs/Week **POE : 50 Marks**

1. HTML, CSS and XHTML **(3 hrs)**

HTML features, syntax , Lists, Links, Tables, Frames, Forms , Colour and images, multimedia,scripts and DHTML, Css basics,style defination**s**, CSS values and Units, CSS inheritance and Cascade, layouts , connectivity with database **.**

2.XML Primer: **(3 hrs)**

Introduction, Benefits, components of XML, XML schemas DTD, Parsing XML, Parsing methodologies, X Link, X pointer, X Include, XBase, XML Technologies & applications viz. E-Commerce, XLS: Overview, applications and programming with XLS.

3.JSP **(4 Hrs)**

JSP overview, JSP language basics, JSP translation and compilation
Directives, Standard java objects from JSP, JSP configuration and deployment,
Actions and tags of JSP; Java servlets – Arch, servlets interface, applications of Servlets.

4.ASP and ASP.NET: **(4 Hrs)**

Overview of ASP, features**,** Database, Relational Database model – Overview, SQL – ASP – Working of ASP – Objects – File System Objects – Session tracking and cookies – ADO – Access a Database from ASP – Server side Active-X Components

ASP.NET

Overview of ASP.NET- ASP.NET IDE, Features, ASP vs. ASP.NET, Developing Web Application-creating web application, executing web application, ASP.NET execution model, and Web form attributes. Standard controls- Label, Textbox, Button, and List box, Radio button, Image Button.

Navigation Controls-Sitemap Path, Tree view, Menu. Validation and login controls.

5.Web services: **(4 Hrs)**

Introduction to web services, , service oriented architecture and web services, web services application scenario.Simple object access protocol (SOAP) SOAP introduction, interaction, SOAP modeling SOAP Encoding, SOAP binding.) Web services description language What is WSDL, Web services invocation & WSDL, Web services Description details, Service Description through WSDL.

Registers: Universal description, Discovery and Inteqratron, What is UDDI, UDDI nomenclature, care UDDI, Services publication, services discovery.

6.PHPandMySQL (**6hrs**)

Introduction to PHP, variables and constants, program flow, functions, arrays and files and directories,Forms and Databases, integration with Mysql .applications on Php .

7.RubyonRails (**6hrs**)

Introduction , rails in depth using active record,Controller in depth abd view in depth, Devloping applications on ruby on rails.

Practicals :

10-15 Practicals on each Topics of the above

Reference & Textbooks:

1. Web Technologies – Black Book – Dreamtech Willey Publications
2. HTML, XHTML, CSS – Stevan Schafer Wiley india
3. Web Design Technology- D.P. Nagpal, S.Chand
3. Head First Servlets and JSP Bryan Bashan, Kathy Sierra and Bert Bates – O'reilly
4. Web Engineering – Gerti Kappel, Birgit Proll, Siegfried Reich – John Wiley & Sons Ltd
5. Web Services – An Introduction – By B.V. Kumar, S.V. Subrahmanya Tata McGraw Hill Publication
6. Ruby on Rails – Timothy Fisher – Wiley India
7. Php and Mysql - Steve Suehring – Wiley India

References :

1. Head First HTML with CSS and XHTML, Elizabeth Freeman and Eric Freeman –O'reilley
2. Head First Servlets and JSP Bryan Bashan, Kathy Sierra and Bert

Course Objective : To introduce student with technologies required to build and engineer web sites and to evaluate the performance of websites . These technologies can also we use for developing applications using websites and portals.

B.E. (Computer Science & Engg.) Part-II

6. Project - II

Lectures: 6 Hrs / Week **Term Work : 50 Marks**

POE : 100 Marks

1. Project –II should contain the work like Design review, Implementation details, coding, Technologies used, Testing, Task distribution. Project leader should maintain the progress register in which each members weekly contribution should be written and the guide will countersign the same.
2. A project report will be submitted as a term work document at the end of semester. Report must include References, Appendix, User manual / Technical reference manual, CD containing Project documentation, implementation, code, required utilities, Software and Manuals.
3. Every student must prepare well formatted, printed and hard bound report.