PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES
B.Tech. (Information Technology)

Programme Educational Objectives:

a. To provide students with core competence in mathematics, science and engineering concepts essential to formulate, analyze and solve hardware / software engineering problems.

b. To impart students with good breadth of knowledge in the core areas of information technology and related engineering so as to comprehend engineering trade-offs, analyze, design and synthesize data and technical concepts to create novel products and solutions for the real time problems.

c. To train students in the use of tools and techniques for software development in different application domains and to grow as an entrepreneur.

d. To prepare students to apply their knowledge and multifaceted skills to get immediate employment and excel in IT professional careers or awareness of the lifelong learning needed to continue their education in IT or related post graduate programmes to perform excellence, leadership and demonstrate good citizenship.

e. To inculcate in students to maintain high professionalism and ethical standards, effective oral and written communication skills, to work as part of teams on multidisciplinary projects and diverse professional environments, and relate engineering issues to the society, global economy and to emerging technologies.

Programme Outcomes:

B. Tech (Information Technology) graduates will be able to

1. Apply knowledge of Mathematics, Science and Information Technology to analyze fundamental engineering and solve problems related to IT.

2. Identify, Formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design hardware and software systems, components or processes to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability to extend creative skills.

4. Show the understanding of impact of engineering solutions in a global, economic, environmental and social context.

5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of limitations.

6. Understand professional, legal, ethical, security and social issues & responsibilities.

7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.

12. Recognize the need for, and have the preparation and the ability to engage in lifelong learning in information technology.

13. Design and conduct experiments for organizing, analyzing, interpreting data to develop skills related to information retrieval.

14. Identify, formulate and solve hardware and software computing problems using appropriate techniques in different domains.

CURRICULUM AND SYLLABI FOR B.Tech. INFORMATION TECHNOLOGY
(Eight Semesters / Full Time)

CURRICULUM

SEMESTER I

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB1181	Algebra, Geometry and Calculus	3	1	0	4
2	HS	ENB1181 FRB1181 ISB1181	English* French* Arabic*	3	0	0	3
3	BS	PHB1181	Physics	3	0	0	3
4	BS	CHB1181	Chemistry	3	0	0	3
5	ESF	GEB1101	Engineering Graphics	2	0	3	3
6	HS	SSB1181	Introduction to Economics	3	0	0	3
7	BS	PHB1182	Physics Lab	0	0	2	1
8	BS	CHB1182	Chemistry Lab	0	0	2	1
9	ESF	GEB1102	Basic Engineering Practices Laboratory	0	0	2	1
10	ESF	GEB1103	Computer Programming & Applications	2	0	2	3
							25

* Any one language

SEMESTER II

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB1282	Advanced Calculus	3	1	0	4
2	BS	PHB1283	Physics of Engineering Materials	3	0	0	3
3	HS	SSB1182	Sociology, Ethics & Human values	3	0	0	3
4	ESF	GEB1211	Basic Engineering Mechanics	3	1	0	4
5	EC	ITB1211	Digital Systems	3	1	0	4

				L	T	P	C
6	ESF	EEB1281	Introduction to Electrical and Electronics Engineering	3	0	0	3
7	HS	ENB1282	Written Communication	0	0	2	1
8	EC	ITB1212	Digital Systems Lab	0	0	3	1
9	BS	PHB1284	Physics of Engineering Materials Lab	0	0	2	1
10	ESF	EEB1282	Electrical and Electronics Engineering Lab	0	0	3	1
							25

SEMESTER III

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB2181	Transforms and Applications	3	1	0	4
2	HS	SSB2181	Law for Engineers	3	0	0	3
3	EC	ITB2101	Data Structures	3	0	0	3
4	EC	ITB2102	Programming Paradigms	3	0	0	3
5	EC	ITB2103	System Software	3	0	0	3
6	EC	ITB2104	Computer Networks	3	0	0	3
7	HS	ENB2181	Oral Communication	0	0	2	1
8	EC	ITB2105	Data Structures Lab	0	0	3	1
9	EC	ITB2106	Advanced Programming Lab	0	0	3	1
10	EC	ITB2107	System Software Lab	0	0	3	1
							23

SEMESTER IV

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB2286	Operations Research	3	1	0	4
2	EC	ITB2211	Computer Architecture	3	0	0	3

3	EC	ITB2212	Network Programming & Management	3	0	0	3
4	EC	ITB2213	Software Engineering	3	0	0	3
5	EC	ITB2214	Microprocessor and Microcontrollers	3	0	0	3
6	BS	LSB2181	Biology for Engineers	3	0	0	3
7	HS	ENB2282	Confidence Building and Behavioral Skill	0	0	2	1
8	EC	ITB2215	Web Technology Lab	1	0	3	2
9	EC	ITB2216	Networking Lab	0	0	3	1
10	EC	ITB2217	Microprocessor and Microcontrollers Lab	0	0	3	1
							24

SEMESTER V

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	EC	ITB3101	Mobile Computing	3	0	0	3
2	EC	ITB3102	Object Oriented Analysis and Design	3	0	0	3
3	EC	ITB3103	Database Management systems	3	0	0	3
4	EC	ITB3104	Operating Systems	3	0	0	3
5	BS	GEB3201	Environmental Science & Engineering	3	0	0	3
6	PE		Professional Elective I	3	0	0	3
7	HS	ENB3181	Career Building & People Skills	0	0	2	1
8	EC	ITB3105	Case tools Lab	0	0	3	1
9	EC	ITB3106	DBMS Lab	0	0	3	1
10	EC	ITB3107	Operating System Lab	0	0	3	1
							22

SEMESTER VI

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	EC	ECB4102	Embedded Systems	3	0	0	3
2	EC	ITB3211	Information Security	3	0	0	3
3	EC	ITB3212	Graphics & Multimedia	3	0	0	3
4	MS	MSB3181	Management of Business Organization	3	0	0	3
5	PE		Professional Elective II	3	0	0	3
6	PE		Professional Elective III	3	0	0	3
7	EC	ITB3213	Mobile Application Development Lab	0	0	3	1
8	EC	ITB3214	Software Development Lab (Elective based)	0	0	3	1
9	EC	ITB3215	Graphics & Multimedia lab	0	0	3	1
							21

SEMESTER VII

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	EC	ITB4101	Software Testing	3	0	0	3
2	EC	ITB4102	Wireless Networks	3	0	0	3
3	EC	ITB4103	Virtualization Techniques	3	0	0	3
4	PE		Professional Elective IV	3	0	0	3
5	PE		Professional Elective V	3	0	0	3
6	GE		General Elective I	3	0	0	3
7	EC	ITB4104	Mini Project	0	0	3	1
8	EC	ITB4105	Software Testing Lab	0	0	3	1
9	EC	ITB4106	Virtualization Lab	0	0	3	1
10	EC	ITB4107	Wireless Networks Lab	0	0	3	1
							22

SEMESTER VIII

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	PE		Professional Elective VI	3	0	0	3
2	GE		General Elective II	3	0	0	3
3	EC	ITB4211	Project	0	0	18	9
							15

Total Credits:177

PROFESSIONAL ELECTIVES

SEMESTER – V

Sl. No.	Course Group	Course Code	Course Title
1.	PE	ITBX02	Distributed Computing
2.	PE	ITBX06	Principles of Digital Signal Processing
3.	PE	ITBX15	Natural Language Processing
4.	PE	ITBX16	Principles of Compiler Design
5.	PE	ITBX30	Information Coding Techniques

SEMESTER – VI

Sl. No.	Course Group	Course Code	Course Title
6.	PE	ITBX01	Principles of Communication
7.	PE	ITBX03	Grid Computing
8.	PE	ITBX04	Cloud Computing
9.	PE	ITBX09	Theory of Computation
10.	PE	ITBX10	Information System Design
11.	PE	ITBX12	Adhoc Networks
12.	PE	ITBX22	XML and Web Services
13.	PE	ITBX24	Graph Theory
14.	PE	ITBX28	C# and .NET Framework
15.	PE	ITBX29	Cryptography and Network Security

SEMESTER – VII

Sl. No.	Course Group	Course Code	Course Title
16.	PE	ITBX05	Service Oriented Architecture
17.	PE	ITBX07	Pervasive Computing
18.	PE	ITBX08	Data Warehousing and Data Mining
19.	PE	ITBX11	Software Quality Management
20.	PE	ITBX18	Enterprise Resource Planning
21.	PE	ITBX19	Knowledge Based Decision Support System
22.	PE	ITBX20	Electronics Commerce
23.	PE	ITBX21	Web Collaboration and Technology
24.	PE	ITBX23	User Interface Design
25.	PE	ITBX25	Telecommunication Systems

SEMESTER – VIII

Sl. No.	Course Group	Course Code	Course Title
26.	PE	ITBX13	Digital Image Processing
27.	PE	ITBX14	Satellite Communication
28.	PE	ITBX17	Bio Informatics
29.	PE	ITBX23	User Interface Design
30.	PE	ITBX26	Soft Computing

GENERAL ELECTIVES
Group I Courses
(To be offered in VII semester)

Sl. No.	Course Group	Course	Course Title	Offering Department
1.	GE	GEBX101	Disaster Management	Civil
2.	GE	GEBX102.	Total Quality Management	Mech
3.	GE	GEBX103.	Energy Studies	Mech
4.	GE	GEBX104	Robotics	Mech.
5.	GE	GEBX105	Transport Management	Auto
6.	GE	GEBX106	Control Systems	EEE
7.	GE	GEBX107	VLSI Design	ECE
8.	GE	GEBX108	Plant Engineering	EIE
9.	GE	GEBX109	Network Security	CSE
10.	GE	GEBX110	Knowledge management	CSE
11.	GE	GEBX111	Cyber security	IT
12.	GE	GEBX112	Genetic Engineering	LS
13.	GE	GEBX113	Entrepreneurship Development	CBS
14.	GE	GEBX114	Fundamentals of Project Management	CBS
15.	GE	GEBX115	Operations Research	Mathematics
16.	GE	GEBX116	Nano Technology	Physics / Chemistry

GENERAL ELECTIVES
Group II Courses
(To be offered in VIII semester)

Sl. No.	Course Group	Course	Course Title	Offering Department
1.	GE	GEBX201	Green Design and Sustainability	Civil
2.	GE	GEBX202	Appropriate Technology	Civil / Mechanical
3.	GE	GEBX203	Engineering System Modelling and Simulation	Mechanical
4.	GE	GEBX204	Value Analysis and Engineering	Mechanical
5.	GE	GEBX205	Industrial Safety	Mechanical
6.	GE	GEBX206	Advanced Optimization Techniques	Mechanical
7.	GE	GEBX207	Smart Grid	EEE
8.	GE	GEBX208	Embedded Systems	ECE
9.	GE	GEBX209	Usability Engineering	CSE
10.	GE	GEBX210	Supply Chain Management	CBS
11.	GE	GEBX211	System Analysis and Design	CA
12.	GE	GEBX212	Advanced Materials	Physics & Chemistry
13.	GE	GEBX213	National Service Scheme	School of Humanities

ITB1211   **DIGITAL SYSTEMS**   **L T P C**

                                                                     3 1 0 4

OBJECTIVES:

• To understand the methods for simplification of Boolean Algebra

• To design and implement combinational circuits.

• To design and implement synchronous sequential circuits.

• To design and implement asynchronous sequential circuits.

MODULE I   BOOLEAN ALGEBRA AND LOGIC GATES   8

Binary systems – Boolean Algebra and Logic Gates : Basic theorems and properties of Boolean Algebra, Boolean functions, Digital logic gates – Simplification of Boolean Functions: The Map Method, The Tabulation Method.

MODULE II   COMBINATIONAL LOGIC   7

Combinational circuits – Design Procedure -Adders – Subtractors – Code conversions – Analysis procedure – Multilevel NAND circuits – Multilevel NOR circuits – Exclusive –OR –Functions.

MODULE III   MSI AND PLD COMPONENTS   7

Binary adder and subtractor – Decimal adder – Magnitude comparator – Decoders and Encoders – Multiplexers – Read Only Memory – Programmable Logic Array – Programmable Array Logic.

MODULE IV   SYNCHRONOUS SEQUENTIAL LOGIC   8

Synchronous sequential circuits – Flip-flops – Triggering of Flip-flops – Analysis of clocked sequential circuits – State reduction and assignment – Flip-flop Excitation Tables – Design Procedures – Design of counters.

MODULE V   REGISTERS, COUNTERS AND THE MEMORY   UNIT   7

Registers – Shift Registers – Ripple Counters – Synchronous Counters – Timing Sequences – Random Access Memory –Memory Decoding – Error-correcting-codes.

Total Hours : 45

Tutorial :15

Asynchronous sequential circuits – Analysis Procedure – Circuits with Latches – Design Procedure – Reduction of State and Flow-Tables –Race-Free State Assignment – Hazards.

TEXT BOOK:

1.   M.Morris Mano, 'Digital Design', Third edition, Pearson Education, 2007.

REFERENCES:

1.   Charles H.Roth, Jr. 'Fundamentals of Logic Design', 4th Edition, Jaico Publishing House, 2000.

2.   Donald D.Givone, 'Digital Principles and Design', Tata McGraw-Hill, 2003.

OUTCOMES:

 On completion of the course students will be able to:

- Apply the principles of Boolean algebra to manipulate and minimize logic expressions.

- Apply the mapping and tabulation methods to minimize and optimize logic functions of any level.

- Design and analyze the operation of combinational logic circuits built with various logic gates.

- Design and implement the Boolean functions with programmable logic array and programmable array logic.

- Design and analyze the operation of various synchronous sequential logic circuits built with different flip-flops.

- Design various asynchronous sequential logic circuits and analyze the hazards

1. Jacob Millman & Christos C.Halkias, "Electronic Devices and Circuits" Tata McGraw–Hill, 1991.

2. Floyd, "Electronic Devices: Conventional Current Version, 7/E" Pearson Education India, 2008

3. S.Salivahanan, N.Sureshkumar and A.Vallavaraj, Electronic Devices and Circuits, TMH, 1998.

OUTCOMES:

On completion of the course students will be able to:

*   Demonstrate the basics of Electrical circuits and their solution methods.

*   Understand the working of machines and their drives.

*   Explain the structure of power system and importance of power quality.

*   Analyse various methods of Power generation from renewable energy sources.

*   Demonstrate working of PN junction diodes and special purpose diodes.

*   Explain the characteristics of Transistors both in ideal and non-ideal cases.

ITB1212   **DIGITAL SYSTEMS LAB**   **L T P C**
                                                     0 0 3 1

OBJECTIVES:

- To study the basic logic gates – AND, OR, INVERT, NAND and NOR

- To verify the Boolean theorems by using logic gates

- To design and implement various combinational logic circuits

- To design and implement various synchronous and asynchronous sequential circuits

- To study the function of various combinational and sequential circuits using hardware description language

LIST OF EXERCISES:

1. Verification of Boolean theorems using digital logic gates

2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.

3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.

4. Design and implementation of parity generator / checker using basic gates and MSI devices.

5. Design and implementation of magnitude comparator

6. Design and implementation of application using multiplexers

7. Design and implementation of Shift registers

8. Design and implementation of Synchronous and Asynchronous counters

9. Coding combinational circuits using Hardware Description Language (HDL software required)

10. Coding sequential circuits using HDL (HDL software required)

OUTCOMES:

On completion of the course students will be able to:

- Design and implement combinational logic circuits using logic gates.
- Design and implement combinational logic circuits using decoders and multiplexers..
- Design and implement a register using any flip-flop.
- Design and implement counters using any flip-flop.
- Analyze the functions of logic circuits using Hardware Description Language.

ITB2101   **DATA STRUCTURES**   **L T P C**
                                                3 0 0 3

OBJECTIVES:

- To describe about problem solving techniques and the usage of various data structures.
- To study the various abstract data types and their applications.
- To study tree ADT and their applications.
- To design and implement different types of searching and sorting algorithms.
- To analyze graphical representation and apply algorithms of path finding.

MODULE I   PROBLEM SOLVING & ABSTRACT DATA TYPES   7

Problem solving - Top-down Design – Efficiency- Analysis - Sample algorithms – Introduction to data structures – Data structure types – Abstract Data Types – Arrays – Structures – Unions – Pointers.

MODULE II   LISTS, STACKS AND QUEUES   8

List ADT – Stack ADT – Queue ADT – Circular Queue – Double Ended Queue - Priority Queue – Array implementation of Stack and Queue – Singly Linked List – Doubly Linked Lists – Stack and Queue using Linked List.

MODULE III   TREES   8

Preliminaries - Binary Trees - The Search Tree ADT - Binary Search Trees - AVL Trees - Tree Traversals – Binary Heap - Hashing - General Idea - Hash Function - Separate Chaining - Open Addressing - Linear Probing .

MODULE IV   SEARCHING AND SORTING   7

Linear Search – Binary Search - Preliminaries - Insertion Sort - Selection sort- Shell sort - Heap sort - Merge sort - Quick sort - External Sorting.

MODULE V   GRAPHS   8

Definitions - Topological Sort - Shortest-Path Algorithms - Unweighted Shortest Paths – Dijkstra's Algorithm - Minimum Spanning Tree – Prim's Algorithm - Applications of Depth-First Search - Undirected Graphs - Biconnectivity.

MODULE VI   APPLICATIONS   7

Linked List - Maintaining an inventory -- Stack - conversion of infix to postfix expression, evaluation of arithmetic expression - Queue - scheduler in OS - Tree - Priority queue - Graph - Traveling Salesman Problem.

1. R. G. Dromey, "How to Solve it by Computer", Prentice-Hall of India, 2009.

2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 3rd Edition, Pearson Education Asia, 2007.

REFERENCES:

1. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", 1st Edition Pearson Education, 2003.

2. Y. Langasam, M.J Augenstein and A.M. Tenenbaum, "Data Structures using C and C++", 2nd Edition, Prentice - Hall of India, 2000.

OUTCOMES:

On completion of the course students will be able to:

• Analyze performance of algorithms.

• Describe how arrays, structures, unions and pointers are represented in memory.

• Exhibit understanding of the abstract properties of various data structures such as lists, stacks and queues.

• Demonstrate the different methods for traversing trees and outline the concepts of hashing.

• Explain the various searching and sorting algorithms.

• Discuss about graph traversal algorithms.

• Choose an appropriate data structure and algorithm design method for a specified application.

ITB2102   **PROGRAMMING PARADIGMS**   **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To understand the basic concepts of java programming using OOPs concepts.
- To acquire knowledge and skills in Graphical User Interface (GUI) using Java fundamentals.
- To explore Object based concepts and Scripting Paradigms.

MODULE I   OBJECT ORIENTED PARADIGM   7

Object Oriented Programming Concepts - Objects - Classes - Methods and Messages - Abstraction and Encapsulation - Inheritance - Abstract Classes.

MODULE II   OBJECTS, CLASSES AND CONSTRUCTORS   7

C++ Fundamentals - I/O Operations - Constructors - Destructors - Pointers - String Handling - Function Overloading - Operator Overloading.

MODULE III   INHERITANCE AND POLYMORPHISM   8

Inheritance, Public, Private and Protected Derivations, Multiple Inheritance, Abstract Class, Virtual Functions - Pure Virtual Functions - Templates and Exception.

MODULE IV   JAVA FUNDAMENTALS   8

Java Virtual Machine - Reflection - I/O Console - Filter and Pipe Streams - Byte Codes - Byte Code Interpretation - Dynamic Reflexive Classes - Operators - Expression - Arrays - Control Structures.

MODULE V   MULTITHREADING AND APPLET PROGRAMMING   8

Threads - Thread Life cycle - Multi threading advantages and issues - Thread program and thread synchronization - Applet class - Applet Life Cycle - Passing Parameters embedding in HTML - Introduction to AWT Programming & Java Swing.

MODULE VI   SCRIPTING PARADIGMS   7

HTML, CSS, DHTML, Java Script, Functions, Events, DOM, Web Application Development.

                                             Total Hours :45

TEXT BOOKS:

1.   Bjarne Stroustrup, "The C++ Programming Language", Special 3rd Edition, Pearson Education, 2000.

2.   Cay S. Horstmann and Gary Cornell, "Core Java: Volume I - Fundamentals", 8th Edition, Sun Microsystems Press, 2008.

3.   P.J. Deitel and H.M. Deitel, "Internet & World Wide Web: How to Program", 4th Edition, Pearson Education, 2009.

REFERENCES:

1.   K. Arnold and J. Gosling, "The JAVA programming language", 3rd Edition, Pearson Education, 2000.

2.   Herbert Schildt, "The complete reference JAVA2", 5th Edition, Tata McGraw-Hill Publishing Company.

3.   C. Thomas Wu, "An introduction to Object-oriented programming with Java", 4th Edition, Tata McGraw-Hill Publishing company Ltd., 2006.

OUTCOMES:

On completion of the course students will be able to:

•   Explain the object-oriented programming concepts.

•   Utilize the concept of constructors and destructors in C++ programs.

•   Apply the inheritance and polymorphism concepts in java programs.

•   Demonstrate java concepts like objects, classes, streams, and array and control structures.

•   Implement application software using threads and applets.

•   Describe how scripting paradigms are used in Java-based web applications.

TB2103 **SYSTEM SOFTWARE** **L T P C**
3 0 0 3

OBJECTIVES:

• To have an understanding of fundamentals of design of assemblers, loaders, linkers and macro processors.

• To know the design and implementation of linkers and loaders.

• To have an understanding of macro processors.

MODULE I   INTRODUCTION **8**

System software and machine architecture - The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

MODULE II   ASSEMBLERS **8**

Basic assembler functions - A simple SIC assembler - Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes - Program relocation - Machine independent assembler features - Literals - Symbol-defining statements - Expressions - One pass assemblers and Multi pass assemblers - Implementation example-MASM assembler.

MODULE III   LOADERS AND LINKERS **8**

Basic loader functions - Design of an Absolute Loader - A Simple Bootstrap Loader - Machine dependent loader features - Relocation - Program Linking - Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search - Loader Options - Loader design options- Linkage Editors - Dynamic Linking - Bootstrap Loaders - Implementation example - MSDOS linker.

MODULE IV   MACRO PROCESSORS **8**

Basic macro processor functions - Macro Definition and Expansion - Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters - Generation of

Unique Labels - Conditional Macro Expansion - Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor - ANSI C Macro language.

MODULE V   COMPILER AND INTERPRETERS   8

Basic concepts of Compiler-Phases of Compiler -Interpreters-Benefits of Interpreters- Overview of Interpretation-A Toy Interpreter-Pure and Impure Interpreters-Java language Environment-Java Virtual Machine.

MODULE VI   SYSTEM SOFTWARE TOOLS   5

Text editors - Overview of the Editing Process - User Interface - Editor Structure. Interactive debugging systems - Debugging functions and capabilities - Relationship with other parts of the system -User-Interface Criteria.

Total Hours: 45

TEXT BOOKS:

1. Leland L. Beck, "System Software - An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2000.

REFERENCES:

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

2. John J. Donovan, "Systems Programming", Tata McGraw-Hill, 1972.

OUTCOMES:

On completion of the course students will be able to:

- Analyze the architecture of hypothetical computers.
- Outline the functions of single pass assembler and two pass assembler.
- Discuss about the various loaders and linkers.
- Compare the different types of macro processors.
- Outline about compilers and interpreters.
- Design a text editor and analyze its features.

ITB2104   **COMPUTER NETWORKS**   **L T P C**
                                                   3 0 0 3

OBJECTIVES:

•   To understand the layering concepts in computer networks.

•   To understand the various functions of each layer and its protocols.

•   To learn about cryptographic techniques and algorithms for network security.

MODULE I   DATA COMMUNICATIONS   8

Components - Direction of Data flow - networks - Components and Categories-types of Connections - Topologies -Protocols and Standards - ISO / OSI model-Transmission Media - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing sequences.

MODULE II   DATA LINK LAYER   8

Error - detection and correction - Parity - LRC - CRC - Hamming code - low Control and Error control - stop and wait - go back-N ARQ - selective repeat ARQ- sliding window - HDLC - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 - FDDI - SONET - Bridges.

MODULE III   NETWORK LAYER   8

Internetworks - Packet Switching and Datagram approach - IP addressing methods - Sub netting - Routing - Distance Vector Routing - Link State Routing-Routers.

MODULE IV   TRANSPORT LAYER   7

Duties of transport layer - Multiplexing - Demultiplexing - Sockets - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) - Congestion Control - Quality of services (QOS) - Integrated Services.

MODULE V   APPLICATION LAYER   7

Domain Name Space (DNS) – Simple Message Transport Protocol – File Transfer Protocol – Hyper Text Transfer Protocol – World Wide Web.

OSI Security Architecture - Classical Encryption techniques - Data Encryption Standard - Block Cipher Design Principles and Modes of Operation – Principles of Public key Cryptosystems - RSA algorithm.

Total Hours: 45

TEXT BOOK:

1.   Behrouz A. Forouzan, "Data Communication and Networking", Tata McGraw-Hill, 2004.

REFERENCES:

1.   James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 5th Edition, Pearson Education, 2003.

2.   Larry L.Peterson and Peter S. Davie, "Computer Networks", 2nd Edition, Harcourt Asia Pvt. Ltd., Pearson education Asia, 2000.

3.   Andrew S. Tanenbaum, "Computer Networks", 4th Edition, PHI, 2003.

4.   William Stallings, "Data and Computer Communication", 6th Edition, Pearson Education, 2000.

5.   William Stallings, "Cryptography and Network Security - Principles and Practices", 3rd Edition, Prentice Hall of India, 2003.

OUTCOMES:

On completion of the course students will be able to:

•   Discuss the terminology and concepts of the OSI reference model and the TCP-IP protocol suite.

•   Apply the error detection and correction methods and compare various flow control mechanisms in data communication.

•   Design and apply appropriate sub-netting scheme upon analyzing the requirements of the organization networking structure.

•   Explain the role of various protocols in TCP-IP protocol suite.

•   Explain how the quality of services in networking can be improved through various congestion control techniques and integrated services.

•   Apply cryptographic techniques and algorithms for network security.

ITB2105   **DATA STRUCTURES LAB**   **L T P C**
                                                       0 0 3 1

OBJECTIVES:

•   To develop skills to design and analyze simple linear and non linear data structures.

•   To Strengthen the ability to identify and apply the suitable data structure for the given real world problem.

•   To Gain knowledge in practical applications of data structures.

LIST OF EXERCISES:

1. Implementation of linear search and binary search
2. Array implementation of List ADT, STACK ADT, Queue ADT.
3. Implementation of Singly linked list (addition, deletion. Insertion in all positions)
4. Implementation of Doubly linked list (addition, deletion. Insertion in all positions)
5. Implementation of Stack and Queues using linked list.
6. Implementation of binary search tree.
7. Program for tree traversal (inorder, postorder, preorder)
8. Implementation of Quick sort, Merge sort, Shell sort.
9. Implementation of Dijkstra"s algorithms.
10. Implementation of Depth First search.
11. Implementation of Linked List, Stack and Queue in real world.

OUTCOMES:

On completion of the course students will be able to:

- Apply advance C programming techniques to develop solutions for real time problems.
- Design abstract data types using static and dynamic implementations.
- Implement various kinds of searching and sorting techniques.
- Identify a suitable data structure and algorithm to solve a real world problem.
- Analyze, evaluate and choose appropriate abstract data types and algorithms to solve problems.

ITB2106   **ADVANCED PROGRAMMING LAB**   **L T P C**
                                                              0 0 3 1

OBJECTIVES:

•   To develop software development skills in java programming.

•   To develop the ability to write computer programs for specific problems.

LIST OF EXERCISES:

1.   Create simple C++ programs with I/O operations.

2.   Illustrate working of classes , objects and constructors using C++ Programs

3.   Implementation of Inheritance and Polymorphism using C++.

4.   Create simple Java programs with multiple classes using object creation

5.   Implementation of constructors and destructors using Java

6.   Implementation of Method Overloading concept using Java

7.   Program to illustrate the Inheritance concepts using Java

8.   Programs using IO streams using Java

9.   Implementation of Multithreading concepts using Java.

10.   Develop simple applications using Applet & AWT concepts

11.   Implementation of Layout Managers.

12.   Develop a simple application using Java Swing.

13.   Design a Dynamic web page using JavaScript and DHTML.

OUTCOMES:

On completion of the course students will be able to:

• Develop C++ programs using object oriented concepts .

• Design a Java application using threads.

• Create dynamic web pages, using Servlets and JSP.

ITB2107   **SYSTEM SOFTWARE LAB**   **L T P C**
                     (Using C or C++)   **0 0 3 1**

OBJECTIVES:

•   To understand the basic design of different types of assemblers and loaders.

•   To understand the basic design of macro processor , lexical analyzer and text editor.

LIST OF EXERCISES:

1.   Implement a symbol table with functions to create, insert, modify, search, and display.

2.   Implement pass one of a two pass assembler.

3.   Implement pass two of a two-pass assembler.

4.   Implement a single pass assembler.

5.   Implement a macro processor.

6.   Implement an absolute loader.

7.   Implement a relocating loader.

8.   Implement pass one of a direct-linking loader.

9.   Implement a simple Lexical Analyzer.

10.   Implement a simple text editor with features like insertion / deletion of a character, word,sentence.

11.   Implement an Interactive Debugger.

OUTCOMES:

On completion of the course students will be able to:

• Design a symbol table to create, insert, modify, search and display.
• Analyze the single pass assembler, two pass assembler and generate object code.
• Outline the design of macro processors and execute a macro.
• Design an absolute loader, relocatable loader and load the object code at the address.
• Design and implement direct linking loader.
• Demonstrate a text editor to insert and delete character, word and sentence.

ITB2211   COMPUTER ARCHITECTURE   L T P C
                                                 3 0 0 3

OBJECTIVES:

• To have a thorough understanding of the basic structure and operation of a digital computer.

• To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

• To study in detail the different types of control and the concept of pipelining.

• To study the hierarchical memory system including cache memories and virtual memory.

• To explore the different ways of communicating with I/O devices and standard I/O interfaces.

MODULE I   BASIC STRUCTURE OF COMPUTERS   7

Functional units - Basic operational concepts - Bus structures - Software performance - Memory locations and addresses - Memory operations - Instruction and instruction sequencing.

MODULE II   ARITHMETIC UNIT   7

Addressing modes - Assembly language - Basic I/O operations - Stacks and queues - Addition and subtraction of signed numbers - Design of fast adders

MODULE III   BASIC PROCESSING   UNIT   7

Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division - Floating point numbers and operations.Fundamental concepts - Execution of a complete instruction - Multiple bus organization

MODULE IV   CONTROL UNIT   7

Hardwired control - Microprogrammed control - Pipelining - Basic concepts - Data hazards - Instruction hazards - Influence on Instruction sets - Data path and control consideration - Superscalar operation.

MODULE V   MEMORY SYSTEM   9

Basic concepts - Semiconductor RAMs - ROMs - Speed - size and cost - Cache memories - Performance consideration - Virtual memory- Memory Management requirements - Secondary storage.

MODULE VI   I/O ORGANIZATION   8

Accessing I/O devices - Interrupts - Direct Memory Access - Buses - Interface circuits - Standard I/O Interfaces (PCI, SCSI, and USB).

Total Hours: 45

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, McGraw-Hill, 2011.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture - Designing for Performance", 9th Edition, Pearson Education, 2012.

2. David A.Patterson and John L.Hennessy, Morgan Kaufmann, "Computer Organization and Design: The hardware / software interface", 5th Edition, 2013.

3. John P.Hayes, "Computer Architecture and Organization", 4th Edition, McGraw- Hill, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Discuss the basic structure and operation of a digital computer.
- Describe Instruction Set Architecture, Instruction format types and various addressing modes.
- Explain how a computer performs arithmetic operation of positive and negative numbers.
- Explain the importance of Pipelining and hazards.
- Compile the concepts of memory organization.
- Outline the I/O Organization, interrupts and interfaces.

ITB2212　NETWORK PROGRAMMING AND　MANAGEMENT　　L　T　P　C
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　0　0　3

OBJECTIVES:

- To learn the basics of socket programming using TCP Sockets.

- To learn basics of UDP sockets.

- To develop knowledge of threads for developing high performance scalable applications.

- To learn about raw sockets.

- To understand simple network management protocols & practical issues.

MODULE I　INTRODUCTION　　　　　　　　　　　　　7

Introduction to Socket Programming - Overview of TCP/IP Protocols - Introduction to Sockets - Socket address Structures - Byte ordering functions- address conversion functions.

MODULE II　ELEMENTARY TCP SOCKETS, TCP CLIENT SERVER　　8

Elementary TCP Sockets - socket, connect, bind, listen, accept, read, write, close functions - Iterative Server - Concurrent Server. TCP Echo Server - TCP Echo Client - Posix Signal handling - Server with multiple clients - boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown

MODULE III　I/O MULTIPLEXING, SOCKET　OPTIONS　　　　　8

I/O multiplexing - I/O Models - select function - shutdown function - TCP echo Server (with multiplexing) - poll function - TCP echo Client (with Multiplexing). Socket options - getsocket and setsocket functions - generic socket options - IP socket options - ICMP socket options - TCP socket options.

MODULE IV　ELEMENTRY UDP SOCKETS　　　　　　　　7

Elementary UDP sockets - UDP echo Server - UDP echo Client - Multiplexing TCP and UDP sockets - Domain name system - gethostbyname function - Ipv6 support in DNS - gethostbyadr function - getservbyname and getservbyport functions.

MODULE V   ADVANCED SOCKETS   **7**

Ipv4 and Ipv6 interoperability - Threads - thread creation and termination - TCP echo server using threads - Mutexes - condition variables - raw sockets- raw socket creation - raw socket output - raw socket input - ping program - trace route program.

MODULE VI   SIMPLE NETWORK MANAGEMENT   **8**

SNMP network management concepts - SNMP management information - standard MIB"s - SNMPv1 protocol and Practical issues - introduction to RMON, SNMPv2 and SNMPv3.

                                                 Total Hours: 45

TEXT BOOKS:

1. W. Richard Stevens, "UNIX Network Programming Vol-I" , 2nd Edition, PHI / Pearson Education, 1998.

2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", 3rd Edition, Addison Wesley, 1999.

REFERENCE:

1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), 2nd Edition, PHI, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Outline the fundamentals of socket programming.

- Develop network applications with socket programming using TCP.

- Discuss the concepts of IO multiplexing.

- Develop network applications with socket programming using UDP.

- Explain advanced socket programming techniques.

- Discuss the different network management protocols.

ITB2213   **SOFTWARE ENGINEERING**   **L T P C**
                                                          3 0 0 3

OBJECTIVES:

• To learn software life cycle models.

• To gain knowledge on software requirements engineering.

• To know software design concepts

• To be able to understand software testing techniques

• To gain knowledge on software quality assurance.

MODULE I   SOFTWARE PROCESS   8

Introduction - Generic Process Model - Process assessment and improvement- perspective process models - Specialized Process Models - The Unified Process - PSP - TSP - Process Technology - Agile Development

MODULE II   SOFTWARE REQUIREMENTS   8

Understanding Requirements - Requirements Modeling - Requirements Analysis - Scenario Based Modeling - UML Models - Data Modeling - Class Based Modeling - Requirements Modeling - Strategies - Flow Oriented Modeling- Creating a Behavioral Modeling - Requirements Modeling for Web Applications.

MODULE III   SOFTWARE DESIGN - I   7

Design Process - Design Concepts - Design Model - Software Architecture - Architectural Genres - Architectural Styles - Architectural Design - Architectural Mapping Using Data Flow.

MODULE IV   SOFTWARE DESIGN - II   6

Component Level Design - Pattern Based Design - User Interface Design - Web Application Design.

MODULE V   SOFTWARE TESTING   8

A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software - Test Strategies for Object Oriented Software - Test Strategies for Web Applications - Validation Testing - System Testing - The Art of Debugging - Internal and External Views of Testing - White   Box

Testing Techniques - Black Box Testing Techniques - Testing Object Oriented Applications-Testing Web Applications.

MODULE VI   MANAGING SOFTWARE PROJECTS   8

Project Management Concepts - the Management Spectrum - People - Product-Process - Project - W5HH Principles - Critical Practices - Process and Project Metrics - Estimation for Software Projects - Software Project Estimation - Decomposition Techniques - Empirical Estimation Models - Estimation for Object Oriented Projects - Specialized Estimation Techniques.

Total Hours: 45

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering - A Practitioners Approach", 7th Edition, McGraw Hill Publication, 2010.

2. Sommerville, "Software Engineering", 9th Edition, Addison-Wesley, 2011.

REFERENCE:

1. William E. Perry, "Effective methods for Software Testing", 2nd Edition, Willey, 2000.

OUTCOMES:

On completion of the course students will be able to:

• Select the suitable software process model for given requirements.

• Identify user requirements, system requirements and model the system requirements.

• Outline the various software architectures.

• Prepare a design for the given software.

• Outline testing strategies and discuss the various white-box and black-box testing techniques.

• Prepare software project plan using software estimation techniques.

ITB2214   MICROPROCESSORS AND MICROCONTROLLER   L   T   P   C
3   0   0   3

OBJECTIVES:

- To study the architecture and Instruction set of 8086

- To develop assembly language programs in 8086.

- To design and understand multiprocessor configurations.

- To study different peripheral devices and their interfacing to 8086.

- To study the architecture and programming of 8051 microcontroller.

MODULE I   8085 AND 8086 ARCHITECTURE   8

Introduction to 8085 Microprocessor, Architecture, Instruction Set, Programming the 8085, Intel 8086 Micro processor, Minimum and Maximum Mode Signals, Architecture, Memory Segmentation, Physical Memory Organization.

MODULE II   INSTRUCTION SET AND ASSEMBLY LANGUAGE
PROGRAMMING OF 8086   8

Instruction formats, addressing modes, instruction set, assembler directives, Assembly Language Programming, String Manipulations, Procedures and Macros.

MODULE III   I/O INTERFACING   7

Memory Interfacing Vs I/O Interfacing , Parallel Communication Interface, 8285 Architecture, Various Modes of Operation, Interfacing to 8085/8086, Serial Communication Interface, 8251 USART Architecture, Interfacing to 8085/8086 , Simple Applications.

MODULE IV   INTERFACING WITH ADVANCED DEVICES   7

Interrupt structure of 8086, Vector interrupt table, Interrupt service routine. Introduction to DOS and BIOS interrupts, Interfacing, Introduction to Timer/ Counter Controller 8253, Keyboard/Display Controller 8279, DMA Controller 8257 , Real Time Applications.

MODULE V   INTRODUCTION TO MICROCONTROLLERS   7

Architecture of 8051 Microcontroller, Signals, Memory Organization, Addressing Modes and Instruction set of 8051, simple programs.

MODULE VI   8051 REAL TIME CONTROL   8

8051-I/O Ports, Interrupts, Timer/ Counter, S erial Communication, Programming Interrupts, Real Time Applications, Introduction to Embedded System..

Total Hours: 45

TEXT BOOKS:

1.   D. V. Hall, "Micro processors and Interfacing",1st edition, 2006.

2.   Kenneth. J. Ayala , "The 8051 microcontroller", 3rd edition, Cengage learning, 2010.

REFERENCES:

1.   A. K. Ray and K.M. Bhurchandani, "Advanced Microprocessors and Peripherals- TMH", 2nd edition, 2006.

2.   K.Uma Rao, Andhe Pallavi, "The 8051 Microcontrollers, Architecture and programming and Applications", Pearson Education, 2009.

3.   Liu and GA Gibson, "Micro Computer System 8086/8088 Family Architecture. Programming and Design", 2nd Edition.

4.   Ajay. V. Deshmukh , "Microcontrollers and application", TMGH, 2005

OUTCOMES:

   On completion of the course students will be able to:

•   Explain the internal architecture of 8085 & 8086 Microprocessor.

•   Develop assembly language programs using 8085 & 8086 instructions.

•   Design and demonstrate I/O interfacing concepts and programming techniques using 8255 and 8251 for simple applications.

•   Develop real time applications using 8253, 8279, 8259 and 8257.

•   Explain the architecture of 8051 Microcontroller.

•   Develop real time control applications using 8051 instructions

ITB2215   **WEB TECHNOLOGY LAB**   **L   T   P   C**
                                                              1   0   3   2

OBJECTIVES:
- To obtain skills in web designing using HTML, DHTML, and CSS.
- To develop programming knowledge using client side and server side scripting languages.
- To create and implement dynamic web applications and web sites using XML technologies and MySQL databases.
- To acquire programming techniques in web based languages and web services.

LIST OF EXERCISES:
1. Creation of static web applications using HTML.

2. Implement the following types of style sheets in the DHTML.

   a. Internal CSS

   b. External CSS

   c. Inline CSS

3. Implementation of dynamic Javascript web applications in DHTML (Structures - Functions – Arrays - Java Script Objects).

4. Data Binding with Tabular Data Conrol in DHTML and Javascript (Moving with a record set - Sorting table data - Binding of an image and table).

5. Enhance the webpages using jQuery implementation.

6. Simple XML implementation using HTML and Javascript. XML transformation using XSLT/XSL, Xpath, Xlink, XML namespaces and XML Schema.

7. Configure and customize HTTP Apache Tomcat Web Server.

8. Implementation of message application and database connectivity using MySQL.

9. Implementation of JSP web application using MySQL database server in NetBeans IDE.

10. Develop a J2EE Web Client to access a .NET Web Service in Microsoft Visual Studio.

11. Creation of user interface using Flash- Study.

12. Creation of simple applications using Photoshop- Study.

OUTCOMES:

On completion of the course students will be able to:

- Analyze and use programming skills on web based applications with appropriate web servers.
- Apply XML based technologies involved to support real-time software development in dynamic web applications.
- Design and development of web sites and web applications using server side programming.
- Create and demonstrate web service interface specifications for real time applications.

ITB2216 **NETWORKING LAB** **L T P C**
0 0 3 1

OBJECTIVES:

- To implement the Address resolution Protocol and Reverse Address resolution Protocol using C language.
- To write, execute and debug c programs which use Socket API.
- To implement the Socket Programming for Client and Server using TCP.
- To implement the Socket Programming for Client and Server using UDP.
- To understand how to use TCP and UDP based sockets and their differences.
- Develop DNS Server to resolve a given host name.
- Study of Network Simulators.

LIST OF EXERCISES:

1. Simulation of ARP / RARP.
2. Write a program that takes a binary file as input and performs bit stuffing and CRC Computation.
3. Develop an application for transferring files over RS232.
4. Simulation of Sliding-Window protocol.
5. Simulation of BGP / OSPF routing protocol.
6. Develop a Client - Server application for chat.
7. Develop a Client that contacts a given DNS Server to resolve a given host name.
8. Write a Client to download a file from a HTTP Server.
9. Study of NS2.
10. Study of Glomosim / OPNET.

OUTCOMES:

On completion of the course students will be able to:

- Develop programs for bit stuffing, CRC computation and file transfer using RS232.
- Demonstrate the functions of ARP/RARP, Sliding window and BGP / OSPF protocols.
- Develop Client-Server applications using socket programming.
- Implement the DNS and HTTP servers.
- Identify an appropriate network simulator for various networking issues.

ITB2217   **MICROPROCESSORS AND MICRO**   **L T P C**
                       CONTROLLERS LAB   **0 0 3 1**

OBJECTIVES:

- To introduce microprocessors and basics of system design using microprocessors.

- To understand h/w architecture, instruction set and programming of 8085 microprocessor.

- To study the h/w architecture, instruction set and programming of 8086 microprocessor.

- To introduce the peripheral interfacing of microprocessors.

- To understand through case studies, the system design principles using 8085 and 8086.

- To introduce the h/w architecture, instruction set, programming and interfacing of 8051 microcontroller.

LIST OF EXERCISES:

1. Programming with 8085 - 8-bit / 16-bit multiplication/division using repeated addition/subtraction.

2. Programming with 8085-code conversion, decimal arithmetic, bit manipulations.

3. Programming with 8085-matrix multiplication, floating point operations.

4. Programming with 8086 - String manipulation, search, find and replace, copy operations, sorting. (PC Required)

5. Using BIOS/DOS calls: Keyboard control, display, file manipulation. (PC Required)

6. Using BIOS/DOS calls: Disk operations. (PC Required)

7. Interfacing with 8085/8086 - 8255, 8253.

8. Interfacing with 8085/8086 - 8279, 8251.

9. 8051 Microcontroller based experiments - Simple assembly language programs. (cross assembler required)

10. 8051 Microcontroller based experiments - Simple control applications. (cross assembler required)

OUTCOMES:

On completion of the course students will be able to:

- Write assembly language programs using 8085 and 8086 instructions.
- Design and demonstrate microprocessor based system using 8255, 8251, 8253 and 8279 interface.
- Implement Keyboard, Disk and File operations using BIOS/DOS calls.
- Prepare 8051 Microcontroller based experiments using assembly language programs.
- Develop real time control applications using 8051 microcontroller.

ITB3101   **MOBILE COMPUTING**   **L T P C**
                                                    3 0 0 3

OBJECTIVES:

- To impart fundamental concepts in the area of mobile computing.

- To provide a computer systems perspective on the converging areas of wireless networking, embedded systems, and software.

- To introduce selected topics of current research interest in the field.

- Students can understand and build systems support mechanisms for mobile computing systems including client-server web/database/file systems, and mobile networks for achieving the goal of anytime, anywhere computing in wireless mobile environments.

MODULE I   WIRELESS COMMUNICATION FUNDAMENTALS   8

Wireless Transmission - Frequencies for Radio Transmission - Signals - Antennas - Signal Propogation - Multiplexing - Modulation - Spread spectrum - MAC - FDMA - TDMA - CDMA.

MODULE II   PRVASIVE COMPUTING PRINCIPLES   8

Pervasive Computing - Information Access Devices - Smart Identification - Embedded Controls - Entertainment Systems

MODULE III   SOFTWARE   8

Java - Operating Systems: Windows CE - Palm OS - Symbian OS - Java Card-Client Middleware - Security.

MODULE IV   CONNECTING THE WORLD   7

Internet Protocols and Formats - Mobile Internet - Voice - Web Services - Connectivity.

MODULE V   BACK-END SERVER INFRASTRUCTURE   7

Service Discovery - Back-End Server Infrastructure: Gateways - Application Servers - Internet Portals-Synchronization.

Home Services - Communication Services - Home Automation - Security Services - Travel and Business Services - Consumer Services.

Total Hours: 45

TEXT BOOK:

1.   Uwe Hansmann, Lothar Merk, Martin S.Nicklous and Thomas Stober, "Principles of Mobile Computing", 2nd Edition, Springer International, 2003.

REFERENCES:

1.   Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", PHI/Pearson Education, 2003.

2.   Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.

3.   Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2002.

OUTCOMES:

 On completion of the course students will be able to:

*   Outline the fundamentals of wireless communication.

*   Discuss the principles of pervasive computing and embedded controls.

*   Analyze and compare the performance of operating systems and security techniques for mobile applications.

*   Identify the protocols and web services for developing mobile computing systems.

*   Demonstrate the back end infra structure used in mobile environment.

*   Develop mobile computing applications for various services.

ITB3102   OBJECT ORIENTED ANALYSIS AND DESIGN   L T P C
**   3 0 0 3**

OBJECTIVES:

- To understand the object oriented life cycle.

- To know how to identify objects, relationships, services and attributes through UML.

- To provide knowledge in Object Oriented Design process.

- To analyze about software quality and usability.

MODULE I   INTRODUCTION   7

An Overview of Object Oriented Systems Development - Object Basics - Object Oriented Systems Development Life Cycle.

MODULE II   OBJECT ORIENTED METHODOLOGIES   9

Unified Approach - Development Process - Unified Modeling Language - Use case - Class diagram: The Essential - Advanced Concepts - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram - Communication Diagrams - Composite Structure - Timing Diagrams.

MODULE III OBJECT ORIENTED ANALYSIS   8

Identifying use cases - Object Analysis - Classification - Identifying Object relationships - Attributes and Methods.

MODULE IV   OBJECT ORIENTED DESIGN   7

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability.

MODULE V   APPLICATIONS   7

System Architecture: Satellite - Based Navigation - Control System: Traffic Management - Artificial Intelligence - Cryptanalysis - Web Application: Vacation Tracking System.

MODULE VI   SOFTWARE QUALITY AND USABILITY   7

Designing Interface Objects - Software Quality Assurance - System Usability - Measuring User Satisfaction

Total Hours: 45

TEXT BOOKS:

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 1999.

2. Martin Fowler, "UML Distilled", 3rd Edition, Pearson Education, 2007.

REFERENCES:

1. John Deacon, "Object Oriented Analysis and Design", Pearson Education, 2009.

2. Bennett, Farmer, Steve McRobb, "Object-oriented Systems Analysis and Design: Using UML", McGraw-Hill Higher Education, 2010.

3. Grady Booch, "Object Oriented Analysis and Design with Applications", 3rd Edition, Pearson, 2010.

OUTCOMES:

On completion of the course students will be able to:

- Outline the basics of object oriented system development life cycle.

- Explain the various UML diagrams.

- Analyze software requirements to identify objects, attributes and methods.

- Prepare design for software using UML diagrams.

- Outline how to identify requirements, analyze requirements and prepare design for application and real-time software.

- Explain how to develop user friendly software.

ITB3103   DATABASE MANAGEMENT SYSTEMS   **L T P C**
                                                                                    3 0 0 3

OBJECTIVES:

• Master the basic concepts and appreciate the applications of database systems.

• Master the basics of SQL and relational algebra expressions.

• Mastering the design principles for logical design of databases, including the E-R method and normalization approach.

• Be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing.

• Master the basics of query evaluation techniques and query optimization.

MODULE I   INTRODUCTION AND CONCEPTUAL MODELING   7

Introduction to File and Database systems- Database system structure - Data Models - Introduction to Network and Hierarchical Models - ER model

MODULE II   RELATIONAL MODEL   7

Relational Model - Relational Algebra and Calculus - SQL - Data definition- Queries in SQL- Updates- Views - Integrity and Security

MODULE III   DATA STORAGE   8

Relational Database design - Functional dependences and Normalization for Relational Databases (up to BCNF) - Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files

MODULE IV   HASHING, INDEXING AND QUERY PROCESSING   7

Hashing Techniques - Index Structure for files -Different types of Indexes- B-Tree - B+Tree - Query Processing.

MODULE V   TRANSACTION MANAGEMENT   8

Transaction Processing - Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules - Concurrency Control - Types of Locks- Two Phases locking-

Deadlock- Time stamp based concurrency control - Recovery Techniques - Concepts- Immediate Update- Deferred Update - Shadow Paging.

MODULE VI   CURRENT TRENDS   8

Object Oriented Databases - Need for Complex Data types - OO data Model- Nested relations - Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage - XML- Structure of XML- Data- XML Document- Schema- Querying and Transformation - Data Mining and Data Warehousing.

Total Hours: 45

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 4th Edition, McGraw-Hill, 2002.

REFERENCES:

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", 3rd Edition, Pearson Education, 2003.

2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.

3. Peter Rob and Corlos Coronel, "Database System, Design, Implementation and Management", 5th edition, 2003.

4. Hector Garcia Molina, Jeffrey D.Ullman and Jennifer Widom, "Database System Implementation", Pearson Education, 2000.

OUTCOMES:

On completion of the course students will be able to:

- Outline the basic concepts and architecture associated with DBMS
- Describe relational database using SQL.
- Apply normalization techniques in database design.
- Use the transaction processing and concurrency control for application software.
- Utilize the query evaluation techniques and query optimization.
- Apply the knowledge in current trends of database system.

ITB3104   **OPERATING SYSTEMS**   **L T P C**
                                                               3 0 0 3

OBJECTIVES:

•   This course provides the overview of computer system and the operating
        system, the concepts of process, memory, and I/O management.

•   To summarize the various approaches for solving the problem of mutual
        exclusion in an operating system.

•   Compare and contrast the various CPU scheduling algorithms.

•   To explain conditions that lead to deadlock.

•   To provide knowledge in memory hierarchy and cost-performance trade-offs.

MODULE I   OPERATING SYSTEM TYPES   7

Introduction - Mainframe systems - Desktop Systems - Multiprocessor
Systems - Distributed Systems - Clustered Systems - Real Time Systems -
Handheld Systems - Hardware Protection - System Components - Operating
System Services - System Calls - System Programs.

MODULE II   PROCESS SCHEDULING   8

Process Concept - Process Scheduling - Operations on Processes -
Cooperating Processes - Inter-process Communication- CPU Scheduling -
Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Multiple-
Processor Scheduling - Real Time Scheduling.

MODULE III PROCESS SYNCHRONIZATION   7

The Critical-Section Problem - Synchronization Hardware - Semaphores -
Classic problems of Synchronization - Critical regions - Monitors- Threads -
Overview - Threading issues.

MODULE IV DEADLOCKS   7

System Model - Deadlock Characterization - Methods for handling Deadlocks-
Deadlock Prevention - Deadlock avoidance - Deadlock detection - Recovery
from Deadlocks.

MODULE V   STORAGE MANAGEMENT   8

Storage Management - Swapping - Contiguous Memory allocation - Paging - Segmentation - Segmentation with Paging-Virtual Memory - Demand Paging-Process creation - Page Replacement - Allocation of frames - Thrashing.

MODULE VI   FILE SYSTEM & DISK MANAGEMENT   8

File Concept - Access Methods - Directory Structure - File System Mounting - File Sharing - Protection- File System Structure - File System Implementation-Directory Implementation - Allocation Methods - Free-space Management-Kernel I/O Subsystems - Disk Structure - Disk Scheduling - Disk Management-Swap-Space Management. Case Study: The Linux System, Windows.

Total Hours: 45

TEXT BOOK:

1.   Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 6th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

REFERENCES:

1.   Harvey M. Deitel, "Operating Systems", 2nd Edition, Pearson Education Pvt. Ltd, 2002.

2.   Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt.Ltd, 2003.

3.   William Stallings, "Operating System", 4th Edition, Prentice Hall of India, 2003.

4.   Pramod Chandra P. Bhatt, "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003.

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OUTCOMES:

On completion of the course students will be able to:

•   Discuss the different types of systems and operating system services.

•   Implement the various scheduling techniques and evaluate their performance.

•   Analyze the issues in process synchronization a n d implement multithreaded programs u sing synchronization tools.

•   Analyze and manage deadlocks in multi process environment.

•   Discuss the concepts of primary and virtual memory management.

•   Explain the concepts of file and disk management.

GEB3201 ENVIRONMENTAL SCIENCE AND ENGINEERING   L T P C
                                                     3 0 0 3

OBJECTIVES:

- To explore the salient features and processes that characterise the rocks, soils, water and their interconnectivity with the atmosphere through bioelement cycling
- To rationalize the biological environment at the level of cell, the population, the community ,ecosystem and the biome
- To get sensitized with the impacts of human activity on the natural environment and with the methods to conserve it
- To study the impacts of human activity on water and air and to identify the steps to conserve
- To find out an unique solution for the environmental crisis in the developing and developed countries
- To   learn about the assessments of the impacts with the help of NGOs and public and to proceed to a sustainable living

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MODULE I   PHYSICAL ENVIRONMENT   8

Earth's surface - the Interior of Earth – Plate Tectonics – Composition of the Crust: Rocks – formation and types, Soils – formation and components – soil profile.
Atmosphere – structure and composition – weather and climate – tropospheric airflow
Hydrosphere – water budget – hydrological cycle – Rainwater and precipitation, River Water and solids, Lake Water and stratification, Seawater and solids, soil moisture and groundwater.
Bioelement cycling – The Oxygen cycles – the carbon cycle – the nitrogen cycle – the phosphorous cycle – the sulfur cycle sodium, potassium and magnesium cycles.

MODULE II   BIOLOGICAL ENVIRONMENT   7

Cellular basis of life – prokaryotes and eukaryotes – cell respiration – photosynthesis – DNA and RNA – genetically modified life
Population dynamics – population – population growth – survival and growth curves – population regulation – future of human population
Biological communities - Five major interactions: competition, predation, parasitism, mutualism and commensalism – Concepts of habitat and niche – natural selection – species richness and species diversity – ecological succession and climax.
Ecosystem and Biomes – Food Chains and food webs – biomagnifications – ecological pyramids - Trophic levels – Energy flow in ecosystem – ecosystem stability –

Terrestrial and aquatic biomes.

MODULE III   IMPACTS ON NATURAL RESOURCES AND CONSERVATION   9

Biological resources – nature and importance – direct damage – introduced species – Habitat degradation, loss and fragmentation – Values of biodiversity – hotspots of biodiversity, threats to biodiversity- endangered and endemic species of India-conservation of biodiversity, in-situ and ex-situ conservation
Land Utilization – past patterns of land use – Urban and Industrial development – deforestation, salinisation, soil erosion, and desertification – Modern Agriculture and Impacts
Waste management – types of solid wastes: domestic, municipal, industrial and e-wastes - disposal options – reduce, recovery, reuse – waste minimization, cleaner production technology.

MODULE IV   IMPACTS ON WATER AND AIR AND CONSERVATION   8

Water pollution – organic oxygen demanding wastes – anthropogenic phosphate and eutrophication - Ground water contamination – Usage of fertilizer and pesticides– acid rain –acid mine discharges – toxic metals – organochlorines – endocrine disrupting substances- treatment process – Rain water harvesting and watershed management-manmade radionuclide's – thermal pollution
Atmospheric pollution – primary and secondary pollutants – anthropogenic, xenobiotic, synergism, sources and sink, residence time, levels and impacts of major pollutants – processes leading to smog, acid rain, global warming, stratospheric ozone depletion - Noise pollution and abatement.

MODULE V   IMPACTS ON ENERGY AND CONSERVATION,   8
              ENVIRONMENTAL CRISIS

Energy – Renewable and non renewable energy resources – thermal power plants – nuclear fuels, fossil fuels, solar energy, wind energy, wave energy, tidal energy, ocean thermal energy, hydropower, geothermal energy, biomass energy
Environment crisis – state of environment in developed and developing countries- managing environmental challenges for future – disaster management, floods, earthquake, cyclone and landslides.

MODULE VI   ENVIRONMENTAL IMPACT ASSESSMENT AND   5
                SUSTAINABILITY
Environmental Impact Assessment – Impacts: magnitude and significance – steps in EIA – methods – precautionary principle and polluter pays principle – role of NGOs and Public – value education –Environment protection act (air, water, wild life) and forest Conservation act

Concept of Sustainability – Sustainable Development – Gaia Hypothesis - Traditional Knowledge for sustainability.

Total Hours: 45

TEXT BOOKS:

1. Environmental Science (The Natural Environment and Human Impact), Andrew R. W. Jackson and Julie M. Jackson, Pearson Education Limited, Harlow, Essex, England, 2000.
2. Environmental Science (Working with the Earth), G Tyler Miller, Jr., Thomson Brooks/Cole, 2006.

REFERENCES:

1. Physical Geology, Earth Revealed, David McGeary and Charles C Plummer, WCB McGraw Hill, 1998.
2. Sustainability: A Philosophy of Adaptive Ecosystem Management, Bryan G. Norton, 2005.
3. Environmental Impact Assessment, Larry W. Canter, McGraw-Hill, 1996.
4. The Revenge of Gaia: Why the Earth is Fighting Back and How We Can Still Save Humanity, James Lovelock, Penguin UK, 2007.

OUTCOMES:

On completion of the course students will be able to:

- To differentiate the rock and the soil and to recognise the pivotal importance of bioelement cycling
- To examine the biological environment both at the microscopic and biome levels
- To analyse the role played by the urban and industrial development that change the pattern of land use
- To judge the level of air and water pollution
- To discriminate renewable energy from non renewable energy and to discuss about the environmental crisis prevailing
- To assess the human impacts on environment and to appreciate the sustainable living

ENB3181   CAREER BUILDING AND PEOPLE SKILLS   L T P C
**   0 0 2 1**

OBJECTIVE:

*   To prepare the students for building their competencies and career building skills.

COURSE OUTLINE:

This course is practical oriented one and exercises will be given to the students group users /individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

LAB ACTIVITIES:

*   Preparation for the placement

*   Group discussions: Do"s and Don"ts - handling of Group discussions - What evaluators look for.

*   Interview - awareness of facing questions - Do"s and Don"ts of personal interview.

*   Selection of appropriate field vis-à-vis personality / interest.

*   Preparation of Resume-Objectives, profiles vis-à-vis companies requirement.

*   Enabling students to prepare for different procedures / levels to enter into any company - books / websites to help for further preparation.

*   Technical interview - how to prepare and face it.

*   Workplace skills

*   Presentation skills

*   Oral presentations

*   Technical presentations

*   Business presentations

*   Technical writing

*   Interpersonal relationships - with colleagues - clients - understanding one"s own behavior - perception by others.

ASSESSMENT:

As the course is practical one, it will be assessed using a portfolio based assessment. The students must in consultation with the Faculty member, plan a portfolio of evidence for the above mentioned activities. The students must develop a résumé or résumés that promote own ability to meet specific job requirements and plan their portfolio in a format appropriate to industry they wish to target. The case studies will contain direct observation of the candidate developing career plans, résumés and skills portfolio, reflect written or oral questioning to assess knowledge and problem-solving activities to assess ability to align career aspirations with realistic career goals. The course coordinator in consultation with the course committee will decide the number of exercises and mark to be awarded for each beside the weightage for the end semester assessment.

OUTCOMES:

On completion of the course students will be able to:

• Develop team work skills

• Take part effectively in various selection procedures followed by the recruiters.

ITB3105 **CASE TOOLS LAB** **L T P C**
0 0 3 1

OBJECTIVES:

- Define the process of object-oriented analysis and design to software development.

- Pointing out the importance and function of each UML model throughout the process of object-oriented analysis and design and explaining the notation of various elements in these models.

- Providing students with the necessary knowledge and skills in using object-oriented CASE tools.Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. Program Analysis and Project Planning.
   Thorough study of the problem - Identify project scope, Objectives, Infrastructure.

2. Software requirement Analysis.
   Describe the individual Phases / Modules of the project, Identify deliverables.

3. Data Modelling.
   Use work products -use case diagrams and activity diagrams, class diagrams, sequence diagrams and add interface to class diagrams.

4. Software development and debugging.

5. Study of software testing tools.

LIST OF EXERCISES:

1. Student Marks Analyzing System.

2. Quiz System.

3. Online Flight Ticket Reservation System.

4. Payroll System.

5. Course Registration System.

6. E-mail client system.

7. Stock Maintenance system.

8. Real-Time Scheduler system.

9. Platform assignment system for the trains in a railway station.

10. Expert system to prescribe the medicines for the given symptom.

11. Remote computer monitoring system.

OUTCOMES:

On completion of the course students will be able to:

*   Demonstrate the importance of systems analysis and design in solving complex problems.

*   Prepare a software project plan and software testing plan to develop successful software.

*   Apply CASE tools to develop quality software.

ITB3106 DATABASE MANAGEMENT SYSTEMS LAB L T P C
0 0 3 1

OBJECTIVES:

The major objective of this lab is

- To provide a strong formal foundation in database concepts, technology and practice to the students to groom them into well-informed database application developers.

- To present the concepts and techniques relating to query processing by SQL engines, ODBC and its implementations.

- To give a good formal foundation on the relational model of data.

LIST OF EXERCISES:

1. Data Definition Language (DDL) commands in RDBMS.

2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.

3. High-level language extension with Cursors.

4. High level language extension with Triggers

5. Procedures and Functions.

6. Design and implementation of Payroll Processing System.

7. Design and implementation of Banking System.

8. Design and implementation of Library Information System.

OUTCOMES:

On completion of the course students will be able to:

- Apply SQL DML/DDL commands for creating a database.

- Demonstrate PL/SQL programming.

- Design small-scale database oriented applications.

ITB3107   **OPERATING SYSTEM LAB**   **L T P C**
                                                  0 0 3 1

OBJECTIVES:

The major objective of this lab is

- To know about the various operating systems like Windows, UNIX, Mac, etc.

- To understand the resource management provided by operating systems.

- To learn the concepts and theories of operating systems.

- To discover the implementation issues of operating systems.

LIST OF EXERCISES:

1. Shell programming Command syntax - write simple functions - basic tests - loops - patterns - expansions - substitutions.

2. Programs using Unix system calls - fork, exec, getpid, exit, wait, close, stat, opendir, readdir

3. Programs using the I/O system calls of UNIX (open, read, write, etc)

4. Programs to simulate UNIX commands like ls, grep, etc.

5. Simulation of following CPU scheduling algorithms: For each of the scheduling algorithms, compute Average waiting time & Average turnaround time and draw the Gantt chart.

    A. FCFS

    B. SJF (preemptive and non-preemptive)

    C. Priority Scheduling (preemptive and non-preemptive)

    D. Round Robin Scheduling

6. Implement the Producer - Consumer problem using semaphores.

7. Implementation of Bankers algorithm for Deadlock avoidance.

8. Implement the following memory Allocation Strategies using arrays:

    A. First Fit

    B. Worst Fit

    C. Best Fit

9. Implementation of Memory Management schemes using the following Page

replacement algorithms:

A. FIFO page replacement algorithm

B. Optimal page replacement algorithm

C. LRU page replacement algorithm

10. Implement the following File Allocation Techniques:

A. Contiguous allocation

B. Linked allocation

C. Indexed allocation

OUTCOMES:

On completion of the course students will be able to:

- Use the basic system calls in UNIX and implement their functionalities.

- Evaluate the various scheduling algorithms and their performance

- Demonstrate Producer - Consumer problem using semaphores in multi process environment

- Implement Bankers algorithm for deadlock avoidance in multi process environment.

- Assess the various memory allocation techniques.

ECB4102   **EMBEDDED SYSTEMS**   **L T P C**
                                                     3 0 0 3

OBJECTIVES:

- This course will introduce students to embedded systems by providing a detailed overview of the important topics in the field.

- This course will equip students with the software development skills necessary for practitioners in the embedded systems field.

- Entire software development lifecycle and examine the various issues involved in developing software for embedded systems.

MODULE I   EMBEDDED COMPUTING PLATFORM   **7**

Embedded computing - characteristics and challenges - embedded system design process-- Overview of Processors and hardware units in an embedded system.

MODULE II   COMPUTING PLATFORM AND DESIGN ANALYSIS   **9**

CPU buses - Memory devices - I/O devices - Component interfacing - Design with microprocessors - Development and Debugging - Program design - Model of programs - Assembly and Linking - Basic compilation techniques - Analysis and optimization of execution time, power, energy, program size - Program validation and testing.

MODULE III   REAL TIME OPERATING SYSTEMS (RTOS)   **7**

Overview of Operating Systems (OS) concepts - Real time systems - Types-Need for RTOS in Embedded Systems -Compare OS and RTOS - RTOS Tasks - Task States - Multitasking -Context Switching - Scheduling Algorithms-IPC mechanisms .

MODULE IV   DISTRIBUTED EMBEDDED SYSTEMS   **8**

Communication buses - Shared memory communication - accelerated design-networks for embedded systems - networks based design - Internet enabled systems.

MODULE V EMBEDDED SOFTWARE DEVELOPMENT TOOLS   7

Host and target machines - Linkers / Locators for Embedded Software - Debugging techniques - Instruction set simulators Laboratory tools - Practical example - Source code.

MODULE VI SOFTWARE TECHNOLOGY FOR EMBEDDED SYSTEMS   7

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - C" Program compilers - Cross compiler - Optimization of memory codes.

Total Hours:45

TEXT BOOKS:

1.   Marilyn Wolf, "Computers as components ", Elsevier, 2012.

2.   Qing Li and Carolyn Yao, "Real-Time Concepts for Embedded Systems", CMP Books, 2003.

3.   Michael Bass, "Programming Embedded Systems in C and C++", Oreilly, 2003.

REFERENCES:

1.   David E.Simon, "An Embedded Software Primer", Pearson Education, 2003.

2.   Rajkamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw-Hill, First reprint Oct. 2003.

3.   Steve Heath, "Embedded System Design", 2nd Edition, Elsevier, 2004.

4.   Frank Vahid and Tony Gwargie, "Embedded System Design", John Wiley & sons, 2002.

OUTCOMES:

On completion of this course the student will be able to

•   Develop Embedded Programs in C and C++.

•   Apply various code minimization techniques.

ITB3211   **INFORMATION SECURITY**   **L T P C**
                                                                         3 0 0 3

OBJECTIVES:
- To understand the basics of cryptography techniques.
- To explore the technological aspects of program, operating system, database and network level security.
- To study the critical need for ensuring Information Security in organizations.
- To know the legal, ethical and professional issues in Information Security.

MODULE I   CRYPTOGRAPHY   9

Security problem in computing - Elementary Cryptography - Symmetric Key Encryption Public Key Encryption - Uses of Encryption.

MODULE II   PROGRAM SECURITY   7

Security Programs - Non-malicious program Errors - Virus and other Malicious Code - Targeted Malicious Code - Control against program threats.

MODULE III OPERATING SYSTEM   SECURITY   7

Memory and Address Protection - File Protection Mechanisms - User Authentication - Trusted Operating Systems - Designing Trusted Operating Systems- Assurance in Trusted Operating Systems-

MODULE IV DATABASE AND DATA MINING SECURITY   7

Introduction to Databases - Database Security Requirements - Reliability & Integrity - Sensitive data - Inference - Multilevel Databases - Proposals for Multilevel Security - Data Mining.

MODULE V NETWORK SECURITY   7

Threats in Networks - Network Security Controls - firewalls - Intrusion Detection Systems - Secure E-Mail

MODULE VI ADMINSTERING SECURITY AND ETHICAL ISSUES   8

Security Planning - Risk Analysis - Organizational Security Policies - Physical Security - Protecting Programs and Data - Information and the Law - Software Failures - Computer Crime - Privacy - Ethical Issues.

Total Hours: 45

TEXT BOOK :

1. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 3rd Edition, Pearson Education, 2003.

REFERENCES:

1. William Stallings, "Cryptography and Network Security - Principles and Practices", 3rd Edition, Pearson Education, 2003.

2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Analyze the various cryptographic techniques in Information Security.
- Identify program level malicious code and provide control measures.
- Discuss operating system level security to assess trusted operating systems.
- Outline database security requirements in multilevel databases.
- Explain threats in network level scenarios.
- Discuss organizational security policies and ethical issues.

ITB3212   **GRAPHICS AND MULTIMEDIA**   **L T P C**
                                                        3 0 0 3

OBJECTIVES:

- To study the various graphical techniques and algorithms.

- To impart the basic knowledge of multimedia concepts and various I/O technologies.

- To enable the students to develop their creativity.

- To understand the fundamental graphical operations and to get a glimpse of recent advances in computer graphics.

- To learn the user interface issues that make the computer easy for the novice user.

MODULE I   INTRODUCTION   7

Introduction - Overview of Graphics Systems- Output Primitives- Line - Curve and Ellipse Algorithms - Attributes of Output Primitives.

MODULE II   TWO-DIMENSIONAL CONCEPTS   7

Two-Dimensional Geometric Transformations - Two-Dimensional Viewing.

MODULE III THREE-DIMENSIONAL CONCEPTS   8

Three-Dimensional Object Representations - Three-Dimensional Geometric and Modeling Transformations - Three-Dimensional Viewing - Color models - Animation

MODULE IV   MULTIMEDIA SYSTEMS DESIGN   7

An Introduction - Multimedia applications - Multimedia System Architecture - Evolving technologies for Multimedia - Defining objects for Multimedia systems- Multimedia Data interface standards - Multimedia Databases.

MODULE V   MULTIMEDIA FILE HANDLING   8

Compression & Decompression - Data & File Format standards - Multimedia I/O technologies - Digital voice and audio - video image and animation - Full motion video - Storage and retrieval Technologies.

MODULE VI   HYPERMEDIA   8

Multimedia Authoring & User Interface - Hypermedia messaging - Mobile Messaging - Hypermedia message component - creating Hypermedia message - Integrated multimedia message standards - Integrated Document management - Distributed Multimedia Systems.

Total Hours: 45

TEXT BOOKS:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education, 2003.

2. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003.

REFERENCES:

1. Judith Jeffcoate, "Multimedia in practice technology and Applications", PHI, 1998.

2. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", 2nd Edition, Pearson Education, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Design algorithms for different geometric shapes.
- Demonstrate the geometrical transformations on geometric objects.
- Describe computer graphics animation techniques.
- Discuss the design of multimedia system.
- Explain the various file handling mechanisms for multimedia system.
- Outline the various message handling techniques.

MSB3181   MANAGEMENT OF BUSINESS ORGANISATION   L T P C
3 0 0 3

OBJECTIVES:

• To give an exposure to principles of management and organizational structures.
• To introduce concepts of operation and material management.
• To provide an understanding of management of human resources.
• To impart some basic knowledge on marketing, pricing and selling.
• To give an overview of accounting and management of finance.

MODULE I   PRINCIPLES OF MANAGEMENT   7
Functions of management - Planning - Organizing - Staffing - Direction - Motivation - Communication - Coordination - Control, organizational structures - Line - Line and staff - Matrix type, functional relationships - Span of control, Management by Objectives (MBO) - Forms of Industrial ownership.

MODULE II   OPERATIONS MANAGEMENT   8
Introduction to operations management - Functions of production/operations management - Types of production, Overview of facility location - Lay out planning, introduction to production planning and control, work study, quality assurance, lean manufacturing and six sigma, plant maintenance and management.

MODULE III   MATERIALS MANAGEMENT   8
Materials Planning - Types of inventory, Purchasing function - Source selection - Negotiation - Ordering, Stores management - Functions - Types of stores - Overview of inventory control, Introduction to newer concepts: MRP-I – MRPII - ERP - JIT.

MODULE IV   HUMAN RESOURCE MANAGEMENT   7
Human Resource Management - Objectives - Role of Human Resource Manager - Manpower planning - Selection and placement - Training – Motivation - Performance assessment - Introduction to grievances handling and labour welfare.

MODULE V   MARKETING MANAGEMENT   7
Marketing - Concept and definition - Elements of marketing mix - PLC – Steps in new product development - Pricing objectives and methods – Advertising types/media - Steps in personal selling - Sales promotion methods – Distribution channels: functions, types.

MODULE VI   FINANCIAL MANAGEMENT   8
Financial management functions - Introduction to financial accounts, financial performance - Profit and loss account statement - Balance sheet, budgetary control - Meaning - Uses - limitations - Types of costs - Basics of depreciation methods -Break-

even analysis - Meaning - Assumption - Uses and limitations, working capital - Meaning and relevance - Use of operating ratios.

Total Hours: 45

REFERENCES:

1. Bhushan Y.K., "Fundamentals of Business Organisation and Management", Sultan Chand & Co., 2003.
2. Banga & Sharma "Industrial Engineering & Management", 11th Edition, Khanna Publications, 2007.
3. Khanna, O.P., "Industrial Engineering & Management", Dhanpat Rai Publications, 2004.
4. S.N.Maheswari "Principles of Management Accounting", 16th Edition, S.Chand & Company Ltd, 2007.

OUTCOMES:

On completion of the course students will be able to:

- The students would have gained basic knowledge of the concepts of management and the functions of management.
- The students would have learnt fundamentals of the functional areas of management viz., operations management, materials management, marketing management, human resources management and financial management.

ITB3213   MOBILE APPLICATION DEVELOPMENT LAB   L T P C
**   0 0 3 1**

OBJECTIVES:

- To develop applications for current and emerging mobile computing devices
- To learn the processes, tools and frameworks required to develop applications for current and emerging mobile computing devices.
- To know all stages of the software development life-cycle from inception through to implementation and testing.
- To consider the impact of user characteristics, device capabilities, networking infrastructure and deployment environment, on the specified requirements of a software project.

LIST OF EXERCISES:

1. Simple mobile applications using J2ME.
2. Create a simple audio player mobile application using J2ME.
3. Simple mobile applications for Android platform. [4 examples]
4. Simple Mobile IP based Network programming applications. [2 examples]
5. Create simple mobile games [Example: 3 X 3 Tic-Tac-Toe game].
6. Simple mobile applications for Apple iOS platform. [2 examples]

OUTCOMES:

On completion of the course students will be able to:

- Apply the different types of application models/architectures used to develop mobile software applications.
- Utilize the components and structure of a mobile development frameworks (Android SDK and xcode IDE) and learn how and when to apply the different components to develop a working system.
- Develop mobile games in Android and iOS environment.
- Design, implement and deploy mobile applications using an appropriate software development environment.

ITB3214   **SOFTWARE DEVELOPMENT LAB**   **L T P C**
                                                0 0 3 1

OBJECTIVES

•   Create a project team and appoint a project leader.

•   Assume the role of client .discuss, evaluate and propose the requirements for a real world problem.

•   Discuss the software requirement with team lead.

•   Use the template to write requirements.

•   To take part in ongoing project development process such as requirement analysis, design, implementation and testing.

•   Learn where and how to make improvements in the software development process through developing projects.

Note: List of exercises will be framed based on the professional elective chosen.

OUTCOMES:

On completion of the course students will be able to:

•   Discuss, evaluate and propose the requirements to solve real world problem with team members.

•   Analyze software requirements and prepare software design using common template.

•   Implement and test software module in coordination with other team members.

ITB3215   GRAPHICS AND MULTIMEDIA LAB   L T P C
0 0 3 1

OBJECTIVES:

- To make students aware of the concepts underlying modern Computer Graphics.
- Learn to do animation using Adobe Flash, Write Action script.
- Learn to do Image Editing using Adobe Photoshop.

LIST OF EXERCISES:

1. To implement Simple DDA algorithm for line drawing.
2. To implement Bresenham"s algorithms for line, circle and ellipse drawing.
3. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
4. To implement Cohen-Sutherland 2D clipping and window-viewport mapping
5. To implement Sutherland - Hodgeman polygon clipping.
6. To perform 3D Transformations such as translation, rotation and scaling.
7. To visualize projections of 3D images.
8. To implement painters algorithm for visible surface identification.
9. To convert between color models.
10. To implement text compression algorithm.
11. To implement image compression algorithm.
12. To perform animation using any Animation software.
13. To perform basic operations on image using any image editing software.

OUTCOMES:

On completion of the course students will be able to:

- Develop programs to draw a Line, circle and ellipse using graphics algorithms.
- Demonstrate the 2D and 3D transformations.
- Implement color modeling techniques.
- Compress the text and image using the compression algorithms.
- Create an animation of an object.

ITB4101   **SOFTWARE TESTING**   **L   T P C**
                                                                     3   0   0 3

OBJECTIVES:

The objective of this course is to enable the students:

- To discuss the distinctions between different levels of testing.

- To describe the principles of software testing and maturity levels.

- To describe strategies for generating system test cases.

- To understand the essential characteristics of tool used for test automation.

- Demonstrate the ability to apply multiple methods to develop reliability estimates for a software system.

MODULE I   SOFTWARE TESTING-INTRODUCTION   9

Testing as an Engineering Activity - Role of Process in Software Quality - Testing as a Process - Basic Definitions, TMM levels- Software Testing Principles - The Tester"s Role in a Software Development Organization - Origins of Defects - Defect Classes - The Defect Repository and Test Design- Defect Examples - Developer/Tester Support for developing a defect Repository.

MODULE II   STRATEGIES AND METHODS FOR TEST CASE   DESIGN   9

Introduction to Testing Design Strategies - The Smarter Tester -Test Case Design Strategies - Using Black Box Approach to Test Case Design - Random Testing -Equivalence Class Partitioning - Boundary Value Analysis -Using White-Box Approach to Test design - Test Adequacy Criteria - Coverage and Control Flow Graphs - Covering Code Logic - Paths - White-box Based Test Design - Additional White Box Test design approaches - Evaluating Test Adequacy Criteria.

MODULE III LEVELS OF TESTING AND TESTING GOALS, PLANS AND   POLICIE   9

The Need for Levels of Testing - MODULE Testing -Integration testing-System Testing - types of system testing - Acceptance Testing-types of acceptance test -testing OO systems - usability and accessibility testing-Testing and

debugging Goals and policies-Test plan components-The role of three groups in Test Planning and Policy Development.

MODULE IV   CONTROLLING & MONITORING   9

Introducing the test specialist - Skills needed by a test specialist - Building a Testing Group-Structure of the testing group- Measurements and milestones for controlling and monitoring-Criteria for test completion- software configuration management-Controlling and Monitoring: Three critical views.

MODULE V   TEST MEASUREMENTS   9

Reviews as a testing activity-Types of Reviews-Developing a Review Program-Measurement program to support product and process Quality-Review of Quality concepts-Quality costs-An approach to usability Testing.

MODULE VI   TESTERS WORKBENCH   9

Defect analysis and prevention-Defect casual Analysis-Evaluating Testing Tools for the workbench-Tool categories-process reuse-Approach to model development-TMM structure-TMM Assessment model components.

Total Hours: 45

TEXT BOOKS:

1.   Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing - Principles and Practices", Pearson education, 2006.

2.   Ilene Burnstein, "Practical Software Testing", Springer, 2003.

REFERENCES:

1.   Limaye L G, "Software Testing - Principles, Techniques and Tools", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009.

2.   Aditya P.Mathur, "Foundations of Software Testing", Pearson Education, 2008.

3.   Boris Beizer, "Software Testing Techniques", 2nd Edition, Dreamtech, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Explain the basic concept of software testing and its essentials.
- Identify the defects/errors using software testing techniques.
- Outline different levels of testing.
- Identify skill set required for testers to monitor and control the testing process.
- Develop a Review Program to improve process and product quality of a project.
- Demonstrate the various testing tools.

ITB4102   **WIRELESS NETWORKS**   **L T P C**
                                                   3 0 0 3

OBJECTIVES:

- To learn the fundamental concepts of wireless, mobile and personal telecommunication system.

- To understand the wireless network topologies, cellular concepts and its operational characteristics.

- To explain the evolution of WLAN and the channel access mechanisms.

- To gain knowledge about the different routing protocols in adhoc wireless networks.

- To understand WPAN and geo-location systems.

MODULE I   PHYSICAL LAYER ALTERNATIVES FOR WIRELESS NETWORKS   8

Applied Wireless Transmission Techniques. Short Distance Baseband Transmission. Pulse Transmission. Carrier Modulated Transmission. Traditional Digital Cellular Transmission. Broadband Modems for Higher Speeds. Spread Spectrum Transmissions. High-Speed Modems for Spread Spectrum Technology. Diversity and Smart Receiving Techniques. Comparison of Modulation Schemes. Coding Techniques for Wireless Communications

MODULE II   PRINCIPLES OF WIRELESS NETWORK OPERATION   8

Wireless networks topologies, cellular topology, cell fundamentals signal to interference ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, micro cell method, overload cells, channels allocation techniques and capacity expansion FCA, channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

MODULE III   GSM, CDMA AND TDMA TECHNOLOGY   8

Mechanism to support a mobile environment, communication in the infrastructure, IS-95 CDMA forward channel, IS - 95 CDMA reverse channel, pallert and frame formats in IS - 95; forward channel in W-CDMA and CDMA 2000, reverse channels in W-CDMA and CDMA-2000.

MODULE IV   LOCAL BROADBAND NETWORKS   7

Historical overviews of the LAN industry, evolution of the WLAN industry, wireless home networking, IEEE 802.11,Physical Layer, Basic MAC Layer Mechanisms, CSMA/CA Mechanisms, other MAC Layers functionalities.

MODULE V   AD HOC NETWORKS   7

Overviews of Ad hoc networks,, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Proactive, Reactive and Hybrid routing protocols - DSDV, AODV, DSR, ABR, TORA, ZRP.

MODULE VI   WPAN AND GEOLOCATION SYSTEMS   7

IEEE 802.15 WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geo location technologies for wireless geo location, geo location standards for E.911 service.

Total Hours: 45

TEXT BOOK:

1.   Kaveh Pahlavan, Prashant Krishnamoorthy, "Principles of Wireless Networks- A united approach", Pearson Education, 2002.

REFERENCES:

1.   Jochen Schiller, "Mobile Communications", 2nd Edition, Pearson Education, 2003.

2.   X.Wang and H.V.Poor, "Wireless Communication Systems", Pearson education, 2004.

3.   M.Mallick, "Mobile and Wireless design essentials", Wiley Publishing Inc. 2003.

4.   P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, "Wireless Networks", John Wiley & Sons, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Explain the various wireless transmission and coding techniques.

- Discuss the principle of operation of wireless networks and its issues.

- Analyze the IEEE 802.11, ITU, and IS-X standards for multiple access wireless networks.

- Discuss about the application of wireless technology in real world applications.

- Compare the different routing protocols for adhoc networks.

- Analyze the available commercial implementations of several wireless technologies.

ITB4103   **VIRTUALIZATION TECHNIQUES**   **L T P C**
                                                      3 0 0 3

OBJECTIVES:

• To provide knowledge on various types of virtualization techniques.
• To understand virtual machine deployment in different operating system platforms.
• To know how to apply virtualization for server consolidation.
• To impart knowledge on processor, memory, network and storage virtualization.
• To familiarize themselves with the various devices and virtual machine products.

MODULE I   INTRODUCTION   8

Understanding Virtualization, Describing Virtualization, Understanding the Importance of Virtualization, Understanding Virtualization Software Operation, Desktop Virtualization - Network Virtualization - Server and Machine Virtualization - Storage Virtualization - System-level or Operating Virtualization-Application Virtualization-Virtualization Advantages, Understanding Hypervisors, Describing a Hypervisor, Understanding the Role of a Hypervisor, Comparing Today"s Hypervisors.

MODULE II   VIRTUAL MACHINES   8

Understanding Virtual Machines-Describing a Virtual Machine-How a Virtual Machine Works-Working with Virtual Machines-Creating a Virtual Machine-Performing P2V Conversions-Loading Your Environment-Building a New Virtual Machine-Installing Windows into a Virtual Machine-Installing Linux into a Virtual Machine.

MODULE III SERVER CONSOLIDATION   7

Hardware Virtualization - Virtual Hardware Overview - Sever Virtualization - Physical and Logical Partitioning - Types of Server Virtualization - Business cases for Sever Virtualization - Uses of Virtual server Consolidation - Planning for Development - Selecting server Virtualization Platform-Understanding Availability.

MODULE IV PROCESSOR AND MEMORY VIRTUALIZATION   7

Managing CPUs for a Virtual Machine-Understanding CPU Virtualization-Configuring VM CPU Options-Tuning Practices for VM CPUs- Managing

Memory for a Virtual Machine-Understanding Memory Virtualization-Configuring VM Memory Options-Tuning Practices for VM Memory.

MODULE V   STORAGE AND NETWORK VIRTUALIZATION   8

Managing Storage for a Virtual Machine-Understanding Storage Virtualization-Configuring VM Storage Options-Tuning Practices for VM Storage-Managing Networking for a Virtual Machine- Understanding Network Virtualization-Configuring VM Network Options-Tuning Practices for Virtual Networks-Copying a Virtual Machine-Cloning a Virtual Machine-Working with Templates-Saving a Virtual Machine State.

MODULE VI   DEVICES AND APPLICATIONS IN VIRTUAL MACHINES   7

Using Virtual Machine Tools-Understanding Virtual Devices-Configuring a CD/ DVD Drive-Configuring a Sound Card-Configuring USB Devices-Configuring Graphic Displays-Configuring Other Devices-Deploying Applications in a Virtual Environment-Understanding Virtual Appliances and vApps

Total Hours: 45

TEXT BOOKS:

1.   Matthew Portnoy, "Virtualization Essentials", John Wiley & Sons, Inc., 2012.

2.   William von Hagen, "Professional Xen Virtualization", Wrox Publications, January 2008.

REFERENCES:

1.   James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

2.   Kumar Reddy, Victor Moreno, "Network virtualization", Cisco Press, July 2006.

3.   David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

4.   Chris Wolf, Erick M. Halter, "Virtualization: From the Desktop to the Enterprise", APress 2005.

OUTCOMES:

On completion of the course students will be able to:

- Outline the types of virtualization techniques and hypervisors.
- Create a virtual machine in Windows and Linux platforms.
- Select server virtualization platforms for business scenarios.
- Discuss processor virtualization and managing memory for a virtual machine.
- Outline storage and network virtualization for virtual networks.
- Discuss virtual machine tools and products to deploy applications in virtual environment.

ITB4104   **MINI PROJECT**   **L T P C**
                                                                  0 0 3 1

OBJECTIVES:

- The mini project is designed to help students develop practical ability and knowledge about practical tools / techniques in order to solve real life problems related to the industry, academic institutions and computer science research.

- Each student will have to prepare proper documentation consisting of Software Requirements Specification (SRS), Modeling Techniques, Development Strategies, Implementation and Testing Strategies.

- Learn to apply the theoretical concepts in appropriate application.

- Learning new tools and new languages.

OUTCOMES:

On completion of the course students will be able to:

- Identify real world problems and propose a solution.

- Prepare various intermediate software products.

- Apply the latest CASE tools and techniques to implement the proposed idea.

ITB4105   **SOFTWARE TESTING LAB**   **L T P C**
                                                                              0 0 3 1

OBJECTIVES:

• Understand the basic concepts of software testing.

• Plan, track and control the software testing effort.

Prepare the following documents and carry out the testing technique for two of the exercises done in ITB3105-Case Tools lab.

1. Software Requirement Specification

2. Software Test Plan

3. Test case design

4. Apply black box and white box testing techniques to design a test suite with a high level of path-coverage for

    • Stack class that implements methods such as push, pop, size, etc.

    • Queue Class that implements methods like enqueue, dequeue, etc.

5. Unit testing using Junit testing tool.

6. Functional Testing.

7. Perfomance and Load Testing using JMeter/Load Runner.

    • Develop a simple web application to demonstrate

8. Integration testing with HttpUnit

9. Study of Loadrunner testing tool

10. Study of cross browser testing tools- Selenium

11. Using Selenium IDE, Write a test suite containing minimum 4 test cases.

12. Install Selenium server and demonstrate it using a script in Java/PHP.

OUTCOMES:

On completion of the course students will be able to:

- Create the software requirement and test plan according to the specification.
- Generate test cases from software requirements specification.
- Perform functional testing using control flow and transaction flow graphs.
- Apply appropriate software testing tools and techniques and for test planning and test execution of software development process.

ITB4106   **VIRTUALIZATION LAB**   **L T P C**
                                                                    0 0 3 1

OBJECTIVES:

- To provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.

- To enthuse students to conduct experiments by the arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.

- To provide a complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self evaluation.

- To share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distance.

LIST OF EXERCISES:

1. Study of Physical Machine resources
2. Study of virtual machines
3. VM Management and Configurations
4. Creation of Virtual Machines using Xen, KVM, Vmware
5. Creation of VM Images, VM Template and VM Networks
6. Creating Windows and Ubuntu Virtual Machines using Eucalpytus and OpenNebula-Open Source Midddleware technology
7. Checking Resource Limitations
8. Storage Virtualization

OUTCOMES:

On completion of the course students will be able to:

- Analyze physical and virtual machines management.
- Design virtual machines using various hypervisors.
- Demonstrate Windows and Ubuntu virtual machines using open source middleware technologies.
- Identify and evaluate physical machines resources for virtual networks.

ITB4107   **WIRELESS NETWORKS LAB**   **L   T   P   C**
                                                      0   0   3   1

OBJECTIVES:

• Introduce various wireless systems and standards and their basic operation cases.

• Learn to simulate wireless networks and analyze the simulation results.

LIST OF EXERCISES:
(Experiments using NS2/matlab/Qualnet/Routers/Switches, etc.,)

1. Wireless Access Point - configuring and enabling security

2. Wi-Fi based Data Acquisition

3. Routing protocols for IP network using routers

4. Configuration of VLAN using switches

5. PDA mobility analysis using layer 3 switches

6. Hidden and exposed terminal problem

7. Signaling in wireless networks (RTS, CTS, DATA and ACK)

8. AODV/DSR

9. RTP protocol of VoIP

10. Implementation of network security algorithms

11. Network performance analysis using packet sniffer

OUTCOMES:

On completion of the course students will be able to:

• Create wireless network environment and configure virtual LAN.

• Develop various wireless network applications.

• Demonstrate different wireless network protocols.

• Identify a suitable network security algorithms for a given scenario.

• Assess the performance of wireless network using packet sniffer.

ITB4211 **PROJECT WORK** **L T P C**
0 0 18 9

OBJECTIVES:

- Learn to formulate, and provide solutions for the identified problems.
- Understand the computing requirements and design appropriate solutions

OUTCOMES:

On completion of the course students will be able to:

- Co-ordinate with team members to identify technical or societal problem and propose a solution.
- Use the techniques and latest computing tools to implement the proposed idea.
- Work with real time projects in IT industry.

SEMESTER V

ITBX02	DISTRIBUTED COMPUTING	L T P C
		3 0 0 3

OBJECTIVES:

- To understand the components of OS and recognize them in different OS.
- To give insight into the basic principles of how distributed computer systems are working.
- To provide depth knowledge and skills in designing, development and management of efficient distributed computing systems.

MODULE I   TYPES OF DISTRIBUTED SYSTEMS   8

Introduction - Goals - hardware concepts - bus based multiprocessor - switched multiprocessor - bus based multicomputer - switched multicomputer - software concepts - network operating systems - Multiprocessor time sharing system- Real time system.

MODULE II   DESIGN ISSUES   7

True distributed system - Design issues in distributed operating systems- transparency – Types of transparency- Flexibility – Reliability- Introduction to Fault Tolerance - Performance – Scalability.

MODULE III   COMMUNICATIONS   7

Communication-Layered Protocols-Issues in communications-Client server model - remote procedure call - group communication

MODULE IV   SYNCHRONIZATION   8

Synchronization-Clock Synchronization - Mutual Exclusion - Election Algorithms - Atomic transactions - Deadlock - System models - Processor Allocation – Scheduling.

MODULE V   DISTRIBUTED FILE SYSTEMS   7

Introduction to Distributed file systems- Distributed file system design – implementation – file models – fault tolerance – file replication – multimedia.

MODULE VI   DISTRIBUTED SHARED MEMORY   8

Distributed shared memory-consistency models – page based distributedshared memory - shared variable distributed shared memory – Distributed programming languages – Case studies –Ameoba.

Total Hours: 45

TEXT BOOK:

1. Andrew S.Tanenbaum, "Distributed Operating Systems", Pearson Education Asia, 2001.

REFERENCES:

1. Mukesh singhal and Niranjan G.Shivaratri, "Advanced concepts in Operating System", Tata McGraw Hill, 2001.

2. Pradeep.K and Sinha, "Distributed operating systems", PHI, 2001.

OUTCOMES:

On completion of the course students will be able to:

- Discuss the various distributed systems and design issues.
- Develop real time applications using client-server communication.
- Outline the resource management concepts and algorithms.
- Apply algorithms for providing synchronization in distributed systems.
- Design and implement distributed file system.
- Prepare a case study on Amoeba distributed system.

ITBX06   PRINCIPLES OF   DIGITAL SIGNAL PROCESSING   L   T   P   C
                                                         3   0   0   3

OBJECTIVES:

- To have an overview of signals and systems.
- To compare DFT & FFT
- To study the design of IIR and FIR filters.
- To study the effect of finite word lengths & applications of DSP.

MODULE I   CLASSIFICATION OF SIGNALS AND SYSTEMS   7

Continuous time signals, discrete time signals, step, Ramp, Impulse, Exponential signals, Classification of CT and DT signals - periodic and aperiodic- odd and even, energy and power, Deterministic and Random signals, Classification of systems – Linear Time Invariant Systems, Causal and non causal systems, stable and unstable systems, Impulse response, Response of continuous time LTI systems, Convolution Integral.

MODULE II   ANALYSIS OF DISCRETE TIME SIGNAL   7

Difference equation representation of discrete time systems, Discrete time Fourier series, Discrete Time Fourier Transform (DTFT), Frequency response of LTI system, Z transforms.

MODULE III   DISCRETE TIMEM LTI   SYSTEMS   8

Impulse response, Convolution sum, Discrete Fourier Transform (DFT), Fast Fourier Transform, radix 2 FFT, Decimation in time(DIT) and Decimation in frequency(DIF) FFT algorithms.

MODULE IV IIR FILTER   DESIGN   8

Analog Butterworth filters, Analog to analog transformation, IIR filter design by Impulse Invariance method and bilinear transformation, Realization structures for IIR filters.

MODULE V   FIR FILTER DESIGN   8

Symmetric &Antisymteric FIR filters – Linear phase filter – Windowingtechnique – Rectangular, Kaiser windows – Frequency sampling techniques
– Structure for FIR systems.

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling – analytical model of sample and hold operations.

Total Hours: 45

TEXT BOOKS:

1. John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", 3ʳᵈ Edition, PHI/Pearson Education, 2000.

2. Alan V. Oppenheim, Alan S. Willsky with S.HamidNawab, "Signals & Systems", Pearson / Prentice Hall of India Pvt. Ltd., 2003.

REFERENCES:

1. K.Lindner, "Signals and Systems", McGraw-Hill International, 1999.

2. Simon Haykin and Barry Van Veen, "Signals and Systems", John Wiley & Sons, Inc., 1999.

3. Charles H.Roth, Jr., "Fundamentals of Logic Design", 4ᵗʰ Edition, Jaico Publishing House, 2000.

OUTCOMES:

On completion of the course students will be able to:

•   Explain the Sampling Theorem and how this relates to Aliasing and Folding.

•   Determine if a system is a Linear Time-Invariant (LTI) System.

•   Compute the Z-transform of a LTI system.

•   Analyze the frequency response of FIR and IIR filters.

•   Design, analyze, and implement digital filters.

•   Implement filters on a digital signal processor.

ITBX15   **NATURAL LANGUAGE PROCESSING**   **L T P C**
                                                    3 0 0 3

OBJECTIVES:

- To provide a general introduction including the use of state automata for Language processing.

- To provide the fundamentals of syntax including a basic parse.

- To explain advanced feature like feature structures and realistic parsing methodologies.

- To explain basic concepts of remotes processing.

- To give details about a typical natural language processing applications.

MODULE I   INTRODUCTION   8

\Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding. Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon-Free FSTs: The porter stammer - Human morphological processing.

MODULE II   SYNTAX   8

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing – Back off - Deleted Interpolation – Entropy - English Word Classes– Tag sets for English - Part of Speech Tagging - Rule-Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Transformation-Based Tagging– Other issues.

MODULE III CONTEXT FREE GRAMMAR   8

Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase - Coordination - Agreement - The verb phase and sub categorization - Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite-State and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

MODULE IV   ADVANCED FEATURES AND SYNTAX   7

Features and Unification: Feature structures - Unification of feature structures - Features structures in the grammar - Implementing unification - Parsing with unification constraints - Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar - problems with PCFGs - Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

MODULE V   SEMANTIC   7

Representing Meaning: Computational desiderata for representations - Meaning structure of language - First order predicate calculus - Some linguistically relevant concepts - Related representational approaches - Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - Word Net: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

MODULE VI   APPLICATIONS   7

Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation - Robust word sense disambiguation - Information retrieval - other information retrieval tasks. Natural Language Generation: Introduction to language generation - Architecture for generation - Surface realization - Discourse planning - Other issues. Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques - Usability and system development.

Total Hours: 45

TEXT BOOKS:

1.   Daniel Jurafsky & James H.Martin, "Speech and Language Processing", Pearson Education (Singapore) Pt. Ltd., 2002.

2.   Chris Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press. Cambridge, MA: May 1999.

REFERENCE:

1. James Allen, "Natural Language Understanding", Pearson Education, 2003.

OUTCOMES:

On completion of the course students will be able to:

*   Discuss the major trends and systems in Natural Language Processing.
*   Utilize and explain the function of software tools.
*   Explain context free grammars and the use of parsers.
*   Outline the Advanced Features and Syntax of grammars.
*   Analyze feature-based semantic systems.
*   Apply statistical techniques to natural language analysis.

ITBX16   PRINCIPLES OF COMPILER DESIGN   L T P C
                                                 3 0 0 3

OBJECTIVES:

The objective of this course is to enable the students:

- To have a knowledge about various phases of compiler.

- To understand, design and implement a lexical analyzer and a parser.

- To understand and design code generation schemes.

- To understand optimization of codes and runtime environment.

- To be able to design and implement a simple compiler.

MODULE I   INTRODUCTION, LEXICAL ANALYSIS   8

Language processors - Structure of a Compiler - Phases of a complier - Evolution of Programming Languages - The science of building a compiler - Applications of computer technology - Programming language basics - Lexical analysis: The role of Lexical analyzer - Input buffering - Specifications of tokens - Recognition of tokens.

MODULE II   SYNTAX ANALYSIS   12

Introduction – Context free grammars – Writing a grammar – Top-down parsing – Bottom-up parsing – Introduction to LR parsing – Simple LR – More powerful LR parsers – Using ambiguous grammars – Parser generators.

MODULE III   SYNTAX DIRECTED   TRANSLATION   7

Syntax directed definitions – Evaluation order for SDDs – Applications for syntax-directed translation – Syntax directed translation schemes.

MODULE IV   INTERMEDIATE CODE GENERATION: 6

Variants of syntax trees – Three address code – Types and declarations – Translation of expressions – Type checking – Control Flow – Back patching – Switch statements – Intermediate code for procedures.

MODULE V   RUN-TIME ENVIRONMENTS   6

Storage organization – Stack allocation of space – Access to non-local data on the stack – Heap management – Introduction to garbage collection.

MODULE VI   CODE GENERATION   6

Issues in the design of code generator – The target language – Addresses in the target code – Basic blocks and flow graphs – Optimization of basic blocks

– A simple code generator.

Total Hours: 45

TEXT BOOK:

1. Alfred V.Aho, Monica S.Lam, Ravi Sethi, Jeffery D.Ullman, "Compilers Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2011.

REFRENCES:

1. Allen Holub I, "Compiler Design in C", Prentice Hall of India, 1990.

2. Charles N.Fischer Richard J.Leblanc, "Crafting a Compiler with C", 1st Edition, 1991.

OUTCOMES:

On completion of the course students will be able to:

*   Analyze the given program using lexical analyzer

*   Discuss various parsing techniques.

*   Evaluate the syntax directed translation.

*   Design and conduct experiments for intermediate code generation.

*   Assess the storage organization for run-time environments.

*   Demonstrate the compilation of a program in a regular high level language.

ITBX30   INFORMATION CODING TECHNIQUES   **L   T   P   C**
                                                        3   0   0   3

OBJECTIVES :

- To learn the concept of information and entropy of Information.
- To understand the basic Modulation and its types.
- To familiarize with text compression techniques.
- To know about video compression, H.261 and MPEG standard.

MODULE I   INFORMATION ENTROPY FUNDAMENTALS   8

Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding – Shannon fano coding – Discrete Memory less channels – channel capacity – channel coding theorem – Channel capacity theorem.

MODULE II   DATA AND VOICE CODING   8

Differential Pulse Code Modulation – Adaptive Differential Pulse code Modulation – Adaptive subband coding – Delta Modulation – Adaptive Delta Modulation – Coding of speech signal at low bit rates (Vocoders, LPC).

MODULE III   BLOCK CODES   7

Definitions and Principles: Hamming weight - Hamming distance - Minimum distance decoding - Single parity codes - Hamming codes - Repetition codes - Linear block codes - Cyclic codes - Syndrome calculation - Encoder and decoder - CRC

MODULE IV   ERROR CONTROL CODING   7

Generator polynomial – Parity check polynomial – Convolutional codes – code tree trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

MODULE V   COMPRESSION TECHNIQUES   8

Principles of text compression – static Huffman coding – dynamic huffman

coding – arithmetic coding – image compression – graphics interchange format – tagged image file format – digitized documents – introduction to JPEG standards.

MODULE VI AUDIO AND VIDEO CODING   7

Linear predictive coding – code excited LPC – perceptual coding - MPEG audio coders – Dolby audio coders – video compression – H.261 and MPEG video standards.

Total :   45

Text Books:
    1.Simon Haykin, 'Communication Systems', John Wiley and Sons, 4th Edition 2001.
    2.Fred Halsall, "Multidedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002

REFERENCES:
1. Mark Nelson, "Data Compression Book", BPB, 1992.
2. Watkinson J, "Compression in Video and Audio", Focal Press, London, 1995.

OUTCOMES:

On completion of the course students will be able to:

- Explain the different information coding theorems.
- Discuss the various modulation methods to encode data and voice.
- Apply the block codes and cyclic codes to detect errors.
- Discuss how error control coding techniques are applied in communication systems.
- Demonstrate the various text and image compression techniques.
- Demonstrate the various audio and video compression techniques.

ITBX01   PRINCIPLES OF COMMUNICATION   L T P C
3 0 0 3

OBJECTIVES:

- To understand basic analog and digital communication system theory and design, with an emphasis on wireless communication methods.
- To understand basic signals, analog modulation, demodulation and radio receivers.
- To understand source digitization, digital multiplexing and modulation.
- To understand the various noises in communication systems.

MODULE I   AMPLITUDE MODULATION: TRANSMISSION   8

Principles of amplitude modulation – AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM power distribution, AM modulator circuits – low level AM modulator, medium power AM modulator, AM transmitters – low level transmitters, high level transmitters.

MODULE II   ANGLE MODULATION: TRANSMISSION   8

Angle Modulation – FM and PM waveforms, phase deviation and modulation index, frequency deviation, phase and frequency modulators and demodulators, frequency spectrum of a angle modulated waves, Bandwidth requirement, Broadcast band FM, Average power FM and PM modulators – Direct FM and PM, Direct FM transmitters, Indirect transmitters, Angle modulation Vs. amplitude modulation.

MODULE III   RECIEVERS   8

AM reception: AM receivers – TRF, Super heterodyne receivers, Receiver Parameters, AM Detector, Automatic Gain Control, Double Conversion AM receivers, FM receivers: FM demodulators – Round-Travis Detector, Foster-Seeley Discriminator, Ratio Detector, PLL FM demodulators, FM noise suppression, Frequency Vs. phase Modulation, Comparison with AM Receiver.

MODULE IV   DIGITAL MODULATION TECHNIQUES   7

Introduction, Binary PSK, DPSK, Differentially encoded PSK, QPSK, M-ary PSK, QASK, Binary FSK, Performance comparison of various systems of Digital Modulation.

MODULE V   BASEBAND DATA TRANSMISSION   7

Sampling theorem, Quadrature sampling of band pass signals, reconstruction of message from its samples, Signal distortion in sampling, Discrete PAM signals, power spectra of Discrete PAM signals, ISI Nyquist Criterion for Distortion less baseband binary transmission, baseband M-ary PAM systems, adaptive equalization for data transmission.

MODULE VI SPREAD SPECTRUM AND MULTIPLE ACCESS
        TECHNIQUES   7

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, Performance of DS-SS, FH spread spectrum - slow frequency hopping, fast frequency hopping, Comparison and Application of Spread Spectrum methods, Multiple access techniques, Wireless communication systems – FDMA, TDMA and CDMA, Comparison, Source coding of speech for wireless communications.

Total Hours: 45

TEXT BOOKS:

1. Wayne Tomasi, "Electronic Communication Systems: Fundamentals Through Advanced", Pearson Education, 2001.

2. Simon Haykin, "Digital Communications", John Wiley & Sons, 2003.

REFERENCES:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2001.

2. Taub & Schilling, "Principles of Communication Systems", 2nd Edition, TMH, 2003.

3. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, PHI, 2002.

4. Blake (ROY), Thomson, "Electronic Communication Systems", 2nd Edition, 2007.

OUTCOMES:

On completion of the course students will be able to:

- Outline the basic concepts of amplitude modulation transmission schemes.
- Analyze the basic concepts of Frequency Modulation and Phase Modulation transmission and reception.
- Discuss the various AM and FM receivers.
- Apply suitable modulation schemes and coding for various applications.
- Analyze the various baseband data transmission techniques.
- Identify and describe different spread spectrum techniques in modern wireless communication systems.

ITBX03   **GRID COMPUTING**   **L T P C**
                                                                    3 0 0 3

OBJECTIVES:

- To provide an overview of the basic concepts of Grid Computing.
- To highlight the advantages of deploying Grid Computing.
- To illustrate the practical adoption of a Grid deployment through real life case studies.

MODULE I   CONCEPTS AND ARCHITECTURE   8

Introduction-Parallel and Distributed Computing- Cluster Computing-Grid Computing- Virtual Organization and the Grid Standards -Anatomy and Physiology of Grid- Web and Grid Services.

MODULE II   STANDARDIZATION OF GRID TECHNOLOGY   8

Service Oriented Grid Architecture – web Services- Open Grid Services Infrastructure-OGSA Services and Schema- OGSA implementations.

MODULE III   GRID SECURITY   6

Grid Security-A Brief Security Primer-PKI-X 509 Certificates-Grid Security Requirement -WS security.

MODULE IV   RESOURCE MANAGEMENT   8

Grid Scheduling and Resource Management, Gridway and Gridbus Broker- principles of Local Schedulers- Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.

MODULE V   KNOWLEDGE ORIENTED GRIDS   7

Knowledge for Grid applications- Metadata, Knowledge and Semantics- Architectures for Knowledge Oriented Grids- Representing Knowledge-Case study.

MODULE VI   GRID MIDDLEWARE   8

List of globally available Middlewares – Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features. Features of Next generation grid.

Total Hours: 45

TEXT BOOKS:

1. Ian Foster, Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, 2004.

2. Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, "Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure", Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, 2005.

3. Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, "Grid Resource Management: State of the Art and Future Trends", (International Series in Operations Research & Management Science), 1st Edition, Springer, 2003.

4. "Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience", Wiley Press, New York, USA, 2008.

5. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making The Global Infrastructure a Reality", Wiley, 2003

OUTCOMES:

On completion of the course students will be able to:

- Outline the basic concepts of Grid Computing
- Discuss the components of OGSA frame work.
- Design suitable methods for grid security.
- Compare the local and global grid scheduling mechanisms.
- Prepare a case study on knowledge oriented grid.
- Develop an application using any grid middleware.

ITBX04　　　　　　　　　**CLOUD COMPUTING**　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 0 0 3

OBJECTIVES:

• 　To learn about cloud computing basics.

• 　To know the various technologies available for cloud platforms.

• 　To understand the cloud storage service and standards to access cloud service providers.

• 　To learn virtualization technology over various open source cloud tools to monitor the cloud performance.

• 　To understand privacy, security and QoS issues and challenges in cloud.

MODULE I　　CLOUD COMPUTING BASICS　　　　　　　　　8

Introduction to Cloud Computing - Essential Characteristics - Architectural Overview – Cloud Delivery Models - Service Models – Deployment models – Cloud computing vendors – Benefits of cloud computing – Limitations.

MODULE II　　CLOUD COMPUTING TECHNOLOGY　　　　　　8

Hardware and Infrastructure – Thick and thin clients – Cloud providers and consumers – Cloud services - Accessing the cloud – Cloud Platforms and Frameworks – Web Applications – Web API"s – Web Browsers.

MODULE III　　CLOUD STORAGE AND STANDARDS　　　　　8

Storage as a Service – Cloud Storage Providers - Cloud File Systems - GFS and HDFS – Big Table, HBase and Dynamo DB – Cloud Data Store – Simple Storage Service – Map Reduce - Map reduce and extensions - Relational operations – Parallel Efficiency of Map Reduce.

MODULE IV　　MONITORING AND MANAGEMENT　　　　　　8

Architecture for Federated Cloud Computing – SLA Management in cloud – Service provider perspective - Performance Prediction for HPC on Clouds - Study of Hypervisors – Virtualization technology management – Multitenancy.

MODULE V　　VIRTUALIZATION　　　　　　　　　　　　　6

Virtualization technology Overview - Virtual Machines Provisioning and Manageability - Virtual Machine Migration Services - VM Provisioning and Migration in Action, VM Life Cycle and VM Monitoring. Amazon Elastic Compute Cloud, Eucalyptus, VM Dynamic Management Using Open Nebula, Aneka.

MODULE VI　　CLOUD SECURITY AND CHALLENGES　　　　7

Cloud security fundamentals-Vulnerability assessment tool for cloud- Privacy and Security in cloud-Cloud computing security architecture - Trusted Cloud computing, Secure Execution Environments - Identity Management and Access control- Issues in cloud computing-Implementing real time application over cloud platform- QoS Issues in Cloud – Load Balancing.

Total Hours: 45

TEXT BOOKS:

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw-Hill, 2010.

2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, "Cloud Computing Principles and Paradigms", John Wiley & Sons, Inc Publications, 2011

3. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, "Cloud Computing for Dummies", 2010.

REFERENCES:

1. Kai Hwang, Fox and Dongarra, Morgan Kaufmann, "Distributed and Cloud Computing", 1st Edition, Elseiver, 2012.

2. Scott Granneman, "Google Apps Deciphered: Compute in the cloud to streamline your desktop", Pearson Education, 2009.

3. Tim Malhar, S.Kumaraswammy, S.Latif, "Cloud Security & Privacy", SPD, O"REILLY 2009.

4. Anthony T Velte, "Cloud Computing: A Practical Approach", Mc Graw Hill, 2009.

OUTCOMES:

On completion of the course students will be able to:
- Discuss the core concepts of cloud computing paradigm.
- Analyze services, systems, platforms, frameworks to support cloud computing.
- Illustrate the concepts of cloud storage system services.
- Outline the architecture, service level agreements in cloud service provider applications.
- Assess virtualization technology services in open source cloud computing environment.
- Identify cloud security issues to demonstrate real time applications.

ITBX09 **THEORY OF COMPUTATION** **L T P C**
3 0 0 3

OBJECTIVES:

- To provide an understanding of basic concepts in the theory of computation.

- To study Push Down Automata, Turing Machines, Universal Computation, Church-Turing thesis, the halting problem and general undecidability.

- To develop knowledge and the core expertise in Theory of Computation.

- To assess via formal reasoning through computing to solve problems in science and engineering.

MODULE I   AUTOMATA   8

Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

MODULE II   REGULAR EXPRESSIONS AND LANGUAGES   8

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

MODULE III   CONTEXT-FREE GRAMMAR AND LANGUAGES   8

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.

MODULE IV   PROPERTIES OF CONTEXT-FREE LANGUAGES   7

Normal forms for CFG – Pumping Lemma for CFL - Closure Properties of CFL – Decision of Algorithms of CFL.

MODULE V   TURING MACHINES   7

Turing Machines – Programming Techniques for TM, Modification of Turing Machines, Church"s hypothesis, Turing machines as enumerators.

MODULE VI   UNDECIDABILITY   7

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post"s Correspondence Problem

Total Hours: 45

TEXT BOOK:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", 2nd Edition, Pearson Education,2003.

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", 2nd Edition, Pearson Education/PHI, 2003.

2. J.Martin, "Introduction to Languages and the Theory of Computation", 3rd Edition, TMH, 2003.

3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

OUTCOMES:

On completion of the course students will be able to:

- Analyze and design finite automata.
- Discuss and transform regular expressions and grammars.
- Explain about context free grammars and pushdown automata.
- Discuss the properties of context free languages.
- Outline the programming techniques for Turing machine.
- Explain about undecidable problems.

ITBX10   INFORMATION SYSTEM DESIGN   L T P C
                                                                3 0 0 3

OBJECTIVES:

- To know the basics of managing the digital firm.

- To understand the design, development and maintenance of information systems.

- To discuss basic issues in knowledge management and information systems.

- To know the ethical and security issues in information system

MODULE I   MANAGING THE DIGITAL FIRM   9

Why information systems – contemporary approaches to information systems – new role of information systems- major types of systems in organizations – systems from a functional perspective – enterprise applications – organizations and information systems – managers decision making and information systems – information systems and business strategy.

MODULE II   DESIGNING INFORMATION SYSTEMS   9

Systems as planned organizational change – business process re-engineering and process improvement – overview of systems development – alternate system – Building approaches – Understanding the business value of Information Systems - The importance of change management in information system success and failure – Managing Implementation.

MODULE III   DEVELOPMENT AND MAINTENANCE OF   INFORMATION
                SYSTEMS   9

Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off-the shelf software packages – Outsourcing – Comparison of different methodologies.

MODULE IV   KNOWLEDGE MANAGEMENT, ETHICS AND SECURITY   9

Knowledge Management in the organization – Information and Knowledge base systems – Decision -support systems – Understanding ethical and Social issues packed to systems – Ethics in an Information society – The moral dimensions of Information Systems – System vulnerability and abuse – Creating a control environment – Ensuring System Quality.

MODULE V   INFORMATION ARCHITECTURE   9

Defining Information Architecture – why Information Architecture matters – Information Architecture Specialists - Practicing Information Architecture in the Real world –Information Ecologies – User needs and Behavior – The "Too-Simple" Information Model – Information Needs – Information Seeking Behaviors.

MODULE VI   BASIC PRINCIPLES Of INFORMATION   ARCHITECTURE   9

The anatomy of Information Architecture – Visualizing Information Architecture– Information Architecture Components - Organizing Systems – Challenges of Organizing Information – Organization Schemes_ Organization Structures – Creating Cohesive Organization Systems - Search Systems – Basic Search System Anatomy – Search Algorithms.

Total Hours: 45

TEXT BOOKS:

1. Lauaon Kenneth & Landon Jane, "Management Information Systems: Managing the Digital firm", 8th edition, PHI, 2004.

2. Uma G. Gupta, "Management Information Systems – A Management Prespective", Galgotia publications Pvt. Ltd., 1998.

3. Louis Rosenfel and Peter Morville, "Information Architecture for the World Wide Web", O'Reilly Associates, 2002.

OUTCOMES:

On completion of the course students will be able to:

- Outline the essential stages in information system development and analyze the role of information systems in organization.

- Design suitable models for information system requirements analysis.

- Develop a small scale information system.

- Apply the ethical and security issues in information system.

- Compare the real world needs with existing information system.

- Design and evaluate the information architecture.

ITBX12   **L T P C**

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ADHOC NETWORKS   **3 0 0 3**

</div>

OBJECTIVES:

- To know the difference between wired and adhoc networks.

- To gain the knowledge about the applications of adhoc networks.

- To learn about the proactive and reactive protocols.

- To realize the importance of hybrid and hierarchical protocols.

MODULE I   INTRODUCTION   8

Model of Operation. symmetric Links. Layer-2 Ad Hoc Solutions. Proactive versus Reactive Protocols. Multicast. Commercial Applications of Ad Hoc Networking. Conferencing. Home Networking. Emergency Services. Personal Area Networks and Bluetooth. Embedded Computing Applications. Technical and Market Factors Affecting Ad Hoc Networks. Scalability. Power Budget versus Latency. Protocol Deployment and Incompatible Standards.

MODULE II   CHANNEL ALLOCATION   8

Channel allocation methods –802.11 WLAN – MACA – MACAW – MACABI – CSMA – TSMA.

MODULE III   DSDV: DESTINATION SEQUENCED DISTANCE   VECTOR PROTOCOL   7

Introduction. Overview of Routing Methods. Link-State. Distance-Vector. Destination-Sequenced Distance Vector Protocol. Protocol Overview. Route Advertisements. Route Table Entry Structure. Responding to Topology Changes. Route Selection Criteria. Operating DSDV at Layer 2. Extending Base Station Coverage. Performance evaluation using simulators.

MODULE IV   DSR : DYNAMIC SOURCE ROUTING PROTOCOL   FOR MULTI HOP WIRELESS   7

Ad Hoc Networks Assumptions. DSR Protocol Description — Overview and Important Properties. DSR Route Discovery. DSR Route Maintenance. Additional Route Discovery Features. Additional Route Maintenance Features. Support for Heterogeneous Networks and Mobile IP. Multicast Routing with DSR. Location of DSR Functions in the ISO Network Reference Model. Performance evaluation using simulators.

MODULE V AODV: AD HOC ON-DEMAND DISTANCE-VECTOR PROTOCOL 7

AODV Properties. Unicast Route Establishment. Route Discovery. Expanding Ring Search. Forward Path Setup. Route Maintenance. Local Connectivity Management. Multicast Route Establishment. Route Discovery. Forward Path Setup. Multicast Route Activation/Deactivation. Multicast Tree Maintenance. Performance evaluation using simulators.

MODULE VI HYBRID AND HIERARCHICAL ROUTING PROTOCOLS 8

ZRP: A Hybrid Framework for Routing in Ad Hoc Networks. The Zone Routing Protocol. ZRP – Formal Description. Hiearchical based Routing – Hierarchical State Routing Protocol, Fisheye Routing Protocol.

Total Hours: 45

TEXT BOOKS:

1. Charles E. Perkins, "Ad Hoc Networking", Addison Wesley, December 2000.
2. C. Siva Ram Murthy, B.S. Manoj, "Adhoc Wireless Networks", Prentice Hall, 2004.

REFERENCES:

1. C.K. Toh, "Adhoc Mobile Wireless Networks: Protocols and Systems", Pearson Education, 2009.
2. Elizabeth M.Royer and C.K.Toh, "A Review of Current Routing Protocols for Mobile Adhoc Networks", IEEE Personal Communications, April 1999.

OUTCOMES:

On completion of the course students will be able to:

- Acquaint the basic knowledge of adhoc networks.
- Analyze the various channel allocation algorithms used in MAC layer.
- Explain the DSDV, DSR and AODV protocols.
- Compare the performance of DSDV, DSR and AODV protocols and implement any one protocol using simulator.
- Identify the difference between the protocols & practical issues.
- Evaluate the ZRP and Fisheye Routing Protocol.

ITBX22   **XML AND WEB SERVICES**   **L T P C**
                                                   3 0 0 3

OBJECTIVES:

- To learn the XML based standards for creating XML application.
- To understand the architecture of web services and its underlying infrastructure.
- To gain knowledge about SOAP, WSDL and UDDI.
- To learn the components of e-business XML systems.
- To apply the concept of semantic web in content management.

MODULE I   XML TECHNOLOGY FAMILY   8

XML – benefits – Advantages of XML over HTML, Databases – XML based standards – Structuring with schemas - DTD – XML Schemas – XML processing – DOM – SAX – presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT –XPATH – XQuery

MODULE II   MOTIVATIONS FOR WEB SERVICES   7

Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service-oriented Architecture (SOA).

MODULE III   ARCHITECTING WEB SERVICES   7

Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

MODULE IV   WEB SERVICES BUILDING BLOCKS   7

Transport protocols for web services – messaging with web services - protocols - SOAP - describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad-Hoc Discovery - Securing web services.

MODULE V   IMPLEMENTING XML IN E-BUSINESS   8

B2B – B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – RosettaNet - Applied XML in vertical industry – web services for mobile devices.

MODULE VI   XML CONTENT MANAGEMENT AND   SECURITY   8

Semantic Web – Role of Meta data in web content - Resource   Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL .

Total Hours: 45

TEXT BOOKS:

1.   Ron Schmelzer et al., "XML and Web Services", Pearson Education, 2002.

2.   Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCES:

1.   Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.

2.   David Chappell, "Understanding .NET A Tutorial and Analysis", Addison Wesley, 2002.

3.   Kennard Scibner and Mark C.Stiver, "Understanding SOAP", SAMS publishing.

4.   Alexander Nakhimovsky and Tom Myers, "XML Programming: Web Applications and Web Services with JSP and ASP", Apress, 2002.

OUTCOMES:

On completion of the course students will be able to:

- Create, validate and parse XML documents.
- Analyze the B2B and B2C real world applications.
- Explain the logical and deployment view of web service technology stack.
- Use SOAP, WSDL and UDDI for creation of a web service.
- Discuss the role of web services in commercial applications.
- Identify the role of semantic web in content management systems.

ITBX24 **GRAPH THEORY** **L T P C**
                                        3 0 0 3

OBJECTIVES:

In this course, students will learn to:

•   Appreciate and develop facility with mathematical structures.

•   Connect the different representations and properties of graphs and develop facility in their use in algorithms.

•   Write graph-theoretic proofs by studying existing proofs.

•   Understand the place of graph theory in the larger structure of discrete mathematics.

•   Understand the foundations of Computer Science and appreciate some of its theoretical and applied uses.

•   Represent graphs as data structures, and develop graph algorithms for classical problems in graph theory.

•   Implement many of the standard algorithms of graph theory;

•   Prove simple results in graph theory.

MODULE I   INTRODUCTION   **8**

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler Graphs – Hamiltonian Paths and Circuits – Trees – Properties of trees – Distance and Centers in Tree – Rooted and Binary Trees.

MODULE II   TREES, CONNECTIVITY, PLANARITY   **8**

Spanning trees – Fundamental Circuits – Spanning Trees in a Weighted Graph – Cut Sets – Properties of Cut Set – All Cut Sets – Fundamental Circuits and Cut Sets – Connectivity and Separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and Geometric Graphs – Planer Graphs – Different Representation of a Planer Graph.

MODULE III   MATRICES, COLOURING AND DIRECTED GRAPH   **8**

Incidence matrix – Submatrices – Circuit Matrix – Path Matrix – Adjacency Matrix – Chromatic Number – Chromatic partitioning – Chromatic polynomial

– Matching – Covering – Four Color Problem. Directed Graphs – Types of Directed Graphs – Digraphs and Binary Relations – Directed Paths and Connectedness – Euler Graphs – Adjacency Matrix of a Digraph.

MODULE IV   DIRECTED GRAPH AND ALGORITHMS   8

Directed Graphs – Types of Directed Graphs –Digraphs and Binary Relations – Directed Paths and Connectedness – Euler Graphs –Adjacency Matrix of a Digraph.Algorithms: Connectedness and Components – Spanning tree – Finding all SpanningTrees of a Graph – Set of Fundamental Circuits – Cut Vertices and Separability –Directed Circuits.

MODULE V   ALGORITHMS   5

Algorithms: Shortest Path Algorithm – DFS – Planarity Testing – Isomorphism.

MODULE VI   APPLICATIONS   8

The Cantor-Schröder-Bernstein Theorem - Fermat"s (Little) Theorem - The Nielson-Schreier Theorem - The SNP Assembly Problem - Computer Network Security - The Timetabling Problem - Map Coloring and GSM Mobile Phone Networks - Knight"s Tours.

Total Hours: 45

TEXT BOOKS:

1.   Ashay Dharwadker and Shariefuddin Pirzada, "Applications of Graph Theory", 2nd Edition, 2011.

2.   Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.

REFERENCE:

1.   R.J. Wilson, "Introduction to Graph Theory", 4th Edition, Pearson Education, 2003.

ITBX28   **C # AND .NET FRAMEWORK**   **L   T   P   C**
                                               3   0   0   3

OBJECTIVES:

- To understand the concepts and elementary use of .NET and the .NET library.

- To understand the syntax and use of C# as a development tool.

- To be able to use C# in desktop and web application development.

- To have a working knowledge of newer technologies such as LINQ and WPF.

MODULE I   INTRODUCTION TO C#   8

Understanding .NET - Overview of C# - Literals – Variables - Data Types – Operators - Expressions – Branching – Looping – Methods – Arrays – Strings-Structures and Enumerations.

MODULE II   OBJECT ORIENTED ASPECTS OF C#   9

Classes – Objects – Inheritance – Polymorphism – Interfaces - Operator Overloading-Delegates – Events - Errors and Exceptions.

MODULE III   APPLICATION DEVELOPMENT ON .NET   8

Building Windows Applications - Accessing Data with ADO.NET - XML and ADO.Net – Simple and Complex Data Binding – Data Grid View Class.

MODULE IV   WEB BASED APPLICATION DEVELOPMENT ON .NET   8

Programming Web Applications with Web Forms - .Net Coding Design Guidelines – Security – Application Development.

MODULE V   THE CLR AND THE .NET FRAMEWORK   6

Assemblies – Versioning – Attributes – Reflection - Viewing Metadata - Type Discovery - Reflecting on a Type – Marshaling – Remoting - Understanding Server Object Types - Specifying a Server with Interface – Thread Operation – Synchronization.

MODULE VI   BUILDING WEBSERVICES USING .NET   6

Building a Server - Building the Client - Programming Web services – Web Service Client – WSDL and SOAP – Web Services with complex Data types. - XML web services using ASP.Net.

                                                        Total Hours: 45

TEXT BOOKS:

1.   E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.

2.   J. Liberty, "Programming C#", 2nd Edition, O'Reilly, 2002.

REFERENCES:

1.   Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.

2.   Robinson et al, "Professional C#", 2nd Edition, Wrox Press, 2002.

3.   Andrew Troelsen, "C# and the .NET Platform", 2003.

4.   S. Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

OUTCOMES:

On completion of the course students will be able to:

•   Outline the concepts of .NET Framework and C#.

•   Apply C# inheritance, interfaces, delegates and events.

•   Use appropriate data sources and data adapters for C# applications.

•   Apply and demonstrate Windows Forms.

•   Analyze Common Language Runtime (CLR), garbage collection and assemblies.

•   Build interactive web applications using ASP.NET and C#.

ITBX29   CRYPTOGRAPHY AND NETWORK SECURITY   L T P C
                                                    3 0 0 3

Course Objective

- To understand OSI security architecture and classical encryption techniques.
- To know the methods of conventional encryption, concepts of public key encryption and number theory.
- To describe the principles of public key cryptosystems, hash functions and digital signature.
- Understand Encryption Techniques, key Generation Techniques, authentication and Security Measures.
- To know the network security tools and applications.
- To understand the system level security used.

MODULE I   SYMMETRIC KEY CRYPTOGRAPHY   9
OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality- Key Distribution - Random Number Generation.

MODULE II   PUBLIC KEY CRYPTOGRAPHY   8
Principles of Public Key Cryptosystems – RSA algorithm - Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory

MODULE III   AUTHENTICATION AND HASH FUNCTION   8
Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard

MODULE IV   NETWORK SECURITY   7
Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

MODULE V   SYSTEM LEVEL SECURITY   7
Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles –

MODULE VI   APPLICATION   7
Trusted Systems. Case study on secured key Generation & Breaking Techniques.
                                                    TOTAL : 45

TEXT BOOK:

1. William Stallings, 'Cryptography and Network Security – Principles and
   Practices', Prentice Hall of India, Third Edition, 2003.

REFERENCES:

1. Atul Kahate, 'Cryptography and Network Security', Tata McGraw-Hill, 2003.
2. Bruce Schneier, 'Applied Cryptography', John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, 'Security in Computing', Third
   Edition, Pearson Education, 2003.

OUTCOMES:

 On completion of the course students will be able to:

- Explain the classical and modern symmetric encryption techniques.
- Outline the various asymmetric encryption techniques.
- Analyze the different authentication algorithms.
- Discuss the security mechanisms used for real time applications.
- Analyze how the network is secured using IDS and Firewall.
- Prepare a case study using cryptographic techniques for real time application.

ITBX05   **SERVICE ORIENTED ARCHITECTURE**   L T P C
                                                      3 0 0 3

OBJECTIVES:
- To gain understanding of the basic principles of service orientation.
- To learn service oriented analysis and coordination techniques.
- To use the concepts of SOAP and WSDL for designing applications.
- To learn technologies underlying the design of web services.
- To know about various WS-* specification standards

MODULE I   **8**

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate -Principles of service orientation.

MODULE II   **8**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration –Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer.

MODULE III   **8**

Service oriented analysis – Business-centric SOA – Deriving business services- servicemodeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design– Application service design – Task centric business servicedesign.

MODULE IV   **9**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

MODULE V   **6**

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WSSecurity.

Transaction processing – paradigm – protocols and coordination – transaction specifications – SOA in mobile – research issues.

Total Hours: 45

REFERENCES:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.

2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.

3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services-An Architect"s Guide", Pearson Education, 2005.

4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation", 1st Edition, O'Reilly, 2006.

5. Shankar Kambhampaly, "Service–Oriented Architecture for Enterprise Applications", Wiley India Pvt Ltd, 2008.

6. Mark O'Neill, et al. , "Web Services Security", Tata McGraw-Hill , 2003

OUTCOMES:

On completion of the course students will be able to:

• Compare SOA with other internet architectures.

• Discuss about coordination, orchestration and choreography in service layers.

• Design a web service using SOAP and WSDL.

• Use of Java APIs to support SOA based applications.

• Explain the various WS-* specification standards.

• Identify the research issues in SOA.

ITBX07 **PERVASIVE COMPUTING** **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To know about the applications of pervasive computing.

- To understand the use of pervasive computing on web applications.

- To gain knowledge about PDA"s using pervasive computing.

- To learn the user interface issues in pervasive computing.

MODULE I   INTRODUCTION   7

Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols.

MODULE II   WEB APPLICATION CONCEPTS   8

Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security - Wireless Mark-Up language (WML) – Introduction.

MODULE III   VOICE TECHNOLOGY   7

Voice Enabling Pervasive Computing - Voice Standards - Speech Applications in Pervasive Computing and security.

MODULE IV   PERSONAL DIGITAL ASSISTANTS   8

PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture.

MODULE V   USER INTERFACE ISSUES   7

User Interface Issues in Pervasive Computing, Architecture - Smart Card-based Authentication Mechanisms - Wearable computing Architecture.

MODULE VI PERVASIVE WEB APPLICATION ARCHITECTURE   8

Introduction - scalability and availability - Development of Pervasive computing Web Applications - Pervasive application architecture. Example application – User interface overview – Architecture – Implementation.

Total Hours: 45

TEXT BOOKS:

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff. "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addision Wesley, Reading, 2002.

2. Uwe Hansman, Lothat Merk, Martin S Nicklous & Thomas Stober, "Principles of Mobile Computing", 2nd Edition, Springer- Verlag, New Delhi, 2003.

REFERENCES:

1. Rahul Banerjee, "Internetworking Technologies: An Engineering Perspective", Prentice –Hall of India, New Delhi, 2003. (ISBN 81-203-2185-5).

2. Rahul Banerjee, "Lecture Notes in Pervasive Computing", Outline Notes, BITS-Pilani, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Outline the basics of pervasive computing device technologies.
- Identify the protocols used in pervasive computing.
- Assess the voice standards and applications in pervasive computing.
- Compile the characteristics of PDA devices.
- Discuss various user interface issues in pervasive computing.
- Develop a Pervasive computing Web Application.

ITBX08   **DATA WAREHOUSING AND DATA MINING**   **L T P C**
                                                       3 0 0 3

OBJECTIVES:

- To introduce the concept of data mining with a detail coverage of basic tasks, metrics, issues and implication.

- To explain core topics like classification, clustering and association rules are exhaustively dealt with.

- To introduce the concept of data warehousing with special emphasis on architecture and design.

MODULE I   INTRODUCTION TO DATA WAREHOUSING   8

Introduction - Data Warehouse - Multidimensional Data Model - Data Warehouse Architecture - Implementation - Further Development - Data Warehousing to Data Mining

MODULE II   DATA PREPROCESSING, LANGUAGE, ARCHITECTURES, CONCEPT DESCRIPTION   9

Why Preprocessing – Cleaning – Integration – Transformation – Reduction – Discretization – Concept Hierarchy generation – Data mining primitives – Query language – Graphical User Interfaces – Architectures – Concept Description – Data Generalization – Characterizations – Class comparisons – Descriptive statistical measures

MODULE III ASSOCIATION RULES   8

Association Rule Mining – Single dimensional Boolean association rules from transactional databases – Multi-level Association rules from transaction databases.

MODULE IV CLASSIFICATION AND CLUSTERING   8

Classification and Predication – Issues – Decision tree induction – Bayesian Classification – Association Rule based – Other Classification methods – Prediction – Classifier Accuracy – Cluster Analysis – Types of data – Categorization of methods – Partitioning methods – Outlier Analysis

MODULE V   MINING COMPLEX TYPES OF DATA   6

Multidimensional analysis and descriptive mining of complex data objects – mining spatial databases – mining multimedia databases – mining text databases – mining the World Wide Web

MODULE VI APPLICATIONS AND TRENDS IN DATA MINING 6

Data mining applications – Data mining system products and research prototypes – Additional themes on data mining – Social impacts of data mining – Trends in data mining

Total Hours: 45

TEXT BOOK:

1. J.Han, M.Kamber, "Data Mining: Concepts and Techniques", Academic Press 2001.

REFERENCES:

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2004.
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education, 2003.
3. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data mining", PHI, 2004.
4. W.H.Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.
5. Alex Bezon, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", McGraw Hill Edition, 2001.
6. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley-Interscience Publication, 2003.

OUTCOMES

On completion of the course students will be able to:

- Design a data warehouse for an organization.
- Apply data mining pre processing techniques for a data set.
- Identify the frequent item set using association rule mining.
- Design and deploy appropriate classification techniques.
- Use data mining techniques for complex data types.
- Select an appropriate data mining tool for an application.

ITBX11   SOFTWARE QUALITY MANAGEMENT   L T P C
3 0 0 3

OBJECTIVES:

The objective of this course is to enable the students:

- To understand the fundamental concepts of quality management.

- To acquire the knowledge of understanding the "widely-used" quality analysis tools and techniques.

- To have the exposure about software quality assurance, quality measures, and quality control.

- To introduce philosophies and strategies to quality related issues.

MODULE I   SOFTWARE QUALITY ASSURANCE   7

What Is Software Quality – Assuring Software Quality Assurance – Software Quality Assurance Planning – Fundamentals Of Measurement Theory – Software Quality Metrics Overview

MODULE II   SOFTWARE QUALITY MEASUREMENTS   7

Applying The Seven Basic Quality Tools In Software Development – Selecting Quality Goals And Measures – Principles Of Measurement – Measures And Metrics – Quality Function Deployment – Measuring And Analyzing Customer Satisfaction.

MODULE III   SOFTWARE QUALITY MANAGEMENT MODELS   8

Quality Management Systems – A Historical Perspective, A QMS For Software – Quality Management Systems – The ISO 9000 Series Of Quality Management Standards – Models And Standards For Process Improvement – Dos And Don"ts Of Software Process Improvement.

MODULE IV   SOFTWARE QUALITY METRICS   8

Product Quality Metrics: Defect Density-Customer Problems Metric-CustomerSatisfaction Metrics-Function Points- In-Process Quality Metrics: Defect Arrival Pattern-Phase-Based Defect Removal Pattern- Defect Removal Effectiveness-Metrics for Software Maintenance: Backlog Management Index-Fix Response Time- Fix Quality-Software Quality Indicators.

MODULE V   SOFTWARE MANAGEMENT RENAISSANCE   7

Conventional Software Management – Evolution Of Software Economics – Improving Software Economics – The Old And The New.

MODULE VI SOFTWARE MANAGEMENT PROCESS FRAMEWORK & DISCIPLINE   8

Life Cycle Process – Model Based Software Architectures – Workflow Of The Process – Checkpoint Of The Process – Iterative Process Planning – Project Organizations And Responsibilities – Process Automation.

Total Hours: 45

REFERENCES:

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", 3rd Edition, Artech House Publishers, 2007.

2. R.A. Khan, K.Mustafa, S.I. Ahson, "Software Quality Concepts and Practices", Narosa Publication, 2006.

3. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson Edition, India, 2004.

4. Alan C. Gillies, "Software Quality Theory and Management", 2nd Edition, Thomson Press, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Outline the software quality assurance and fundamentals of software quality metrics

- Measure the software quality based on measurement theory using quality tools.

- Prepare quality models and explain software quality standards to improve the software process.

- Identify software process and product quality metrics.

- Outline how to improve software economy.

- Discuss the software management process framework.

ITBX18   ENTERPRISE RESOURCE PLANNING   L T P C
                                                          3 0 0 3

OBJECTIVES:

•   To understand the key implementation issues.

•   To know the business modules and appreciate the current and future trends.

•   To be aware of some popular products available in market.

MODULE I   INTRODUCTION   8

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM.

MODULE II   ERP IMPLEMENTATION   8

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring.

MODULE III   ERP IN ACTION   7

After ERP Implementation, Operation and Maintenance of the ERP System, Measuring the Performance of the ERP System, Maximizing the ERP System.

MODULE IV   THE BUSINESS MODULES   7

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

MODULE V   THE ERP MARKET   8

ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA.

MODULE VI   ERP – PRESENT AND FUTURE   7

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions.

TEXT BOOK:

1.   Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000.

REFERENCES:

1.   Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003.
2.   Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning",Thompson Course Technology, USA, 2001.

OUTCOMES:

 On completion of the course students will be able to:

- Outline the basics of Enterprise resource planning and related technologies.
- Identify the requirements to implement ERP.
- Assess the Operation and Maintenance of ERP System.
- Discuss the various business processes in ERP.
- Describe various commercial software providers.
- Analyze present and future status of ERP.

ITBX19   **KNOWLEDGE BASED DECISION**   **L T P C**
                 SUPPORT SYSTEM   **3 0 0 3**

OBJECTIVES:

• To become familiar with the theoretical perspectives of knowledge creation, knowledge transfer, knowledge sharing, and knowledge leadership roles and skills.

• To understand how the study of communication relates to knowledge development and knowledge sharing in organizations.

• To read about and discuss the relationship between knowledge management and a learning organization, Development of support system Methods of managing knowledge Intelligent decision system development.

MODULE I   INTRODUCTION   7

Decision making, Systems, Modeling, and support - Introduction and Definition - Systems - Models - Modeling process - Decision making: The intelligence phase - The design phase - The choice phase - Evaluation: The implementation phase -Alternative Decision - Making models - Decision support systems - Decision makers - Case applications.

MODULE II   DECISION SUPPORT SYSTEM DEVELOPMENT   8

Decision Support System Development: Introduction - Life cycle - Methodologies - prototype - Technology Levels and Tools - Development platforms - Tool selection - Developing DSS. Enterprise systems: Concepts and Definition - Evolution of information systems - Information needs - Characteristics and capabilities – Comparing and Integrating EIS and DSS - EIS data access, Data Warehouse, OLAP, Multidimensional analysis, Presentation and the web - Including soft information enterprise on systems- Organizational DSS - supply and value chains and decision support - supply chain problems and solutions - computerized systems MRP, ERP, SCM - frontline decision support systems.

MODULE III KNOWLEDGE MANAGEMENT   8

Introduction - Organizational learning and memory - Knowledge management -Development -methods, Technologies, and Tools - success -Knowledge management and Artificial intelligence - Electronic document management.

Knowledge acquisition and validation: Knowledge engineering - Scope - Acquisition methods - Interviews - Tracking methods - Observation and other methods - Grid analysis - Machine Learning: Rule induction, case-based reasoning - Neural computing - Intelligent agents - Selection of an appropriate knowledge acquisition methods - Multiple experts - Validation and verification of the knowledge base - Analysis, coding, documenting, and diagramming - Numeric and documented knowledge acquisition - Knowledge acquisition and the Internet/Intranets.

MODULE IV KNOWLEDGE REPRESENTATION AND INFERENCE TECHNIQUES   8

Knowledge representation: Introduction - Representation in logic and other schemas - Semantic networks - Production rules - Frames - Multiple knowledge representation - Experimental knowledge representations - Representing uncertainty.Inference Techniques: Reasoning in artificial intelligence - Inference with rules: The Inference tree - Inference with frames- Model-based and case- based reasoning - Explanation and Meta knowledge- Inference with uncertainty - Representing uncertainty - Probabilities and related approaches - Theory of certainty - Approximate reasoning using fuzzy logic.

MODULE V   INTELLIGENT SYSTEM DEVELOPMENT   7

Intelligent Systems Development: Prototyping: Project Initialization – System analysis and design - Software classification: Building expert systems with tools - Shells and environments - Software selection - Hardware -Rapid prototyping and a demonstration prototype - System development - Implementation - Post implementation.

MODULE VI MANAGEMENT SUPPORT SYSTEMS   7

Implementing and integrating management support systems - Implementation: The major issues - Strategies - System integration – Generic models MSS, DSS, ES - Integrating EIS, DSS and ES, and global integration - Intelligent DSS - Intelligent modeling and model management – Examples of integrated systems - Problems and issues in integration. Impacts of Management Support Systems - Introduction - overview - Organizational structure and related areas - MSS support to business process reengineering - Personnel management issues - Impact on individuals - Productivity, quality, and competitiveness - decision making and the manager manager"s

job - Issues of legality, privacy, and ethics - Intelligent systems and employment levels - Internet communication - other societal impacts - managerial implications and social responsibilities .

Total Hours: 45

TEXT BOOK:

1. Efrain Turban, Jay Aaronson, "Decision Support Systems and Intelligent Systems", 6th Edition, Pearson Education, 2001.

REFERENCES:

1. Ganesh Natarajan, Sandhya Shekhar, "Knowledge management – Enabling Business Growth", Tata McGraw Hill, 2002.

2. George M.Marakas, "Decision Support System", Prentice Hall, India, 2003.

3. Efrem A.Mallach, "Decision Support and Data Warehouse Systems", Tata McGraw-Hill, 2002.

OUTCOMES:

On completion of the course students will be able to:

* Outline the relationship between business information needs and decision making

* Explain the development of decision support systems.

* Discuss the role of knowledge management.

* Identify the various knowledge representation and inference techniques.

* Analyze the working of an intelligent system development.

* Evaluate the function of management support systems.

ITBX20   **ELECTRONICS COMMERCE**   **L T P C**
                                                  3 0 0 3

OBJECTIVIES:

- To understand Ecommerce and to understand how Ecommerce is affecting business enterprise, consumers and people.

- To have an awareness about different types of ecommerce websites and different modes of payments.

- To have an awareness about security and legal issues in ecommerce.

MODULE I   **8**

Introduction – Electronic Commerce Framework – The Anatomy of E-Commerce Applications. The Network Infrastructure for E-Commerce, The Internet as a Network Infrastructure.

MODULE II   **8**

Electronic Payment Systems, Interorganizational Commerce and EDI, EDI Implementation, MIME and Value – added Networks.

MODULE III   **8**

Advertising and Marketing on the Internet, Computer Based Education and Training, Technological Components of Education on-Demand, Digital Copy rights and Electronic Commerce, Software Agent.

MODULE IV   **8**

The Corporate Digital Library – Dimensions of Internal Electronics Commerce Systems, Making a Business case for a document Library, Types of Digital documents, Issues behind document Infrastructure, Corporate data warehouses, Documents Active / Compound document architecture.

MODULE V   **8**

Structured Documents-Structured Document Fundamentals-Document Interchange Representations-Separating Logical Structure from Physical Structure-Document Markup-Document Markup Languages.

MODULE VI **5**

Multimedia and Digital Video – Broad band Telecommunications – Mobile and Wireless Computing Fundamentals.

Total Hours: 45

TEXT BOOK:

1. Kalakota & Whinston, "Frontiers of Electronic Commerce", Pearson Education, 2002.

REFERENCES:

1. Kamalesh K. Bajaj, "E-Commerce: The Cutting Edge & Business", Tata McGraw-Hill, 2003.

2. Brenda Kennan, "Managing your E-Commerce Business", Prentice Hall of India, 2001.

3. Elias M. Awad, "Electronic Commerce from Vision to Fulfillment", Prentice Hall of India, 2003.

4. Bharat Bhaskar, "Electronic Commerce – Framework, Technology and Application", TMH, 2003.

5. Effy Oz, "Foundations of E-Commerce", Prentice Hall of India, 2001.

6. Jim A Carter, "Developing E-Commerce Systems", Prentice Hall of India, 2001.

OUTCOMES:

On completion of the course students will be able to:

*   Outline the principles of E-Commerce and World Wide Web.
*   Apply the concepts of electronic data interchange in payment systems.
*   Design Ecommerce websites.
*   Analyze ecommerce mechanisms and driving forces.
*   Identify the critical building blocks of Ecommerce.
*   Describe Internet trading relationships .

ITBX21   WEB COLLABORATION AND TECHNOLOGY   **L T P C**
                                                                   3 0 0 3

OBJECTIVES:

• To have current knowledge about the collaborative and interactive web.

• To describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address

• To demonstrate techniques for improving the accessibility of JavaScript Webpage.

• To demonstrate server side programming with semantic web implications.

MODULE I   INTRODUCTION   8

History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, and IMAP. Introduction to JAVA Scripts – Object Based Scripting for the web. Structures – Functions – Arrays – Objects – Jquery implementation of JavaScript.

MODULE II   DYNAMIC HTML   7

Introduction – Object reference - Collectors all and Children. Dynamic style - Dynamic positioning - Event Model – Filters –Transitions – Data Binding – Sorting table data – Binding of an Image and table – Cascading Style Sheets – Types and Dynamic Implementation.

MODULE III   TRANSFORMATION OF WEB 1.0 to WEB 2.0 and WEB 3.0   7

Technology Overview, Rich User Experience, User Participation, Dynamic Content, Metadata, Web Standards and scalability, Openness and collective intelligence, Web 1.0 vs. Web 2.0 – Mashups- Semantic Web and its Implications.

MODULE IV   SERVER SIDE PROGRAMMING   8

Three tiers Architecture – Java Servlets – Architecture Overview – Generating Dynamic Content – Life cycle – JSP - Applications – Introduction to JSF- Java struts - Data base Connectivity- Open source Languages - Introduction to PHP and MYSQL – WAMP- Web servers – Apache – Nginix.

MODULE V   WEB SERVICES, STANDARDS & SPECIFICATIONS   8

Description Languages, Protocols - REST (Representational State Transfer), SOAP, Collaboration architecture and standards (Enterprise bus), Security, Messaging, Reliability, Transaction, Business Process & Management, Collaboration- SOA.

MODULE VI   RICH INTERNET APPLICATIONS   7

Introduction to Photoshop - Dream weaver – Flash – AJAX – Cloud and RIA - Software as a Service –Applications in SaaS - Impact of RIA on cloud.

Total Hours: 45

TEXT BOOK:

1.   Deitel & Deitel, Goldberg, "Internet and World Wide Web – How to Program", Pearson Education Asia, 2001.

REFERENCES:

1.   Eric Ladd, Jim O'Donnel, "Using HTML 4, XML and JAVA", Prentice Hall of India, 1999.

2.   Aferganatel, "Web Programming: Desktop Management", PHI, 2004.

3.   Ravi Kumar Jain Brajesh Prabhakar, "Wiki - A New Wave in Web Collaboration", Icfai University Press, 2006.

4.   Vivek Chopra, Sing Li, Rupert Jones, Jon Eaves, John T. Bell, "Beginning Java Server Pages", Wrox Publishers, 2005.

5.   Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design"-Prentice Hall, 2006.

6.   Imothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, "Beginning PHP 6, Apache, MySQL 6 Web Development", Wrox Publications, 2009.

OUTCOMES:

On completion of the course students will be able to:

•   Analyze a web page and identify its elements and attributes.

•   Create Web pages dynamically using XHTML and Cascading Style Sheets.

•   Discuss the transformation of Web 1.0 to Web 2.0 and Web 3.0.

•   Build interactive web applications using JSF, PHP and Jquery.

•   Demonstrate secure and reliable web applications using protocols and standards.

•   Create rich internet application using tools.

ITBX23   **USER INTERFACE DESIGN**   **L   T   P   C**
                                                              3   0   0   3

OBJECTIVES:

• To understand the concept of menus, windows, interfaces and business functions.

• To know the various characteristics and components of windows.

• To study about various problems in windows design with color, text, graphics.

MODULE I   **8**

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.

MODULE II   **9**

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

MODULE III   **8**

Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

MODULE IV   **8**

Text for web pages - effective feedback-guidance & assistance-Internationalization-accesssibility-Icons-Image-Multimedia -coloring.

MODULE V   **6**

Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

MODULE VI   **6**

Conceptual Model Evaluation – Design Standards Evaluation –Detailed User Interface Design Evaluation.

Total Hours: 45

REFERENCES:

1. Wilbent. O. Galitz ,"The Essential Guide to User Interface Design", John Wiley& Sons, 2001.

2. Alan Cooper, "The Essential of User Interface Design", Wiley – Dream Tech Ltd., 2002.

3. Sharp, Rogers, Preece, "Interaction Design", Wiley India, 2007.

4. Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.

OUTCOMES:

On completion of the course students will be able to:

• Identify design elements of existing interfaces.

• Use HCI concepts and principles to design and implement a user interface.

• Design a user interface using windows characteristics and controls.

• Apply icons, images, coloring to design a standard web page.

• Outline the different kinds of user interface test.

• Evaluate an interface design.

ITBX25   **TELECOMMUNICATION SYSTEMS**   **L T P C**
                                                           3 0 0 3

OBJECTIVES:

*   To have knowledge about characteristics of Transmission and microwave devices.
*   To study about the fundamentals of satellite communication.
*   To gain brief knowledge about optical communication and advances in telephone systems.
*   To understand the essentials of cellular communication systems.

MODULE I   METHODS OF COMMUNICATION   9

Transmission lines – Types and Characteristics, Antenna Fundamentals – Different types of antennas & their Characteristics, Radio Frequency wave propagation- Microwave –Principles, Devices (Reflex Klystron, Magnetron, TWT)-(Principles Only) Radar - Pulsed Radar - CW Radar (Principles and Block Diagram Only).

MODULE II   INTRODUCTION TO SATELLITE COMMUNICATIONS   6

Satellite orbits- Satellite communication systems –Earth stations- Applications: Surveillance, Navigation, Mobile Communication, TV Broadcast, Satellite Radio, SatelliteTelephone-TheInternet.

MODULE III INTRODUCTION TO FIBER OPTIC COMMUNICATION   6

Light wave communication systems – Fiber structure and function types of Fiber – Optical Transmitter & Receiver –Fiber optic Data communication systems

MODULE IV   TELEPHONE SYSTEM AND ITS APPLICATION   6

Telephones –Telephone system- Facsimile- Cellular telephone system-Paging system –IntegratedservicesDigitalNetworks(ISDN)

MODULE V   CELLULAR RADIO   10

Citizen"s band Radio, Cordless Telephone, Improved Mobile Telephone service (IMTS), Introduction to Advanced Mobile Phone Service (AMPS), GSM – RF channels and time slots – Voice transmission – Frequency Hopping - Subscriber ID module – GSM Privacy and Security – IS-95 CDMA PCS – Channels – Forward Channel – Reverse Channel – Voice Coding – Power Control – Hand-off and CDMA Security.

MODULE VI   SIMULATION METHODOLOGY   8

Introduction, Aspects of methodology, Performance Estimation, Simulation sampling frequency, Low pass equivalent simulation models for band pass signals, Multicarrier signals, Non-linear and time-varying systems, Post processing – Basic graphical techniques and estimations.

TotalHours:45

TEXT BOOKS:

1. William.H.Tranter, K. Sam Shanmugam, Theodore. S. Rappaport, Kurt L. Kosbar, "Principles of Communication Systems Simulation", Pearson Education (Singapore) Pvt. Ltd, 2004.

2. Louis.E.Frenzel, "Communication Electronics – Principles and Application", 3rd Edition, Tata McGraw-Hill, 2002.

3. Roy Blake, "Wireless Communication Technology", Thomson Delmar Learning, 2nd Reprint, 2002.

REFERENCES:

1. Wayne Tomasi, "Electronic Communication systems", 4th Edition, Pearson Education, 2001.

2. Marin Cole, "Introduction to Telecommunications –Voice, Data and Internet", Pearson Education, 2001.

OUTCOMES:

On completion of the course students will be able to:

- Explain digital communication and its application in telecommunication systems.

- Analyze optical fibers, light sources and detectors used in optical fiber communications.

- Discuss the basic operations and characteristics of antenna and waveguides.

- Explain different types of satellite systems and solve basic communication problems in satellite system.
- Discuss basic concept of telephony and switching system.
- Describe the latest technology in telecommunications system.

ITBX13   **DIGITAL IMAGE PROCESSING**   **L   T P C**
                                                                                3   0 0 3

OBJECTIVES:

The course aims to provide understanding of

- The basic principles and concepts in digital image processing

- The application of digital image analysis moving towards image interpretation.

- The techniques and tools for digital image processing, and finally also introduce image analysis techniques in the form of image segmentation.

- To study the image fundamentals and mathematical transforms necessary for image processing.

MODULE I   DIGITAL IMAGE FUNDAMENTALS   7

Digital image fundamentals - Digital Image through scanner, digital camera. Concept of gray levels. Imaging Geometry – Image sampling and quantization Basic relationship between pixels.

MODULE II   DIGITAL IMAGE TRANSFORMS   8

Basic geometric transformations-Introduction to Fourier Transform and DFT , Properties of 2D Fourier Transform , FFT , Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

MODULE III IMAGE ENHANCEMENT TECHNIQUES   7

Spatial Domain methods: Basic grey level transformation, Histogram equalization, Image subtraction, Image averaging, Spatial filtering: Smoothing, sharpening filters, Laplacian filters , Frequency domain filters : Smoothing, Sharpening filters.

MODULE IV IMAGE RESTORATION   7

Model of Image Degradation/restoration process, Noise models , Inverse filtering, Least mean square filtering , Constrained least mean square filtering, Blind image Restoration, Pseudo inverse , Singular value decomposition.

MODULE V   IMAGE COMPRESSION   8

Need for data compression, Lossless compression: Variable length coding, LZW coding, Bit plane coding, predictive coding-DPCM. Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Basics of Vectorquantization.

MODULE VI   IMAGE SEGMENTATION AND REPRESENTATION   8

Edge detection , Thresholding, Region Based segmentation , Boundary representation: chair codes- Polygonal approximation , Boundary segments, boundary descriptors: Simple descriptors-Fourier descriptors, Regional descriptors, Simple descriptors.

Total Hours: 45

REFERENCES:

1.   Rafael C Gonzalez, Richard E Woods, "Digital Image Processing", 2nd Edition, Pearson Education, 2003.

2.   William K Pratt, "Digital Image Processing", John Willey, 2001.

3.   Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, "Image Processing Analysis and Machine Vision", 1999.

4.   A.K. Jain, PHI, "Fundamentals of Digital Image Processing", New Delhi ,1995.

5.   Chanda Dutta Magundar , "Digital Image Processing and Applications", Prentice Hall of India, 2000.

OUTCOMES:

On completion of the course students will be able to:

•   Explain the basic elements and applications of image processing.

•   Create Gray level transformations for Image enhancement .

•   Design and implement two-dimensional spatial filters for image enhancement.

•   Select Wiener filtering for de-blurring and noise removal .

•   Analyze the techniques for image compression and segmentation.

•   Apply digital image analysis techniques and Enhance their criticalthinking skills in digital color images.

ITBX14   **SATELLITE COMMUNICATION**   **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To learn the overview of satellite systems in relation to other terrestrial systems.

- To study various multiplexing and multiple access techniques.

- To study about satellite link design, interference and attenuation.

- To learn satellite navigation, global positioning system and differential GPS.

- To study the various fields of application of satellite communication

MODULE I   ORBITAL MECHANICS AND LAUNCHING METHODS   8

Introduction, Kepler"s laws, Newton"s laws, Orbital parameters, Definitions of Terms for Earth-orbiting Satellites, Orbital perturbations, Station keeping, Geo stationary and Non- geo stationary orbits, Eclipse of Satellite, Calendars- Universal Time, Julian Dates, Sidereal Time. Launch vehicles and propulsion, Launching orbits, Hohmann transfer, Frequency allocation, frequency co-ordination and regulatory services.

MODULE II   SPACE SEGMENT AND SPACE LINK   8

Spacecraft configuration- Methods of stabilization, Satellite subsystems- Communication payload and supporting subsystems: Transponders, Wideband Receiver, Input Demultiplexer, Power Amplifier, Antenna Subsystem, Power Supply, Thermal Control, Attitude Control (AOCS), TT&C Subsystem, Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade– Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density– Input Back Off, Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise. Polarization

MODULE III   SATELLITE ACCESS   8

Modulation and Multiplexing: Voice, data, Video, Analog- Digital transmission system, Digital video Broadcast, Multiple access: FDMA-Pre-assigned FDMA,Demand-Assigned FDMA, SPADE System. TDMA- Reference Burst; Preamble and Post-amble, Carrier recovery, Network synchronization,

unique word detection, Traffic Date, Frame Efficiency and Channel capacity, pre-assigned TDMA, Demand assigned TDMA, Satellite switched TDMA Speech Interpolation and Prediction, Downlink analysis for Digital transmission, CDMA- Direct- Sequence spread spectrum.

MODULE IV   SATELLITE SERVICES AND THE INTERNET   7

code signal c(t) – autocorrelation function for c(t) – Acquisition and tracking – Spectrum spreading and dispreading – CDMA throughput – Problems- Network Layers – TCP Link – Satellite Links and TCP – Enhancing TCP Over Satellite Channels Using Standard Mechanisms (RFC-2488) – Requests for comments– Split TCP connections – Asymmetric Channels – Proposed Systems.

MODULE V   EARTH SEGMENT   7

Introduction, The Sub-satellite Point, Antenna look angles, limits of visibility, Sun transit outages, The Polar Mount Antenna, Transmitters, Power amplifiers (HPA), Receivers, Low noise amplifiers (LNA), Types of Antennas, TT&C systems, Power supplies, Terrestrial Interface, TRVO, MATV, CATV, Test Equipments Measurements on G/T, C/No, EIRP, Antenna gain.

MODULE VI   SATELLITE APPLICATIONS   7

INTELAST Series, INSAT, VSAT, Facsimile system, Weather service, Remote sensing, Mobile satellite services: GSM, GPS, INMARSAT,LEO, MEO, Satellite navigational System, Direct Broadcast Satellite(DBS), Direct to Home Broadcast(DTH), Digital Audio Broadcast(DAB), Business TV(BTV), GRAMSAT, Specialized services: E mail, Video conferencing, Internet.

Total Hours: 45

TEXT BOOK:

1.   Dennis Roddy, "Satellite Communications", 3rd Edition, McGraw-Hill Publication, 2001.

REFERENCES:

1.   Timothy Pratt – Charles Bostian & Jeremy Allmuti, "Satellite Communications", John Willy & Sons (Asia) Pvt. Ltd. 2004

2.   Wilbur L. Pritchars Henri G.Suyder Hond Robert A.Nelson, "Satellite Communication Systems Engineering", 2nd Edition, Pearson Education Ltd., 2003.

3.   M.Richharia, "Satellite Communication Systems", 2nd Edition, McGraw-Hill Telecommunications, 2003.

OUTCOMES:

On completion of the course students will be able to:

- Apply analytical skills and solve elementary problems in electromagnetic antenna theory.

- Discuss the design methodologies for various antenna structures used in mobile and satellite communication systems.

- Identify the commercial requirements and characteristics of antennas.

- Explain the various satellite services.

- Assess and characterize the performance of antennas.

- Outline the various available satellite applications.

ITBX17   **BIO INFORMATICS**   **L T P C**
                                                                   3 0 0 3

OBJECTIVES:

The objective of this course is to enable the students:

- To impart knowledge on basic techniques of Bioinformatics.

- To understand dynamic programming concepts.

- To explore various issues in Information retrieval.

MODULE I   INTRODUCTION   9

Life in Space and Time, Dogmas, Data Archives, WWW, Computers, Biological Classification, Use of Sequences, Protein Structure, Clinical Implications.

MODULE II   GENOME ORGANIZATION   9

Genomics and Proteomics, Eavesdropping on transmission of genetic information, Genomes of prokaryotes, Genomes of Eukaryotes, Human Genome, SNPs, Genetic Diversity, Evolution of Genomes.

MODULE III ARCHIVES AND INFORMATION RETRIEVAL   9

Introduction, The archives, Gateways to Archives.

MODULE IV   ALIGNMENTS AND PHYLOGENETIC TREES   9

Introduction to Sequence Alignment, The dot plot, Dot plots and Sequence Alignments, Measures of Sequence similarity, computing the Alignment, The dynamic programming algorithm, Significance of alignments, multiple sequence alignment, Applications. Phylogeny, Phylogenetic trees.

MODULE V   PROTEIN STRUCTURE   9

Protein Stability and Folding, Applications of Hydrophobicity, Superposition of structures, DALI, Evolution of Protein Structures, Classification of Protein Structures, Protein Structure prediction and modeling, Assignment of protein structures to genomes, Prediction of protein function.

MODULE VI   DRUG DISCOVERY AND PHARMAINFORMATICS   9

Drug discovery and development - target identification and validation - identifying the lead compound - optimization of lead compound - chemical libraries.

TEXT BOOKS:

1. Arthur M Lesk, "Introduction to Bioinformatics", Oxford University Press, India, 2004.

2. S.C. Rastogi & others, "Bioinformatics - Concepts, Skills, and Applications", CBS Publishing, 2003.

3. S. Ignacimuthu, S.J., "Basic Bioinformatics", Narosa Publishing House, 1995.

REFERENCES:

1. T K Attwood, D J parry-Smith, "Introduction to Bioinformatics", 1st Edition, 11th Reprint Pearson Education, 2005.

2. C S V Murthy, "Bioinformatics", 1st Edition, Himalaya Publishing House, 2003.

3. Stephen A. Krawetz, David D. Womble, "Introduction to Bioinformatics A Theoretical and Practical Approach", Humana Press, 2003.

4. Hooman H. Rashidi, Lukas K. Buehler, "Bioinformatics Basics-Applications in Biological Science and Medicine", CRC press, 2005.

OUTCOMES:

On completion of the course students will be able to:

• Explain Sequencing Alignment and Dynamic Programming.

• Perform Sequence Databases.

• Outline Evolutionary Trees and Phylogeny.

Total Hours : 45

ITBX26   **SOFT COMPUTING**   **L T P C**
                                                                              3 0 0 3

OBJECTIVES:
- To become familiar with AI and neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

MODULE I   INTRODUCTION   8

Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning.

MODULE II   INTRODUCTION TO NEURAL NETWROK   8

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb"s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN.

MODULE III   MLP   7

Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA. Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine.

MODULE IV   FUZZY LOGIC   8

Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system: fuzzy propositions, formation,

decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

MODULE V   GENETIC ALGORITHM   7

Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

MODULE VI   APPLICATION OF COMPUTATIONAL INTELLIGENCE   7

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Total Hours: 45

TEXT BOOK:

1.   S.Rajasekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications", PHI Publication, 2002.

REFERENCES:

1.   S.N. Sivanandam & S.N. Deepa, "Principles of Soft Computing", Wiley Publications, 2007
2.   Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3.   N.K.Bose, "Neural Network Fundamentals with Graphs, Algorithms, and Applications" TMH, 1996.
4.   Klir & Yuan, "Fuzzy sets & Fuzzy Logic: Theory & Application", Prentice Hall of India Pub, 1995.
5.   Kosko: "Neural Network & Fuzzy System", PHI Publication, 1992.
6.   Rich E and Knight K, "Artificial Intelligence", TMH, 1991.

OUTCOMES:

On completion of the course students will be able to:

- Describe soft computing techniques and various searching algorithms.
- Apply neutral network to pattern classification and regression problem.
- Outline multi layer perceptron network.
- Explain fuzzy systems.
- Outline the basics of genetic algorithm and analyze its applications and its advancements.
- Discuss the applications of computational intelligence.

GEBX15	CYBER SECURITY	L T P C
		3 0 0 3

OBJECTIVES:

- To understand the basics of Cyber Security Standards and Policies.
- To know the legal, ethical and professional issues in Cyber security.
- To understand Cyber Frauds and Abuse and its Security Measures.
- To know the technological aspects of Cyber Security.

MODULE I   FUNDAMENTALS OF CYBER SECURITY   7

Security problem in computing – Cryptography Basics – History of Encryption – Modern Methods – Legitimate versus Fraudulent Encryption methods – Encryption used in Internet.

MODULE II   CYBERCRIME AND CYBEROFFENSES   8

Cybercrime and Information Security – Cybercriminals – Classifications of Cybercrimes – Email Spoofing – Spamming – Cyber defamation – Internet Time Theft – Forgery – Web jacking – Hacking – Online Frauds – Software Piracy – Mail Bombs – Password Sniffing – Cyberoffenses – Categories – Planning the attacks – Cyberstalking – Cybercafe and Cybercrimes – Botnets.

MODULE III   CYBERCRIME: MOBILE AND WIRELESS DEVICES   8

Proliferation of Mobile and Wireless Devices – Trends in Mobility – Credit card frauds in Mobile and Wireless Computing – Security Challenges – Authentication Service Security – Attacks on Mobile Phones.

MODULE IV   TOOLS AND METHODS USED IN CYBERCRIME   8

Proxy Servers and Anonymizers – Phishing – Password Cracking – Keyloggers and Spywares – Virus and Worms – Trojan Horses and Backdoors – Steganography – DoS and DDoS Attacks.

MODULE V   SECURITY POLICIES   7

Introduction - Defining User Policies – Passwords – Internet Use – Email Usage – Installing/ Uninstalling Software – Instant Messaging – Defining System Administrative Policies – Defining Access Control – Developmental Policies – Standards, Guidelines and Procedures – Basics of Assessing a System.

MODULE VI   COMPUTER FORENSICS   7

General Guidelines – Finding Evidence on the PC - Finding Evidence in System Logs – Windows Logs – Linux Logs – Getting Back Deleted Files – Operating System Utilities – The Windows Registry.

Total Hours: 45

TEXT BOOK:

1. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley, 2011.
2. Chuck Easttom, "Computer Security Fundamentals", 2nd Edition, Pearson Education, 2012.

REFERENCES:

1.   Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 3rd Edition, Pearson Education, 2003.
2.   William Stallings, "Cryptography and Network Security – Principles and Practices", 3rd Edition, Pearson Education, 2003.
3.   Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2000.

OUTCOMES:

Upon completion of this course, students will be able to
1. Explain the general security issues.
2. Discuss various cybercrimes and offenses.
3. Cybercrime in mobile and wireless environment.
4. Use relevant tools and methods in cybercrime
5. Apply security policies in cyber forensics.
6. Outline the strategies adopted in computer forensics.