Solapur University, Solapur

Revised Structure of B. E (Information Technology) 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	Management Information System	4	-	2	100	25	-	-	125
3	Advanced Data Base 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	Information Retrieval	3	-	2	100	25	-	50	175
2	Mobile Computing	4	-	-	100	-	-	-	100
3	Network Security	4	-	-	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	-	200	700

Elective – I

    1. Artificial Neural Network
    2. Object Oriented Modeling & Design
    3. Microcontroller
    4. Digital Signal Processing
    5. Human Computer Interface

Elective – II

    1. Pattern Recognition
    2. Software Testing & Quality Assurance
    3. Embedded systems
    4. Image processing
    5. 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. (Information Technology) 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. (Information Technology) Part-I
2. Management Information Systems

Theory : 4Hrs/Week   Theory : 100 Marks
Practical : 2Hrs/Week   Term Work : 25 Marks

Section - I

1. Information Systems in Global &E-Business   [6]
   Information Systems in Global Business
   Global E-Business: How Businesses Use Information Systems

2. Information Systems, Organizations, and Strategy   [6]
   Ethical and Social Issues in Information Systems

3. Information Technology Infrastructure   [6]
   IT Infrastructure and Emerging Technologies
   Foundations of Business Intelligence: Databases and Information Management

4. Communication in IT   [5]
   Telecommunications, the Internet and Wireless Technology
   Securing Information Systems

Section – II

5. Key System Applications for the Digital Age   [5]
   Achieving Operational Excellence and Customer Intimacy: Enterprise Applications
   E-Commerce: Digital Markets, Digital Goods

6. Knowledge Management Techniques   [5]
   Managing Knowledge
   Enhancing Decision Making

7. Building and Managing Systems   [11]
   Building Information Systems
   Project Management: Establishing the Business Value of Systems and Managing Change
   Managing Global Systems

   Textbook :
   1. Management Information Systems : Managing the Digital Firm , 10th edition,
                                        Laudon&Laudon , Pearson Education
   Reference Books :
   1.   Information Technology for Management: Transforming Organizations in the Digital
                                        Economy, Efraim Turban,6th Edition, Wiley
                                        Edition

   Practical:
   Students should design & develop a MIS for an Institution or Industry, using the principles
   covered in theory

   Course Objectives :
   This course acquaints a student with the basic infrastructure, strategy for information systems. It
   introduces a student with the communication technology required for IT & enables him to build
   and manage corporate information system.

Lecture : 4Hrs/Week   **Theory : 100 Marks**
Practical : 2Hrs/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 topis.

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.

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 discriminant 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. (INFORMATION TECHNOLOGY) 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. (INFORMATION TECHNOLOGY) PART – I
4. Elective I
3. Microcontroller

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

Section I

1. MCS 51 Microcontroller family

a. Introduction to MCS 51 family, Architecture, Memory organization, Functional pin
description, SFRs and various resources of MCS 51.   (4)
b. Addressing modes, Instruction set and c programming.   (4)
c. Hardware Overview
Study of Interrupt structure, Port structure Operation, Timer 0, Timer 1,
Timer 2, Serial port and multiprocessor communication.   (5)
d. Interfacing of External data. Program memory and peripherals (ADC0809, DAC 0808 etc)
for I/O expansion.   (4)
e. Programming MCS 51 and Study of assemblers and Simulators for MCS 51 Family
 (MCS 51 IDE from Kail or other similar manufacturer)   (3)

Section II

2. Microchip PIC Microcontrollers
a. Introduction to Microchip PIC 16Fxx family of Microcontrollers   (2)
b. CPU architecture and instruction set, Harvard Architecture and Pipelining,   (5)
c. Program memory considerations, Register file structure and addressing modes, CPU
Registers   (3)
d. I/O Ports and TRIS registers   (2)

3. AVR Microcontroller family
a. The AVR RISC microcontroller architecture   (3)
b. The AVR instruction set, AVR Hardware design issues   (3)
c. Hardware and software interfacing with AVR.   (2)

Books:
1. Intel or Atmel MCS 51,PIC 16fxx,AVR Family Microcontrollers Data Sheets.
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e By Muhammad
Ali Mazidi, Pearson Education Asia LPE
3.Programming and customizing The AVR microcontroller By Dhananjay V. Gadre , McGraw-
Hill Professional, 2000
4. PIC Microcontroller and Embedded Systems: Using assembly and C for PIC 18 Muhammad
Ali Mazidi, Pearson Education Asia LPE
5. Design with PIC Microcontrollers By John B. Peatman, Pearson Education
Asia. LPE

Course Objectives : This course is a first level course on Microcontrollers. It introduces the
architecture and interfacing details of microcontrollers and interfacing details of microcontrollers
and enables a student to design applications using microcontrollers.

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B.E. (Information Technology) Part-I
4. Elective I
4. Digital Signal Processing

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

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SECTION - I

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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.

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SECTION - II

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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. (Information Technology) Part-I
4. Elective I

5. 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 .

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

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

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

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

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

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

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

9. Introduction to MFC. Creating SDI application.

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

11. Study of Documents & Views
    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

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.

6. Project -I

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

                                                                              Oral   : 75

1.   A project group shall be about 4 to 5 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 at the end of semester.

B.E. (INFORMATION TECHNOLOGY) 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. (INFORMATION TECHNOLOGY) PART – II
1. Information Retrieval

Lectures: 3 Hrs/week   **Theory : 100 Marks**
Practical : 4 Hrs /Week   **POE : 50 Marks.**
                                     T/W : 25 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. (INFORMATION TECHNOLOGY) 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. (INFORMATION TECHNOLOGY) PART – II
3. Network security

Lectures: 4 Hrs/Week   **Theory: 100 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.(INFORMATION TECHNOLOGY) PART -II
4. Elective – II

1) 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 PropertiesImplementation 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.(INFORMATION TECHNOLOGY) 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.

(Minimum 8 to 10 Experiments to be conducted on above topics)

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 softwares that are interface between Hardware & User.

B.E.(INFORMATION TECHNOLOGY) PART -II
4. Elective-II
3. 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

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.(INFORMATION TECHNOLOGY) PART –II
4. Elective-II
5. VLSI

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

Section – I

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

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

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

Section-II

4.VHDL: (9)
Introduction, entity, architechture , 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 optimisation considerations, Information to EDA tools for simulation and synthesis, Design of Test bench.

Term work:
1.Combinational design using structural and behavioral modeling.
2.Sequential design considering clock aspect.
3.Simulation and synthesis of state machine.
4.Downloading of combinational and sequential circuit for CPLD or FPGA.
At least two programs of each above.

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 Modelling 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.(INFORMATION TECHNOLOGY) 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 definations, 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.(INFORMATION TECHNOLOGY) PART -II
5. Project - II

Practicals : 6 Hrs / Week   **T/W : 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 along with above progress register will be submitted as a term work 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.