ANNA UNIVERSITY COIMBATORE

Curriculum & Syllabus – Regulations 2007

Four Year Programme

B. Tech (INFORMATION TECHNOLOGY)

SEMESTER VII

Code No.	Course Title	L	T	P	M	C
THEORY						
	Web Technology	3	0	0	100	3
	Enterprise Computing	3	0	0	100	3
	Principles of Management	3	0	0	100	3
	Elective II	3	0	0	100	3
	Elective III	3	0	0	100	3
PRACTICAL						
	Web Technology Lab	0	0	3	100	2
	Enterprise Computing Lab	0	0	3	100	2

SEMESTER VIII

Code No.	Course Title	L	T	P	M	C
THEORY						
	Cryptography and Network Security	3	1	0	100	4
	Elective IV	3	0	0	100	3
	Elective V	3	0	0	100	3
PRACTICAL						
	Project Work	0	0	12	200	

LIST OF ELECTIVES FOR B.E. INFORMATION TECHNOLOGY

SEMESTER VI

Code No.	Course Title	L	T	P	M	C
	Resource Management Techniques	3	0	0	100	3
	UNIX Internals	3	0	0	100	3
	High Performance Microprocessors	3	0	0	100	3
	Data Warehousing and Mining (Business Intelligence)	3	0	0	100	3
	Visual Programming	3	0	0	100	3
	Mobile Computing	3	0	0	100	3
	Advanced Database	3	0	0	100	3
	Intellectual Property Rights	3	0	0	100	3
	Indian Constitution and Society	3	0	0	100	3

SEMESTER VII

Code No.	Course Title	L	T	P	M	C
	TCP/IP Design and Implementation	3	0	0	100	3
	C# and .NET Framework	3	0	0	100	3
	Pervasive Computing	3	0	0	100	3
	Mainframe Technologies	3	0	0	100	3
	Neural Networks	3	0	0	100	3
	Service Oriented Architecture	3	0	0	100	3
	Grid Computing	3	0	0	100	3
	Advanced JAVA Programming	3	0	2	100	3
	Software Testing	3	0	0	100	3
	Cyber Law and Information Act	3	0	0	100	3

SEMESTER VIII

Code No.	Course Title	L	T	P	M	C
	Parallel Computing	3	0	0	100	3
	Genetic Algorithms and Applications	3	0	0	100	3
	High Speed Networks	3	0	0	100	3
	Digital Image Processing	3	0	0	100	3
	Component Based Technology	3	0	0	100	3
	Software Project Management	3	0	0	100	3
	Cloud Computing	3	0	0	100	3
	Bio Informatics	3	0	0	100	3
	Professional Ethics	3	0	0	100	3
	Embedded Systems	3	0	0	100	3

SEMESTER VII

WEB TECHNOLOGY **3 0 0 100 3**

UNIT I INTRODUCTION WEB SERVICES 8

Web services architecture – overview of web services – service oriented roles and architecture – architectural process – three tier web based architecture

UNIT II XML 10

Introduction to XML – XML fundamentals – well-formed XML documents – components of XML document – XML tools – XML stylesheets – XSL – CSS - XML namespaces- EDI Fact- Message Definition-segments-Mapping-Message Structure and Electronic Enveloping.

UNIT III JAVA WEBSERVICES ARCHITECTURE 9

J2EE and web services-Introduction to JSP and java servlets – servlets – overview of Java server pages

UNIT IV ACTIVE SERVER PAGES 9

HTML and VBScript fundamentals – ASP concepts, using request, response, application, session, server objects – using cookies

UNIT V .NET FRAMEWORK 9

Introducing .NET framework – brief history – building blocks of .NET platform – role of .NET class libraries – understanding CTS, CLR, CLS – deploying .NET – Building C# applications

TOTAL 45

REFERENCES:

1. Rashim Mogha, Preetham.V.V., " Java Web Services Programming", Wiley Dreamtech, New Delhi, 2002.
2. Achyut S Godbole and Atul Kahate, "Web Technologies – TCP/IP Architectures and Java Programming", Second Edition, Tata Mc-Graw Hill Education Pvt., Ltd., New Delhi, 2009
3. E Balagurusamy, "Programming in C#", Second Edition, Tata Mc-Graw hill Publishing Co. Ltd., New Delhi, 2008
4. Deitel ," XML How to Program", first edition, Pearson Education, USA, 2002.
5. Jason Hunter, William Crawford, "Java Servlet Programming", O' Reilly Publications, USA, 1998.

ENTERPRISE COMPUTING **3 0 0 3**

UNIT I ENTERPRISE FOUNDATIONS **9**

Enterprise Architectural overview - object oriented software development for enterprise - Component Based software development for enterprise. Java Enterprise System. Enterprise Data - Basis of JDBC - interfaces -drivers. Advanced JDBC features.

UNIT II DISTRIBUTED ENTERPRISE COMMUNICATIONS ENABLING 9

Distributed Enterprise Communications Basis - RMI Communication - CORBA communication - DCOM Communication – Software Development for RMI Communication

UNIT III SERVICES FOR DISTRIBUTED ENTERPRISE SYSTEMS 9

Naming Services, Directory and Trading services, Activation Services, Message Services, Transaction Services, Security Services and High assurance Enterprise applications.

UNIT IV ENTERPRISE WEB ENABLING **9**

Web Browsers and Web Servers in Enterprise. Web Programming, XML. Java Servlets - Java Server pages.

UNIT V INTEROPERABILITYAND MULTITIER ENTERPRISE COMPUTING **9**

Java Beans, EJB, Enterprise Application Integration, Interoperability between various computing technologies - Tools For Enterprise Computing - Patterns – Frame work

TOTAL 45

REFERENCES :

1. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, " Building Java Enterprise Systems with J2EE", Techmedia , New Delhi, 2000.
2. George Reese, “ Database programming, with JDBC and Java" Second Edition, O’Reiliy Publishers , New Delhi, 2000.
3. Dustin R. Callaway - "Inside Servlets " - Addison Wesley Longman Inc, New Delhi, 2001.
4. Tom Valesky - "Enterprise Java Beans" - Addison Wesley Longman Inc. New Delhi, 2000.
5. Ed Roman - "Mastering EJB" - John Wiley & Sons, New Delhi, 2001.

PRINCIPLES OF MANAGEMENT **3 0 0 100 3**

UNIT I INTRODUCTION **9**

Meaning, Definition and Significance of Management, Basic Functions of Management – Planning, Organizing, Staffing, Directing and Controlling. Engineers and Organizational Environment – Social, Economic, Technological and Political. Social Responsibility of Engineers

UNIT II MANAGEMENT CONCEPTS **9**

MBO, Theory Z, Kaizen, Six Sigma, Quality Circles and TQM. BUSINESS PROCESS REENGINEERING: Need for BPR, Various phases of BPR, Production and Productivity – Factors Influencing Productivity.

UNIT III ORGANIZATIONAL BEHAVIOUR **9**

Significance of OB, Role of leadership, Personality and Motivation. Attitudes, Values and Perceptions at work. INDUSTRIAL AND BUSINESS ORGANIZATION: Growth of Industries (Small Scale, Medium Scale and Large Scale Industries). Forms of Business Organizations. Resource Management – Internal and External Sources.

UNIT III MATERIALS MANAGEMENT **9**

Importance and Scope of Materials Management, Purchase Procedure, Inventory Control and Systems for Inventory Control – ROL, EOQ, MRP, ABC Analysis, VED, FSN and Value Analysis. MARKETING MANAGEMENT: Definition and Approaches to Marketing Management – Marketing Environment. The Marketing Process. Marketing Mix, Advertising, Sales Promotion and Consumer Behavior.

UNIT V HUMAN RESOURCE MANAGEMENT **9**

Importance, Objectives and Functions, Job Analysis and Recruitment, Selection and Placement, Training and Development – Case Discussion. JOB EVALUATION: Meaning and Methods of Job Evaluation. Performance Appraisal – Meaning and Methods of Performance Appraisal. WELFARE IN INDUSTRY: Working condition, service facilities, legal legislation – Factories Act, 1948 and Workmen's Compensation Act.

TOTAL 45

REFERENCES:

1. Harold Koontz, Heinz Weihrich and Ramachandra Aryasri, "Essentials of Management", Eighth Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.
2. Mamoria C B, "Personnel Management", Sultan Chand & Sons, New Delhi, 2002.
3. John W Newstrom, Keith Davis, "Organizational Behavior", Tata McGraw Hill, New Delhi, 2002.
4. Philip Kotler, "Marketing Management", Pearson Education Asia, New Delhi, 2003.
5. Khanna O P, "Industrial Engineering & Management", Dhanpat Rai Publications, New Delhi, 2003

WEB TECHNOLOGY LAB **0 0 3 100 2**

Creating applications using web development tools

1. HTML & VB Script
2. XML - DTD
3. XML - XSL
4. XML - CSS
5. Translating EDIfact document to XML
6. Active Server Pages
7. Java Server Pages
8. Java Servlets
9. .NET Platform
10. C# in .NET Platform

ENTERPRISE COMPUTING LAB **0 0 3 100 2**

Study of multi-tier software environment.
Study of web servers / web browser and Tools for enterprise software development and deployment

1. Develop a package using servlets / JSP.
2. Develop a package using RMI.
3. Develop a package using EJB.
4. Develop a package using JDBC

SEMESTER VIII

CRYPTOGRAPHY AND NETWORK SECURITY 3 1 0 100 4

UNIT I INTRODUCTION 10

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

UNIT II PUBLIC KEY CRYPTOGRAPHY 10

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION 9

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

UNIT IV NETWORK SECURITY 8

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V SYSTEM LEVEL SECURITY 8

Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TUTORIAL 15 LECTURE 45

TOTAL : 60

RFERENCES:

1. Behrouz A Forouzan , “Cryptography and Network Security”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2007.
2. Atul Kahate, ““Cryptography and Network Security”, Second Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009
3. William Stallings, “Cryptography and Network Security, fourth edition, Prentice Hall, New Delhi, 2006
4. Bruce Schneier, “Applied Cryptography”, second edition, John Wiley & Sons, New York, 1996.
5. Chris Brenton, “Mastering Network Security”, BPB Publication, New Delhi, 2002.
6. Steven L Shaffer, Alan R Simon, “Network Security”, AP Professional, New York, 2001.

ELECTIVES – SEMESTER VII

TCP / IP DESIGN AND IMPLEMENTATION 3 0 0 100 3

UNIT I ROUTING 9

Datalink layer protocols**-** Internet Protocol, Header, Routing, Subnetting and Supernetting, ARP and RARP, Internet Control Message Protocol (ICMP), Internet Group Message Protocol (IGMP), IP Routing, Dynamic Routing Protocols, IPV6

UNIT II TRANSPORT LAYER 9

End-to-end issues**-** Flow control- Congestion control- Error control- User Datagram protocol- Transmission Control Protocol- Services and Leader connection Establishment and Termination, Interactive Dataflow, Timeout and Retransmission - SCTP

UNIT II TCP 9

Services – header – connection establishment and termination- interactive data flow- bulk data flow- timeout and retransmission – persist timer - keepalive timer- futures and performance

UNIT IV TCP IMPLEMENTATION I 9

Data structure and input processing – transmission control blocks- segment format- comparison-finite state machine implementation-Output processing- mutual exclusion-computing the TCP data length

UNIT V TCP IMPLEMENTATION II 9

Timers-events and messages- timer process- deleting and inserting timer event- flow control and adaptive retransmission-congestion avoidance and control – urgent data processing and push function.

TOTAL : 45

REFERENCES:

1. Behrouz A.Forouzan, ”TCP/IP Protocol Suite”, second edition, Tata McGraw Hill, New Delhi, 2003.
2. Douglas E.Comer, “Internetworking with TCP/IP, Principles, Protocols and Architecture”, fourth edition, Prentice Hall, New Delhi, 2004.
3. Richard Stevens.W, “Unix Network Programming” , second edition, Prentice Hall, New Delhi, 2001.
4. Richard Stevens, “TCP/IP Illustrated”, Volume 2, Prentice Hall, New Delhi, 2003.

C # AND . NET FRAMEWORK **3 0 0 100 3**

UNIT I INTRODUCTION TO C# ***8***

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

UNIT II OBJECT ORIENTED ASPECTS OF C# **9**

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

UNIT III APPLICATION DEVELOPMENT ON .NET **8**

Building Windows Applications, Accessing Data with ADO.NET.

UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET **8**

Programming Web Applications with Web Forms, Programming Web Services.

UNIT V THE CLR AND THE .NET FRAMEWORK **12**

Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using SingleCall, Threads.

TOTAL : 45

REFERENCES:

1. E. Balagurusamy, “Programming in C#”, Tata McGraw-Hill, 2004.
3. J. Liberty, “Programming C#”, 2nd ed., O’Reilly, 2002.
4. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill, 2004.
5. Robinson et al, “Professional C#”, 2nd ed., Wrox Press, 2002.
6. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 2003.
7. S. Thamarai Selvi, R. Murugesan, “A Textbook on C#”, Pearson Education, 2003.

PERVASIVE COMPUTING **3 0 0 100 3**

UNIT – I PERVASIVE COMPUTING APPLICATION 9

Pervasive Computing devices and Interfaces – Device technology trends, Connecting issues and protocols, pervasive computing principles

UNIT – II PERVASIVE COMPUTING AND WEB BASED APPLICATIONS 9

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

UNIT – III MIDDLEWARE COMPONENTS 9

Programming consumer devices, Smart card programming, messaging components, Database components

UNIT – IV PDA IN PERVASIVE COMPUTING 9

Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture

UNIT – V USER INTERFACE ISSUES IN PERVASIVE COMPUTING 9

Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture

TOTAL 45

REFERENCES

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec, Klaus Rindtorff, “Pervasive Computing Technology and Architecture of Mobile Internet Applications”, Addison Wesley, New Delhi, 2002
2. Uwe Hansman, Lothat Merk, Martin S Nicklous, Thomas Stober, “Pervasive Computing - Handbook”, Springer- Verlag, New Delhi, 2003
3. Uwe Hansman, Lothat Merk, Martin S Nicklous, Thomas Stober, “Principles of Mobile Computing”, Springer- Verlag, New Delhi, 2003

MAIN FRAME TECHNOLOGIES **3 0 0 100 3**

UNIT – I NEW MAINFRAME **9**

Mainframe concepts-an evolving architecture- mainframe computer users-factors contributing to mainframe use – mainframe workloads.

UNIT – II CAPACITY **9**

Capacity – elements of a system required for capacity – few server Vs Many server – service level agreement – managing the system to the SLA – architecture, running work and capacity – several servers on one physical machine – parallel sysplex and its measurements.

UNIT - III SCALABILITY, INTEGRITY AND SECURITY **9**

Introduction to scalability – scalability concepts – scalability implementation on IBM system – integrity – security – introduction to availability – Inhibitors to availability - redundancy – z/OS elements for availability – Disaster recovery.

UNIT - IV ACCESSING LARGE AMOUNT OF DATA **9**

Introduction – channel subsystem – control unit- DASD CKD architecture and DASD subsystem – multiple allegiance/Parallel Access volumes – database and data sharing – Data placement and management .

UNIT - V SYSTEM MANAGEMENT AND AUTONOMIC COMPUTING **9**

Introduction – system data – configuration management – operating management – performance management – problem management – introduction to autonomic computing – self healing – self protecting – self optimizing.

TOTAL 45

REFERENCES:

1. Mike Ebbers,Frank Byrne, Pilar Gonzalez Adrados,Rodney Martin and Jon Veilleux “Redbook – Introduction to Mainframe - Large Scale Commercial Computing”. First Edition December 2006, IBM Corp.
2. Lydia Parziale, Edi Lopes Alves, Klaus Egeler, Clive Jordan” Introduction to the New Mainframe: z/VM Basics”, November 26, 2007, IBM Redbooks

NEURAL NETWORKS **3 0 0 100 3**

UNIT – I INTRODUCTION TO NEURAL NETWORKS 9

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT – II ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS 9

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT – III SINGLE LAYER FEED FORWARD NETWORKS 9

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

UNIT – IVI MULTI- LAYER FEED FORWARD NETWORKS 9

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - V ASSOCIATIVE MEMORIES 9

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function.
Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis. Neural network applications: Process identification, control, faultdiagnosis.

TOTAL : 45

REFERENCES

1. Laurene Fausett, “Fundamentals of Neural Networks” , Pearson Education, 2004..

2. Simon Haykin, “Neural Networks- A comprehensive foundation”, Pearson Education, 2003.
3. S.N.Sivanandam, S.Sumathi,S. N. Deepa “Introduction to Neural Networks using MATLAB 6.0”, TATA Mc Graw Hill, 2006.
4. S. Rajasekharan and G. A. Vijayalakshmi pai, “Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications”, PHI Publication, 2004.
4. Timothy J. Ross, “ Fuzzy Logic With Engineering Applications”, Tata McGraw-Hill Inc. 2000

SERVICE ORIENTED ARCHITECTURE **3 0 0 100 3**

UNIT I THE TECHNOLOGY OF ENTERPRISE SOA 9

The goal of loose coupling-Web services overview-Introducing Service oriented Architecture: Enterprise architecture-The service oriented architecture

UNIT II ENTERPRISE APPLICTION INTEGRATION AND B2B COMMERCE 9

EAI-web services in portals and software development-managing the supply chain-Building hubs-Partner to Partner-Government and scientific SOA

UNIT III REAL TIME OPERATIONS AND SECURITY 9

Goal of the real time enterprise-Delivering real time with the SOA –Real time virtual data warehouse-business level agreements. SECURITY: Risk of loose coupling-layers of SOA security-Solutions to SOA security

UNIT IV SOA MANAGEMENT SOLUTION AND SOA NETWORKS 9

Problems in the unmanaged SOA-web services management solutions-Managing the SOA network-Securing the SOA network and solutions-SOA network management-Utility computing in the SOA

UNIT V PEOPLE AND PROCESS OF ENTERPRISE SOA 9

Exploring an SOA for titan-achieving consensus at titan-Grouping for SOA Training ESTABLISHING PRACTICE, PLAN AND PROCEED: Services discovery-Service creation-Selecting a platform-Forming an SOA plan and proceed

TOTAL 45

REFERENCES

1. Eric Pulier,Hugh Taylor, " Understanding Enterprise SOA", Dreamtech press, New Delhi, 2005.
2. Chris Peiris and Dennis Mulder, "Pro WCF Practical Microsoft SOA implementation", Apress, Berkeley, CA, USA, 2007.
3. Greg Lomow, Eric Newcomer, "Understanding SOA with Web Services", Pearson Education, New Delhi, 2005.
4. Dan Woods, Thomas Mattern, "Enterprise SOA: Designing it for Business Innovation", Shroff publishers, 2006.

GRID COMPUTING **3 0 0 100 3**

UNIT – I INTRODUCTION **9**

The Grid - Past, Present, Future, A New Infrastructure for 21st Century Science - The Evolution of the Grid - Grids and Grid Technologies, Programming models - A Look at a Grid Enabled Server and Parallelization Techniques – Grid applications

UNIT – II THE ANATOMY OF THE GRID **9**

The concept of virtual organizations – Grid architecture – Grid architecture and relationship to other Distributed Technologies – computational and data Grids, semantic grids

UNIT – III THE OPEN GRID SERVICES ARCHITECTURE **9**

Grid Management systems, security, Grid Grid-Enabling software and Grid-enabling network services, Data Grid - Virtualization Services for Data Grids, Peer-to-Peer Grids - Peer-to-Peer Grid Databases for Web Service Discovery

UNIT – IV THE OPEN GRID SERVICES INFRASTRUCTURE **9**

Technical details of OSGI specification, service data concepts, Naming and Change Management Recommendations – OGSA basic services

UNIT – V APPLICATION CASE STUDY **9**

Molecular Modeling for Drug Design and Brain Activity Analysis, Resource management and scheduling, Setting up Grid, deployment of Grid software and tools, and application execution

TOTAL 45

REFERENCES:

1. Fran Bermn, Geoffrey Fox, Anthony Hey J.G., “Grid Computing: Making the Global Infrastructure a Reality”, Wiley, USA, 2003
2. Joshy Joseph, Craig Fallenstein, “Grid Computing”, Pearson Education, New Delhi, 2004,
3. Ian Foster, Carl Kesselman, “The Grid2: Blueprint for a New Computing Infrastructure”. Morgan Kaufman, New Delhi, 2004
4. Ahmar Abbas, “Grid Computing: Practical Guide to Technology and Applications”, Delmar Thomson Learning, USA, 2004,

ADVANCED JAVA PROGRAMMING 3 0 2 100 4

UNIT I JAVA FUNDAMENTALS 9

Java I/O streaming – filter and pipe streams – Byte Code interpretation - reflection – Dynamic Reflexive Classes – Threading – Java Native Interfaces-Swing.

UNIT II NETWORK PROGRAMMING IN JAVA 9

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services

UNIT III APPLICATIONS IN DISTRIBUTED ENVIRONMENT 9

Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation

UNIT IV MULTI-TIER APPLICATION DEVELOPMENT 9

Server side programming – servlets – Java Server Pages - Applet to Applet communication – applet to Servlet communication - JDBC – Using BLOB and CLOB objects – storing Multimedia data into databases – Multimedia streaming applications – Java Media Framework.

UNIT V ENTERPRISE APPLICATIONS 9

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans – Transactions.

TOTAL : 45

REFERENCES

1. Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, 2000
2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999.
3. Hortsmann & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002.
4. Web reference: http://java.sun.com.
5. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.

SOFTWARE TESTING **3 0 0 100 3**

UNIT I INTRODUCTION **9**

Perspective of Testing – definition, approaches, testing during development life cycle, test policy, test planning, categories of defect, configuration management, risk analysis.

UNIT II TESTING TECHNIQUES **9**

Levels of testing, acceptance testing, criticality of requirement, special tests – complexity, GUI, compatibility, security, recovery, installation, error handling, smoke, sanity, parallel and execution testing

UNIT III TECHNIQUES FOR AUTOMATING TEST EXECUTION **9**

Testing and test automation – The V model –Tool support for life-cycle testing – The promise of test automation, Common problems of test automation – The limitations of automating software testing, Script Preprocessing, Scripting Techniques

UNIT IV TOOLS TO AUTOMATE TESTING **9**

Selecting tools - requirements - tool market - tool selection project - tool selection team - Identifying requirements - Identifying constraints - Identifying tools availability in market - Evaluating the candidate tools - decision making, Testing Tools - WinRunner, SilkTest, LoadRunner, JMeter

UNIT V AUTOMATED COMPARISON **9**

Verification, comparison, automation – comparators, dynamic comparison – post-execution comparison – simple comparison, complex comparison – test sensitivity – comparing different types of outcomes – comparison filters and guidelines – Testware Architecture – Automating pre and post processing – Building maintainable tests

TOTAL 45

REFERENCES:

1. Limaye L G, “Software Testing – Principles, Techniques and Tools”, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009
2. Boris Beizer, “Software Testing Techniques”, Dream Tech press, New Delhi, 1990.
3. Mark Fewster, Dorothy Graham., "Software Test Automation: Effective Use of Test Execution Tools", Addison Wesley, New Delhi, 1999.
4. William E Perry, “Effective Methods of Software Testing”, John Wiley & sons, Singapore 2006.
5. Roger S Pressman, "Software Engineering – A Practitioner’s Approach", sixth edition, Tata McGraw Hill, New Delhi, 2006.
6. Glenford J Myer, "The Art of Software Testing", second edition, John Wiley & Sons, Singapore, 2004.

CYBER LAW AND INFORMATION ACT 3 0 0 100 3

UNIT – I EVOLUTION OF LAW IN CYBERSPACE 9

The Online Landscape: Technological, Social and Legal Issues, Harmonisation of Laws and the Issue of Jurisdiction Over the Internet , The Internet in the Context of International Commerce, Electronic Signature Legislation-a historical respective, An Overview of Specific Aspects, SEBI Guidelines, The UNCITRAL Model Law and Electronic Equivalents to Traditional Bills of Lading

UNIT – II SECURITY CONCERNS 9

The legal framework, Confidential Information, Protection of Confidential Information , Nature of confidential information , Confidence implied in a contract, Confidence implied by circumstances, Identification of confidential information, Essential requirements of breach of confidence, Exceptions to breach of confidence, Remedies for breach of confidence , Employee Privacy Rights , Employer Protection, Internet Banking in India : Analyzing Legal Issues, Negligent Misstatements

Unit – III INTELLECTUAL PROPERTY IN CYBERSPACE 9

Intellectual Property on The Internet , Squatting in Cyberspace: A Web of Deception, WIPO Cases Involving Complainants from India, Intellectual Property (Trade Marks), Domain Names: ICANN and New Remedies Against Cybersquatting, Domain names, copyright intellectual Property and the Internet: A case study of the Indian approach to intellectual property and e-commerce, The CSS Technology License, DVD Audio Disc Copy Protection, Systems-on-a-Chip: Intellectual Property and Licensing Issues

UNIT – IV PROTECTION OF PERSONAL DATA AND PRIVACY 9

. Introduction, Personal Data, Data Subject, Data Processing: Definition and Grounds, Purpose Limitation , Legitimate Purposes, Data Controllers And Data Processors, Establishment, Data - Access and Information, Anonymous and Pseudonymous Data, Freedom of Expression , Free Flow of Data within the Eu, Data Transfer, Data Minimization

UNIT – V INFORMATION TECHNOLOGY ACT 9

Observations on the Preamble, Jurisdictions proposing to adopt provisions of the Model Law, UNCITRAL Model Law on Electronic Commerce Part One. Electronic Commerce In General, Sphere of application, UNCITRAL Model Law , Information Technology Act, 2000: An overview, Existing restrictions on FDI in domestic trading to be applicable to e-commerce as well.

TOTAL : 45

REFERENCES :

1. Rodney D. Ryder, " Guide to Cyber Laws", Second Edition, Wadhwa and Company, 2007
2. Joha Rao, " Law of Cyber Crimes and Information Technology Law", Wadhwa and Company, 2007
3. Vakul Sharma, "Handbook of Cyber laws" Macmillan India Ltd, 2003
4. Justice Yatindra Singh, " Cyber Laws", Universal Law Publishing, New Delhi, 2003

ELECTIVES – SEMESTER VIII

PARALLEL COMPUTING **3 0 0 100 3**

UNIT I SCALABILITY AND CLUSTERING 9

Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts Of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues – Semantic Issues In Parallel Programs.

UNIT II ENABLING TECHNOLOGIES 9

System Development Trends – Principles of Processor Design – Microprocessor Architecture Families – Hierarchical Memory Technology – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding.

UNIT III SYSTEM INTERCONNECTS 9

Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.

UNIT IV PARALLEL PROGRAMMING 9

Paradigms And Programmability – Parallel Programming Models – Shared Memory Programming.

UNIT V MESSAGE PASSING PROGRAMMING 9

Message Passing Paradigm – Message Passing Interface – Parallel Virtual Machine.

TOTAL : 45

REFERENCES:

1. Kai Hwang and Zhi.Wei Xu, “Scalable Parallel Computing”, Tata McGraw-Hill, New Delhi, 2003.
2. Michael J. Quinn, “Parallel Computing Theory and Practice”, Second Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2003.
3. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, “ Introduction to Parallel Computing”, Pearson, Education, New Delhi, 2009.
4. Kai Hwang, “Advanced Computer Architecture” Tata McGraw-Hill, New Delhi, 2003.
5. David E. Culler & Jaswinder Pal Singh, “Parallel Computing Architecture: A Hardware/Software Approach”, Morgan Kaufman Publishers, 1999.

GENETIC ALGORITHMS AND APPLICATIONS 3 0 0 100 3

UNIT – I INTRODUCTION TO EVOLUTIONARY COMPUTATION 9

Biological and artificial evolution - Evolutionary computation and AI - Different historical branches of EC-GAs- EP- ES- GP - A simple evolutionary algorithm.

UNIT- II SEARCH AND SELECTION OPERATORS 9

Recombination/Crossover for strings- one-point- multi-point-uniform crossover operators - Mutation for strings- bit-flipping - Recombination/Crossover and mutation rates - Recombination for real-valued representations- Fitness proportional selection and fitness scaling – Ranking methods – Tournament selection.

UNIT – III EVOLUTIONARY COMBINATORIAL OPTIMIZATION 9

TSP - Evolutionary algorithms for TSPs – Hybrid evolutionary and local search algorithms.Schema theorems - Convergence of EAs - Computational time complexity of EAs - No free lunch theorem.

UNIT – IV CONSTRAINT HANDLING 9

Common techniques- penalty methods- repair methods - Analysis -Some examples.
Pareto optimality - Multiobjective evolutionary algorithms.

UNIT – V GENETIC PROGRAMMING 9

Trees as individuals - Major steps of genetic programming-, functional and terminal sets- initialization- crossover-mutation- fitness evaluation - Search operators on trees – Examples.

TOTAL 45

REFERENCES:

1. Goldberg and David E, “Genetic Algorithms in Search. Optimization and Machine Learning”, Pearson Education, New Delhi, 2006.
2. Kalyamoy Deb, “Multiobjective Optimization using Evolutionary Algorithms”, John Wiley & Sons, First Edition, USA, 2003.
3. Koza, John, Wolfgang Banzhaf, Kumar Chellapilla, Kalyanmoy Deb, Marco Dorigo, David Fogel, Max Garzon, David Goldberg, Hitoshi Iba, and Rick Riolo(Eds.), “Genetic Programming”, Academic Press. Morgan Kaufmann, USA, 1998.
4. John R.Koza, Forrest H Bennett III , David Andre, Martin A Keane, “Genetic Programming III:Darwinian Invention and Problem Solving” Morgan Kaufmann, USA, 1999.

HIGH SPEED NETWORKS **3 0 0 100 3**

UNIT I HIGH SPEED NETWORKS ***8***

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL.High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's: applications, requirements – Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT ***8***

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL ***12***

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM.
Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES ***8***

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V PROTOCOLS FOR QOS SUPPORT ***8***

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL : 45

REFERENCES:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2005.

2. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.

3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003

DIGITAL IMAGE PROCESSING **3 0 0 100 3**

UNIT I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS 9

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – 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.

UNIT II IMAGE ENHANCEMENT TECHNIQUES 9

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 – Homomorphic filtering.

UNIT III IMAGE RESTORATION: 9

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.

UNIT IV IMAGE COMPRESSION 9

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 Vector quantization.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION 9

Edge detection –Thresholding – Region Based segmentation – Boundary representation: chair codes- Polygonal approximation –Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors – Regional descriptors –Simple descriptors- Texture

TOTAL : 45

REFERENCES:

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.
2. William K Pratt, Digital Image Processing John Willey (2001)
3. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy (1999).
4. A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.
5. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India, 2000

COMPONENT BASED TECHNOLOGY **3 0 0 100 3**

UNIT I INTRODUCTION ***9***

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware

UNIT II JAVA BASED COMPONENT TECHNOLOGIES 9

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP

UNIT III CORBA COMPONENT TECHNOLOGIES ***9***

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture

UNIT IV . NET BASED COMPONENT TECHNOLOGIES ***9***

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting

UNIT V COMPONENT FRAMEWORKS AND DEVELOPMENT ***9***

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools

TOTAL : 45

REFERENCES:

1. Clemens Szyperski, “Component Software: Beyond Object-Oriented Programming”, Pearson Education publishers, 2003
2. Ed Roman, “Mastering Enterprise Java Beans”, John Wiley & Sons Inc., 1999.
3. Mowbray, “Inside CORBA”, Pearson Education, 2003.
4. Freeze, “Visual Basic Development Guide for COM & COM+”, BPB Publication, 2001.
5. Hortsamann, Cornell, “CORE JAVA Vol-II” Sun Press, 2002.

SOFTWARE PROJECT MANAGEMENT 3 0 0 100 3

UNIT - I SOFTWARE PROJECT MANAGEMENT 9

Introduction, Need for Software Project Management – Software Project versus other projects – Overview of Project planning

UNIT - II PROJECT EVALUATION 9

Introduction, Strategic assessment, Technical Assessment, Cost benefit Analysis, Cash flow forecasting, Cost benefit Evaluation Techniques Risk Evaluation – Selection of appropriate project planning.

UNIT III ACTIVITY PLANNING 9

Objectives of activity planning, Project schedules, Projects and activities, Sequencing and scheduling activities, Network Planning models –Formulating network models, Using dummy activities, Identifying critical path, identifying critical activities. Risk Analysis and Management: Nature of risk, Managing risk, Risk identification, Risk analysis, reducing the risks, evaluating the risks.

UNIT IV SOFTWARE EFFORT ESTIMATION 10

Problems with over and under estimate, the basis for software estimation, software estimation Techniques. Expert judgments, Estimating by analogy, Function point analysis. Resource Allocation: Identifying resource requirements, Scheduling resources, Monitoring and control, Managing people and organization teams.

UNIT V PROJECT MANAGEMENT

Project Management in the Testing phase – Introduction, test scheduling, test types, issues, management structures for testing, metrics for testing phase, Project Management in the Management phase – Introduction, activities, management issues, configuration management, estimating size, effort and people resources, advantages, metrics

TOTAL: 45

REFERENCES:

1. Bob huges, Mike cotterell, “Software Project Management”, Tata McGraw Hill, New Delhi, 2002.
2. Gopalaswamy Ramesh, “Managing Global Software Projects”, Tata McGraw Hill, New Delhi, 2006.
3. Roger S Pressman, “Software Engineering, A Practitioner’s Approach”, Tata McGraw Hill, New Delhi, 2001.
4. Kamna Malik, Praveen Choudary, “Software Quality, a practitioner’s Approach”, Tata McGraw Hill, New Delhi, 2008.

CLOUD COMPUTING **3 0 0 100 3**

UNIT – I INTRODUCTION **9**

Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.

UNIT – II CLOUD COMPUTING FOR EVERYONE **9**

Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping schedulesm managing projects, presenting on road.

UNIT – III USING CLOUD SERVICES **9**

Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.

UNIT – IV OUTSIDE THE CLOUD **9**

Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis

UNIT – V STORING AND SHARING **9**

Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.

TOTAL : 45

REFERENCES:

1. Michael Miller, " Cloud Computing", Pearson Education, New Delhi, 2009

BIO INFORMATICS **3 0 0 100 3**

UNIT I INTRODUCTION ***9***

Need for Bioinformatics technologies – Overview of Bioinformatics technologies – Structural bioinformatics – Data format and processing – secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS 9

Bioinformatics data – Datawarehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics

UNITIII MODELING FOR BIOINFORMATICS 9

Hidden markov modeling for biological data analysis – Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling

UNIT IV PATTERN MATCHING AND VISUALIZATION 9

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

UNIT V MICROARRAY ANALYSIS 9

Microarray technology for genome expression study – image analysis for data extraction – preprocessing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark - Tradeoffs

TOTAL 45

REFERENCES:

1. Yi-Ping Phoebe Chen (Ed), “BioInformatics Technologies”, First Indian Reprint, Springer Verlag, 2007.
2. Zoe lacroix and Terence Critchlow, “BioInformatics – Managing Scientific data”, First Indian Reprint, Elsevier, 2004
3. Zoe Lacroix and Terence Critchlow, “Bioinformatics – Managing Scientific Data”, First Edition, Elsevier, 2004
4. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2003.

PROFESSIONAL ETHICS **3 0 0 100 3**

UNIT I ENGINEERING ETHICS **9**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY **9**

Safety and Risk – Assessment of Safety and Risk – Riysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS **9**

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES **9**

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TOTAL :45

REFERENCES :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000
3. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999
4. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001
6. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
7. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

EMBEDDED SYSTEMS **3 0 0 100 3**

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK 9

I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - '12C', 'USB', 'CAN' and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT III PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++ 9

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, 'C' Program compilers – Cross compiler – Optimization of memory codes.

UNIT IV REAL TIME OPERATING SYSTEMS – PART - 1 9

Definitions of process, tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services-Goals – Structures- Kernel - Process Management – Memory Management – Device Management – File System Organisation and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS, REAL TIME OPERATING SYSTEMS : RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics – Co-operative Round Robin Scheduling – Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative Scheduling) – Preemptive Scheduling Model strategy by a Scheduler – Critical Section Service by a Preemptive Scheduler – Fixed (Static) Real time scheduling of tasks - INTER PROCESS COMMUNICATION AND SYNCHRONISATION – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).

UNIT V REAL TIME OPERATING SYSTEMS – PART - 2 9

Study of Micro C/OS-II or Vx Works or Any other popular RTOS – RTOS System Level Functions – Task Service Functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore Related Functions – Mailbox Related Functions – Queue Related Functions – Case Studies of Programming with RTOS – Understanding Case Definition – Multiple Tasks and their functions – Creating a list of tasks – Functions and IPCs – Exemplary Coding Steps.

TOTAL: 45

REFERENCES:

2. Rajkamal, Embedded Systems Architecture, Programming and Design, Second Edition, Tata McGraw-Hill,New Delhi, 2009
3. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
4. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000