

M.Sc. Computer Science

Syllabus

(For students admitted from 2017-2018 onwards)



**Department of Computer Science
Bishop Heber College (Autonomous)**

**Nationally Re-accredited at the 'A' by NAAC with a CGPA of 3.58 out of 4
Recognized by UGC as " College of Excellence"
Tiruchirappalli 620017**

Sem	Course	Title	Code	Prerequisites	Hours /Week	Credits	Marks		
							CIA	ESE	Total
I	Core I	Programming in C#.NET	P15CS101	---	5	5	25	75	100
	Core II	Cloud Computing	P16CS102	---	5	5	25	75	100
	Core III	Software Project Management	P15CS103	---	5	5	25	75	100
	Elective I	1a) Mobile Application Development 1b) Human Computer Interaction 1c) Multimedia Systems and Design	P15CS1:1 P15CS1:2 P15CS1:3	---	4	4	25	75	100
	Core Practical I	Programming in C#.NET Lab	P16CS1P1	---	6	4	40	60	100
	Core Practical II	Programming in Android Lab	P15CS1P2	---	5	3	40	60	100
II	Core IV	J2EE Technologies	P16CS204	---	4	4	25	75	100
	Core V	Mathematical Foundation for Computer Science	P15CS205	---	4	4	25	75	100
	Core VI	Network Management and Protocols	P15CS206	---	4	4	25	75	100
	Elective II	2a) Web Services 2b) Client Server Computing 2c) Web Technology	P15CS2:1 P15CS2:2 P15CS2:3	---	4	4	25	75	100
	Core Practical III	J2EE Lab	P15CS2P3	---	4	2	40	60	100
	Core Practical IV	Visual Programming Lab	P15CS2P4	---	4	2	40	60	100
	NMEC	Internet Technology	P15CS2E1	---	4	4	25	75	100
	NMEC	Office and Visual Basic Programming	P15CS2E2	---	4	4	25	75	100
	VLO	RI/MI	P15VL2:1 P15VL2:2	---	2	2	25	75	100
III	Core VII	Digital Image Processing	P15CS307	---	5	5	25	75	100
	Core VIII	Big Data Analytics	P15CS308	P16CS102	5	5	25	75	100
	Core IX	Compiler Design	P15CS309	---	5	5	25	75	100
	Elective III	3a) Data Mining and Data Ware Housing 3b) Mobile Computing 3c) Distributed Object Technology	P15CS3:1 P15CS3:2 P15CS3:3	---	4	4	25	75	100
	Core Practical V	Big Data Analytics Lab	P15CS3P5	---	6	4	40	60	100
	Core Practical VI	Software Engineering CASE Tools Lab (Open Source Case Tool)	P15CS3P6	P15CS103	5	3	40	60	100
IV	Core X	Soft Computing	P16CS410	---	6	5	25	75	100
	Elective IV	4a) Cryptography and Network Security 4b) Semantic Web 4c) Advanced Microprocessors And Microcontrollers	P15CS4:1 P15CS4:2 P15CS4:3	---	4	4	25	75	100
	Core Project	Project	P16CS4PJ	P15CS103	---	5	40	60	100

PROGRAMMING IN C#.NET

Objectives:

On the completion of the course, the students will

1. Acquire knowledge on .Net Framework, building form with web controls creating and using Rich Controls, Validation Controls and ADO.NET.
2. Develop the Dot Net based applications

Unit 1: Introducing C# and the .NET platform: The philosophy of .NET-Introducing the building blocks of the .NET platform (CLR, CLS and CTS)-.NET assemblies – Common type system - Namespaces/types distinction.

Unit 2: Core C# Programming Constructs: System.Environment class – System.Console class-String-Data type Conversion-C# iteration constructs-Decision Constructs-methods-arrays-structure -understanding values types and reference types-c# nullable.

Unit 3: Object Oriented Programming with C#: Introducing the C# class type-understanding constructor-this keyword-static keyword-defining pillars of OOP-c# access modifiers-inheritance and polymorphism-understanding exception handling-understanding object lifetime-working with interfaces – delegates–events - Introducing LINQ.

Unit 4: Windows Forms: windows forms fundamentals-windows MDI forms-Handling events-Adding Controls to forms. **Windows Controls:**Textboxes – labels – Linkablebutton – checkboxes – radiobuttons – ListBoxes – CheckedListBoxes -ComboBoxes-PictureBox – ImageList – DateTimePicker – ListView – Richtextbox-Toolbars-TabControl-MenuStrip. **Advanced Window Programming:** File Handling.

Unit 5: Data Access with ADO.NET:ADO.NET Architecture – Advantages-ADO.NET Objects. **Handling Databases in code:** Connection class-Command class – DataAdapter-DatasetClass-DataReader class-DataTable Class-DataRow, DataColumn classes-Datarelationship. **Handling Data Manipulation in code:** Record navigation-record updation-inserting record-deleting record.

Text Books:

1. Andrew Troelson, “C# 2010 and .Net Platform”, A press, 6th Edition, 2010-**(Unit I, II,III)**
2. J. G. R. Sathiaselan and N. Sasikaladevi, “Programming with C#.NET”, Pearson Education,1st Edition, 2009**(Unit-IV& V)**

Reference Books:

1. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw Hill Publications, 2004.
2. E. Balagurusamy, “Programming in C#”, Tata Mc-GrawHill Publications,2nd Edition 2009.

CLOUD COMPUTING

Objectives:

On the completion of the course, the students will

1. Know the fundamentals of Cloud Computing and its Architectures.
2. Understand the services and applications of Cloud Computing.

Unit 1: DEFINING CLOUD COMPUTING- Cloud Types - The NIST model - The Cloud Cube Model - Deployment models - Service models - Examining the Characteristics of Cloud Computing - Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing - Assessing the Role of Open Standards. **ASSESSING THE VALUE PROPOSITION:**Early adopters and new applications - The laws of cloudonomics - Cloud computing obstacles - Behavioral factors relating to cloud adoption.

Unit 2: UNDERSTANDING CLOUD ARCHITECTURE:Exploring the Cloud Computing Stack- ComposabilityInfrastructure - Platforms - Virtual Appliances - Communication Protocols - Applications. **UNDERSTANDING SERVICES AND APPLICATIONS BY TYPE:**Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - SaaS characteristics - Open SaaS and SOA.

Unit 3: UNDERSTANDING ABSTRACTION AND VIRTUALIZATION: Using Virtualization Technologies - Load Balancing and Virtualization - Advanced load balancing - The Google cloud - Understanding Hypervisors - Virtual machine types - VMware vSphere - Understanding Machine Imaging - Porting Applications - The Simple Cloud API - AppZero Virtual Application Appliance.
CAPACITY PLANNING - Load testing - Resource ceilings - Server and instance types.

Unit 4: USING MICROSOFT CLOUD SERVICES:Administrating the Clouds - Management responsibilities - Lifecycle management - Emerging Cloud Management Standards. **UNDERSTANDING CLOUD SECURITY:**Securing the Cloud - Securing Data - Establishing Identity and Presence.

Unit 5: USING THE MOBILE CLOUD: Working with Mobile Devices - Defining the Mobile Market - Using Smartphones with the Cloud. **WORKING WITH MOBILE WEB SERVICES:** Understanding Service Types - Performing Service Discovery - Using SMS - Defining WAP and other Protocols - Performing Synchronization.

Text Book:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley Publishing Inc., 2011.

Reference Books:

1. Michael Miller, "Cloud Computing", Pearson Education Inc., 7th Edition, 2012.
2. RajkumarBuyya& Co., "Cloud Computing Principles and Paradigms", John Wiley & Sons Publications, 2011.

SOFTWARE PROJECT MANAGEMENT

Objectives:

By the end of the course, the learner will

1. Obtain knowledge on the basics of Software Project management
2. Understand responsibilities of Software Project Manager, Risk Management roles.

UNIT 1: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

UNIT 2: PROJECT EVALUATION

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

UNIT 3: ACTIVITY PLANNING

Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

UNIT 4: MONITORING AND CONTROL

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT 5: MANAGING PEOPLE AND ORGANIZING TEAMS

Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.

Text Book

1. Bob Hughes, Mikecoterrell, “Software Project Management”, 3rd Edition, Tata McGraw Hill, 2004.

Reference Books:

1. Royce, “Software Project Management”, Pearson Education, 1999.
2. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

Elective - 1a) MOBILE APPLICATION DEVELOPMENT

Objectives:

On the completion of the course, the students will

1. Know the basics involved in Application development in Mobile platforms
2. Develop User Interface and Mobile Applications using Android tools.

UNIT 1: Introduction: Applications - A Simplified Reference Model. Multiplexing: Space Division Multiplexing – Frequency Division Multiplexing – Time Division Multiplexing – Code Division Multiplexing. Cellular Systems – Comparison of S/T/F/CDMA. GSM: Mobile Services – System Architecture – Localization and Calling – Handover.

UNIT 2: Developing Spectacular Android Applications: Why Develop for Android? - Android Programming Basics – Hardware Tools – Software Tools. Prepping Your Development Headquarters: Assembling Your Toolkit – Installing and Configuring Your Support Tools – Getting Acquainted with the Android Development Tools.

UNIT 3: Your First Android Project: Starting a New Project in Eclipse – Deconstructing Your Project – Setting up an Emulator – Creating Launch Configurations – Running the Hello Android App – Understanding the Project Structure. Designing the User Interface: Creating the Silent Mode Toggle Application – Laying Out the Application – Developing the User Interface – Adding an Image to Your Application – Creating a Launcher Icon for the Application – Adding a Toggle Button Widget – Previewing the Application in the Visual Designer.

UNIT 4: Coding Your Application: Understanding Activities – Creating Your First Activity – Working with the Android Framework Classes – Installing Your Application – Reinstalling Your Application – Responding to Errors. Understanding Android Resources: Understanding Resources – Working with Resources.

UNIT 5: Handling User Input: Creating the User Input Interface – Getting Choosy with Dates and Times – Creating Your First Alert Dialog Box – Validating Input. Getting Persistent with Data Storage: Finding Places to Put Data – Asking the User for Permission – Creating Your Application’s SQLite Database. Creating and Editing Tasks with SQLite: Inserting, Deleting and Updating a task.

Textbook

1. Jochen H. Schiller, “Mobile Communications”, Addison-Wesley and imprint of Pearson Education Ltd., 2003. (Units I)
2. Donn Felker and Joshua Dobbs, “Android Application Development – for Dummies”, Wiley Publishing Inc., 2011. (Units II,III,IV,V)

Book for Reference

1. Jerome (J.F.) DiMarzio, “Android – A Programmer’s Guide”, Tata McGraw-Hill Publication, 2008.

Elective -1b) HUMAN COMPUTER INTERACTION

Objectives:

At the end of the course, the students will

1. learn the basics of Design, models, frameworks
2. Understand the process of developing user support systems.

Unit 1: The interaction: Introduction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction Styles – Elements of WIMP interface – Interactivity – The Context of the interaction - Paradigm: Introduction – Paradigms for interaction.

Unit 2: Interaction Design basics: Introduction – what is design? – User focus – Scenarios – Navigation design – Screen design and layout – Interaction and prototyping - HCI in the software process: Introduction – The software lifecycle – Usability engineering – Interactive design and prototyping – Design rationale.

Unit 3: Design rules: Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics – HCI patterns - Implementation Support: Introduction – Elements of windowing systems – Programming the application – Using toolkits – User interface management systems.

Unit 4: Evaluation techniques: What is evaluation – Goals of evaluation – Evaluation through expert analysis – Evaluation through user participation – Choosing an evaluation method - Universal Design: Introduction – Universal design principles – Multi-modal interaction – Designing for diversity.

Unit 5: User Support: Instruction – Requirements of user support – Approaches to user support – Adaptive help system – Designing user support systems.

Text Book:

1. Alan Dix, “ Human-computer Interaction”, Pearson Education, 3rd Edition, 2004.

Reference Books:

1. Donald Hearn M. Pauline Baker “Computer Graphics”, PHI, 1992
2. Human Computer Interaction in the New Millennium, John M. Carroll, Pearson Education, 2002

Elective - 1c) MULTIMEDIA SYSTEMS AND DESIGN

Objectives:

On the completion of the course, the students will

1. Obtain knowledge on multimedia hardware, multimedia tools and multimedia documentation.
2. comprehend Multimedia Applications in various Domain

Unit 1: Introduction to Multimedia – Definitions, CD-ROM and the Multimedia highway. Uses of Multimedia – Introduction to making multimedia, Multimedia skills.

Unit 2: Multimedia Hardware – Macintosh versus windows, Networking Macintosh and windows computers, Connections, Memory and storage devices, Input devices, Output hardware, Communication devices. Basic Software Tools – Text editing and word processing tools, Painting and Drawing tools, 3-D modeling and animation tools, Image editing tools, Sound editing tools, Animation, Video and Digital movie tools. Multimedia authoring tools.

Unit 3: Text – Fonts and Faces, Using Text in Multimedia, Computers and Text, Sounds-Multimedia System Sounds, Digital Audio, Making MIDI Audio, Audio File formats, MIDI Versus Digital Audio, Production Tips. Images – Making Still images, Color – Understanding natural light and color, computerized color, color palettes, Animation – The principles of Animation, Animation by computer.

Unit 4: Video – Using video, How video works, Broadcast video standards, Analog video, Digital video, Shooting and Editing video, Optimization video files for the CD-ROM. Tools for the World Wide Web – Web servers, Web Browsers, Web page makers and site builders. Plugins and delivery vehicles. Designing for the World Wide Web – Working on the web, Text for the web, Images for the web, Sound for the web, Animation for the web.

Unit 5: Planning and Costing – The process of making multimedia, scheduling, estimating Designing and Producing, Content and Talent – Using content created by others – Using content created for a project, Using Talent, Delivering – Testing, Preparing for Delivery Delivering on CD ROM, Delivering on world wide web.

Text Book:

1. Tay Vaughan, *“Multimedia: Making It Work”*, , TATA McGraw-Hill Publication, Sixth Edition, 2004.

Reference Books:

1. James E. Shuman, *“Multimedia in Action”*, Vikas Publishing House, 5th Edition, 2002.
2. Casanova John Villamil, Molina. Louis, *“Multimedia An Introduction”*, Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, 2000.

PROGRAMMING IN C#.NET LAB

Objectives:

At the end of the course, the students will able to

1. Develop simple applications in ASP .NET using C#
 2. Design web based application with ADO. NET and C#
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1. Create a table and insert a few records using Disconnected Access.
 2. Develop a project to update and delete few records using Disconnected Access.
 3. Develop a project to view the records using GridView, DetailsView, FormView Controls.
 4. Develop a project to generate a crystal report from an existing database.
 5. Design a web page that makes uses of Ad Rotator Control.
 6. Design a web page involving Multi View or Wizard Control.
 7. Make use of Image Control involving two hot spots in a web page.
 8. Design a simple web site that makes use of Master Pages.
 9. Establish the security features in a simple web site with five pages.
 10. Use state management concepts in a mobile web application.
 11. Develop a web service that has an ASP.NET client.
 12. Develop a web service to fetch a data from a table and send it across to the client.

PROGRAMMING IN ANDROID LAB

Objectives:

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

1. Develop simple applications using Android
 2. Create the Mobile Applications using different controls in Android.

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1. Write an Android Program to Demonstrate Alert Dialog Box
 2. Build an Android Program to Build a Simple Android Application
 3. Design an Android Program to Demonstrate Usage of String.xml File
 4. Create an Android Program to Demonstrate Activity Life Cycle
 5. Construct an Android Program to Change the Background of your Activity
 6. Simulate an Android Program to Perform all Operations using Calculators
 7. Implement an Android Program to Change the Image Displayed on the Screen
 8. Build an Android Program to Create Multiple Activities within an Application
 9. Prepare an Android Program to Demonstrate Action Button by Implementing on Click Listener
 10. Develop an Android Program to Demonstrate the Sound Button Application
 11. Write an Android Program to Demonstrate the use of Scroll View
 12. Build an Android Program to Demonstrate Radio Group Application
 13. Design an Android Program to Set the Wallpaper of Your Device using Bitmap Class
 14. Create an Android Program to Demonstrate the Menu Application
 15. Construct an Android Program to Demonstrate Toast in an Application
 16. Implement an Android Program for Dividing our Activity into Fully Encapsulated Reusable Components using Fragment
 17. Simulate an Android Program to Demonstrate List View Activity
 18. Build an Android Program to Demonstrate an Advanced Xml Layout
 19. Prepare an Android Program to Draw on a Canvas
 20. Develop an Android Program to Demonstrate Surface View via Thread

J2EE TECHNOLOGIES

Objectives:

By the end of the course, the students will

1. Understand the concepts of programming knowledge in J2EE.
2. Develop websites using J2EE.

UNIT 1: J2EE OVERVIEW: Distributed Multi-tiered Applications - J2EE Containers - Web Services Support –Packaging Applications – Development Roles – J2EE APIs – Sun Java System Application Server Platform Edition 8.

UNDERSTANDING XML: Introduction to XML – Generating XML Data.

UNIT 2: GETTING STARTED WITH WEB APPLICATIONS: Web Application Life Cycle – Web modules – Web Application Examples.

JAVA SERVLET TECHNOLOGY: What Is a Servlet? – Servlet Life Cycle – Sharing Information – Creating and Initializing a Servlet – Writing Service Methods – Filtering Requests and Responses – Invoking Other Web Resources – Accessing the Web Context – Maintaining Client State – Finalizing a Servlet – The Example Servlet.

UNIT 3: JAVASERVER PAGES TECHNOLOGY: What Is a JSP Page? - The Life Cycle of a JSP Page - Creating Static Content - Creating Dynamic Content - Expression Language - JavaBeans Components - Using Custom Tags - Reusing Content in JSP Pages - Transferring Control to Another Web Component - Including an Applet.

JAVASERVER PAGES STANDARD TAG LIBRARY: Using JSTL - Core Tag Library - XML Tag Library - Internationalization Tag Library - SQL Tag Library - Functions.

UNIT 4: ENTERPRISE BEANS: What Is an Enterprise Bean? - What Is a Session Bean? -What Is an Entity Bean? - What Is a Message-Driven Bean? - Defining Client Access with Interfaces -The Contents of an Enterprise Bean - Naming Conventions for Enterprise Beans - The Life Cycles of Enterprise Beans.

GETTING STARTED WITH ENTERPRISE BEANS: Creating the J2EE Application - Creating the Enterprise Bean - Creating the Application Client - Creating the Web Client - Specifying the Web Client's Context Root - Deploying the J2EE Application - Running the Application Client - Running the Web Client.

UNIT 5: SECURITY: Understanding Login Authentication - HTTP basic authentication - Form-based login authentication - Client certificate authentication - Mutual authentication - Digest authentication.

THE JAVA MESSAGESERVICE API: Overview - Basic JMS API concepts - The JMS API programming model. HTTP OVERVIEW: HTTP Requests – HTTP Responses.

Text Book:

1. Eric Armstrong; Jennifer Ball;Stephanie Bodoff; Debbie Bode Carson; Ian Evans; Dale Green; Kim Haase Eric Jendrock, *“The J2EE™ 1.4 Tutorial for Sun Java System Application Server Platform Edition8.2”*, Sun Microsystem, 2006.

Reference Book:

1. Jim Keogh, *“J2EE: The complete Reference”*, McGraw Hill Education (India) Private Limited, 2002.

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

Objectives:

On the completion of the course, the students will

1. Acquire knowledge on the basic concepts of Graph Theory, the input language for all types of systems, the methods of reasoning and rules of logic.
2. Understand the automata theory basics.

UNIT 1: Introduction: The Konigsberg Bridge problem. Graphs and sub-graphs: Definition – Degrees – Sub graphs – Isomorphism – Ramsey Numbers – Operations on graph. Connectedness: Walks, Trails and Paths- connectedness and components.

UNIT 2: Eulerian and Hamiltonian graphs: Eulerian graphs – Hamiltonian graphs. Trees: Characterization of trees. Planarity: Definition and properties- characterization of planar graphs. Directed graphs: Definitions and Basic properties. Shortest path problem.

UNIT 3: Mathematical reasoning/Proportional calculus and Logic: Proposition_ Logical connectives- Truth Tables- Polish notations- Propositions and truth tables- Algebra of Propositions- Tautologies and contradictions – Rules of inference.

UNIT 4: Chomsky Hierarchy: Phrase structure grammar- Chomsky Hierarchy- Unrestricted (type 0) Grammar – Context Sensitive Grammar – relation between classes of languages. Properties of regular languages: Introduction- Proving the language is not to be Regular- Closure properties of Regular Grammar.

UNIT 5: Context Free Grammar and Languages: Grammars- context Free Grammars – Parse Tree- Parsing an example of Context Free Grammar- Ambiguity in Grammars and Languages. Simplified Context Free Grammar and its Normal Form- Reduction of Context Free Grammar – Chomsky Normal Form- Greibach Normal Form – Regular Grammar. Properties of Context Free Grammar: Pumping Lemma for CFL'S

Text books:

1. S.Arumugam, S.Ramachandran, “Invitation to Graph Theory”, Scitech Publications(India) Pvt Ltd, 2001
2. Rakesh Dube,Adesh Pandey,Ritu Gupta, “Discrete Structures and Automata Theory”, Narosa Publishing House, 2007.

Reference Books:

1. Narsingh Deo, “Graph Theory with Applications to Engineering and Computer Science”, Prentice-Hall of India Pvt Ltd,2007
2. Gary Chartrand , “Introduction to Graph Theory”, Ping ZhangTata Mc Graw-Hill Publishing Company Ltd,2006

NETWORK MANAGEMENT AND PROTOCOLS

Objectives:

By the end of the course, the students will

1. Obtain knowledge on the various networking technologies
2. Know the concepts of Internetworking, Architecture and the Protocols involved.

Unit 1:

Local Area Networks: Packets, Frames, And Topologies - The IEEE MAC Sub-Layer - Wired LAN Technology (Ethernet And 802.3).

Unit 2:

Wireless Networking Technologies - LAN Extensions: Fiber Modems, Repeaters, Bridges, and Switches - WAN Technologies And Dynamic Routing - Networking Technologies Past and Present.

Unit 3:

Internetworking: Concepts, Architecture, and Protocols - IP: Internet Addressing - Datagram Forwarding - Support Protocols And Technologies.

Unit 4:

The Future IP (IPv6) - UDP: Datagram Transport Service - TCP: Reliable Transport Service – Internet Routing And Routing Protocols.

Unit 5:

Network Performance (QoS and DiffServ) - Multimedia And IP Telephony (VoIP) - Network Management (SNMP) - Trends In Networking Technologies And Uses.

Text Book

1. Douglas E.Gomer, *“Computer Networks and Internetworks”*, Pearson Publications, 5th Edition, 2009.

Reference Books

1. Forouzan, *“TCP/IP protocol suite”*, Tata McGraw Hill, Second edition, 2003.
2. W.Richard Stevens, *“TCP/IP illustrated”*, Pearson Education, Volume 2, 2003.

Elective - 2a) WEB SERVICES

Objectives:

At the end of the course, the student will

1. acquire knowledge on the emergence of web services as a service
2. comprehend the technology behind Web services.

Unit 1: Introduction – What are web services? SOAP WSDL UDDI-Why Web Services are important? – The evolution of web applications -Not just another distributed computing platform – Web services and enterprises.

Unit 2: XML Fundamentals XML: The Lingua Franca of web services - XML Documents-XML namespaces: Explicit and Default namespaces, Inheriting namespaces, And not inheriting namespaces, Attributes and namespaces –XML Schema. XML schema and namespaces, A first schema, Implementing XML schema types, The any Element, Inheritance, Substitution groups, Global and local type declarations, Managing Schemas, Schemas and instance documents, XML schema best practices- Processing XML SAX: Simple API for XML, DOM: Document object Model, XSLT, XPATH.

Unit 3: SOAP and WSDL5: The SOAP Model- SOAP- SOAP Messages, SOAP Envelope, SOAP Header, SOAP Body, SOAP Faults- SOAP encoding – SOAP RPC- Using alternative SOAP Encodings, Document, RPC, Literal, Encoded SOAP RPC and SOAP Document-Literal, SOAP web services and the REST Architecture- Looking back to SOAP 1.1: Syntactic differences between SOAP 1.2 and SOAP 1.1- Changes to SOAP-RPC- SOAP Encoding- WSDL structure - The stock quote WSDL interface, definitions, The type element, bindings, services, managing WSDL descriptions, Extending WSDL – Using SOAP and WSDL.

Unit 4: UDDI: UDDI at a glance- The UDDI Business registry- UDDI under the covers – Accessing UDDI- How UDDI is playing out Conversations Overview – Web Services – Web services Conversation Language – WSCL Interface components – The Bar scenario conversations – Relationship between WSCL and WSDL Workflow Business Process Management – Workflow and Workflow management systems – Business process execution language for web services

Unit 5: Transactions: ACID Transactions – Distributed Transactions and two phase commit – Dealing with Heuristic outcomes – Scaling transactions to web services – OASIS business transaction protocol – Other web services transaction Protocol Security Everyday security basis – Security is an end to end product – Web service security issues – Types of Security attacks and threats - Web services security road map – WS security

Text Book:

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services - An Architect's Guide", Pearson Education, 2nd Indian Reprint, 2005.

Reference Book:

1. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, and First Indian Reprint, 2005.

Elective – 2b) CLIENT SERVER COMPUTING

Objectives:

On the completion of the course, the students will

1. Acquire knowledge on client server Technology
2. Know the concepts of NOS, transaction processing, groupware and compound documents

Unit 1: Client/Server – Fat servers / clients – 2 tier versus 3-tier – intergalactic client / server – client/server building blocks – a one size fits all model – server-to-server middleware – clients, servers and operating systems.

Unit 2: Creating the single system Image – NOS middleware: The transparent issues – RPC, messaging and peer-to-peer – peer-to-peer communications – remote procedures call. Messaging and Queuing: The MOM middleware – MOM versus RPC- SQL database servers – fundamentals of SQL and Relational Databases – SQL database server architecture – stored procedures, triggers and rules – SQL middleware and federated databases – SQL middleware options – real SQL API – open SQL gateways.

Unit 3: Client / Server Transaction processing – ACID properties – Transaction models – TP monitors – transaction management standards – TP lite – TP – Heavy – TP – Lite versus TP – Heavy.

Unit 4: Client / Server groupware – what is groupware? – importance of groupware – components of groupware – client / server with distributed objects – distributed objects and components – from distributed objects to components – 3-tier client/server object style. CORBA: From ORBs to business objects – distributed objects, CORBA style – CORBA components – OMG's object management architecture – CORBA 2.0: The Intergalactic ORB – CORBA object services – CORBA common facilities – CORBA Business objects.

Unit 5: The Client Framework : compound documents – the compound document framework – the open Doc component – model – components, open Doc – style – Open Doc's Constituent Technologies – open Doc become OLD and vice versa – what open Doc does for client/server systems – OLE/D COM : What is OLE? OLE's constituent Technologies.

Text Book:

1. Robert orfali, Dan Harkey and Jeri Edwards, "The Essential Client / Server Survival Guide" , Galgotia Publications, 2nd Edition, 1997.

Reference Book:

1. Patrick Smith, Steve Gueugerich, "Client Server Computing", PHI, 2nd Edition, 2011

Elective – 2c) WEB TECHNOLOGY

Objectives:

On the completion of the course, the students will

1. Gain knowledge on internetworking concepts and internet protocols
2. learn the concepts of domain Name Service and Active Server Page.

Unit 1:

Internetworking concepts, devices, basics, history and architecture: Need for Internetworking – problems in Internetworking – dealing with Incompatibility issues – A virtual network – Internetworking Devices: Repeaters – Bridges – Routers – Gateways. A brief history of the internet – Growth of the internet – Internet topology – Internal Architecture of an ISP. TCP/IP Basics – Need for IP Address? – Logical Addresses – TCP/IP Example – The concept of IP Address.

Unit 2: Address Resolution Protocol (ARP) – Remote Address Resolution protocol (RARP) – Internet Control Message Protocol (ICMP) – Datagram fragmentation and reassembly. Basics of TCP – Features of TCP- Relationship between TCP and IP – Ports and sockets – Connections – Passive open and active open – TCP connections – TCP Reliability – TCP Packet Format – User Datagram Protocol – UDP Packet.

Unit 3: Domain Name service (DNS) – Electronic Mail (Email) – File Transfer Protocol (FTP) – Trivial file transfer protocol – A brief history of WWW – The Basic of WWW and browsing – Locating information on the internet – Hypertext markup language (HTML) – Web browser architecture – Web pages and Multimedia.

Unit 4: Web Technology : Introduction to web pages – Tiers – The concept of a Tier – Web pages : Static web pages – Plug-ins – Introduction to frames and forms – Frames – forms – Dynamic web pages – The need for dynamic web pages – The magic of dynamic web pages – An overview of dynamic web page Technologies – An Overview of Dynamic HTML (DHTML) – Common Gateway Interface.

Unit 5: Active Server Pages (ASP) – Basics of ASP Technology – Modern Trends in ASP – Java and the concept of Virtual Machine – Java servlets and Java server pages (JSP) – Java servlets – Java server pages. Active Web Pages : Introduction to active web pages – Java applets – Power of active web pages – Usage of active web pages – Life cycle of Java Applets – ActiveX controls – Java Beans. User sections in E-commerce applications: Problems with statelessness – Sessions and sessions management – Techniques for maintaining state information – Peer-to-peer (P2P) computing.

Text Book:

1. Achyut. S. Godbole, Atul Kahate, “Web Technologies, TCP/IP to Internet Application Architecture”, Tata McGraw-Hill Publication, 2003.

Reference Book:

1. N.P. Gopalan, J. Akilandeswari, “Web Technology: A Developer’s Perspective”, Prentice Hall of India Pvt. Ltd, Publication, 2014.

J2EE LAB

Objectives:

At the end of the course, the students will able to

1. Develop simple applications programs using J@EE
2. Design web applications using J2EE technologies.
3. Test and Install Tomcat server and create the work environment.
4. Design a
 - (i) Welcome Servlet Programs and
 - (ii) Servlet with Parameters
5. Implement Session Tracking in Servlet
 - (i) using cookies
 - (ii) using HttpSession
 - (iii) URL rewriting
6. Develop a
 - (i) HelloWorld Jsp program
 - (ii) JSP: declarations, expression and scriptlets
 - (iii) JSP with Parameter passing
7. Create Session tracking in JSP
 - (i) using cookies
 - (ii) using HttpSession
 - (iii) URL rewriting
8. Build an Online Exam program using JSP (jdbc)
9. Construct a Job Portal program using JSP (jdbc)
10. Test and Simulate a Entity Bean program in J2EE
11. Design and Test Session Bean in J2EE
12. Implement a Message Driven Bean in J2EE
13. Develop a Simple webservice using JSP.

VISUAL PROGRAMMING LAB

Objectives:

On the completion of the course, the students will

1. Obtain the knowledge on visual basic and vb.net.
 2. Get exposed to programming constructs in visual basic and vb.net.
-
1. Accept a character from console and check the case of the character.
 2. Build a program to accept any character from keyboard and display whether it is vowel or not.
 3. Design a VB.Net program to accept a string and convert the case of the characters.
 4. Create a menu based VB.Net application to implement a text editor with cut, copy, paste, save and close operations.
 5. Demonstrate a program in VB.Net to implement a calculator with memory and recall operations.
 6. Develop a Form in VB.NET to pick a date from Calendar control and display the day, month, year details in separate text boxes.
 7. Create a VB.Net application to perform timer based quiz of 10 questions.
 8. Develop a VB.Net application using the File, Directory and Directory controls to implement a common dialog box.
 9. Construct a database application to store the details of students using ADO.NET.
 10. Design a database application using ADO.NET to insert, modify, update and delete operations.
 11. Create a VB.Net application using Data grid to display records.
 12. Develop a VB.Net application using Data grid to add, edit and modify records.

NMEC - INTERNET TECHNOLOGY

Objectives:

By the end of the course, the students will be able to

1. Gain knowledge on internet, e-mail, world wide web
2. Know the concepts of web designing

UNIT 1: Introduction to Internet - protocols and other jargon - host machines and host names - internet architecture and packet switching - client server software model - band width and asynchronous communication.

UNIT 2: Working with e-mail- anatomy of an e-mail message - viewing inbox - viewing mail messages - sending a new mail message - replying to and forwarding e-mail messages - e-mail netiquette - inbox and mail folders.

UNIT 3: Mailing list and e-mail archives - mailing list - subscribing to mailing list managing mailing list - searching e-mail archives.

UNIT 4: The world wide web - hypertext and multimedia - web browser tips and tricks - search engines - subject tree - calculated serendipity - cleaning houses - assessing web page credibility - constructing own home page.

UNIT 5: Web page construction - remember the big picture - working with text - working with graphic - URL and path names - using tables and frames - HTML tag.

Text Book:

1. Wendy G. Lehnert, Internet 101, *"A beginners guide to Internet and World Wide Web"*, Pearson Education, 2003.

Reference Books:

1. Alexis Leon & Mathews Leon, *"Internet for Everyone"*, Leon Tech world, 1998.
2. Maureen Adams, Sherry Bonelli, *"Internet Complete"*, BPB Publications, 1998.

NMEC - OFFICE AND VISUAL BASIC PROGRAMMING

Objectives:

On the completion of the course, the students will

1. Acquire knowledge on Ms-Office
2. Understand the concepts of Visual Basic.

UNIT 1: Windows: A jump start – A short course in word for windows – The basics – Getting it right – Making it pretty – Formatting with styles – proofing your work – Tables – Automation x Customization.

UNIT 2: A short course in excel for windows – The basics – Building blocks – Enhancements – All about printing – Creating Excel – Database – Charting your course, Greeting your point across with PowerPoint – Editing presentations – Enhancing presentations.

UNIT 3: First steps with Microsoft Visual Basic 6 – the integrated development environment – Running the IDE – Selecting the project type – your very first VB program.

UNIT 4 : Introduction to forms – Common properties – Common methods – Common events – The form object.

UNIT 5: Intrinsic controls – Text box controls – Label and frame controls – Command Button, Checkbox, Option Button Control – List Box and Combo box controls – Picture box and Image controls.

Text Books:

1. John Weingarten, “Microsoft Office in Concert”, Galgotia Publications, 2nd Edition, 2003.
2. Francesco Balene, “Programming Microsoft Visual Basic 6.0”, WP publishers and distributors (p) Ltd., 2003

Reference Books:

1. S.S. Shrivastava, “MS Office”, Laxmi Publications, 2015
2. Mohammed Azam, “Programming with Visual Basic 6.0”, Vikas Publication House Pvt. Ltd, 2001.

DIGITAL IMAGE PROCESSING

Objectives:

On the completion of the course, the students will

1. Acquire knowledge on the problems in Image Processing techniques
2. Elucidate the various algorithms in Image Processing.

Unit 1: Continuous And Discrete Images And Systems :Light, Luminance, Brightness and Contrast, Eye, The Monochrome Vision Model, Image Processing Problems and Applications, Vision Camera, Digital Processing System, 2-D Sampling Theory, Aliasing, Image Quantization, Lloyd Max Quantizer, Dither, Color Images, Linear Systems And Shift Invariance, Fourier Transform, ZTransform, Matrix Theory Results, Block Matrices and Kronecker Products.

Unit 2: Image Transforms : 2-D orthogonal and Unitary transforms, 1-D and 2-D DFT, Cosine, Sine, Walsh, Hadamard, Haar, Slant, Karhunen-loeve, Singular value Decomposition transforms.

Unit 3: Image Enhancement : Point operations - contrast stretching, clipping and thresholding density slicing, Histogram equalization, modification and specification, spatial operations - spatial averaging, low pass, high pass, band pass filtering, direction smoothing, medium filtering, generalized cepstrum and homomorphic filtering, edge enhancement using 2-D IIR and FIR filters, color image enhancement.

Unit 4: Image Restoration :Image observation models, sources of degradation, inverse and Wiener filtering, geometric mean filter, non linear filters, smoothing splines and interpolation, constrained least squares restoration.

Unit 5: Image Data Compression And Image Reconstruction From Projections: Image data rates, pixel coding, predictive techniques transform coding and vector DPCM, Block truncation coding, wavelet transform coding of images, color image coding. Random transform, back projection operator, inverse random transform, back projection algorithm, fan beam and algebraic restoration techniques.

Text Books:

1. Anil K. Jain, "Fundamentals of Digital Image Processing", PHI, 1995.
2. Sid Ahmed M.A., "Image Processing", McGraw Hill Inc, 1995.

Reference Books:

1. Gonzalaz R. and R.Woods, "Digital Image Processing", Addison Wesley, 2nd Ed, 1987.
2. William. K. Pratt, "Digital Image Processing", Wiley Interscience, 2nd Ed,1991.

BIG DATA ANALYTICS

Objectives:

At the end of the course, the students will

1. Understand Big data basics
2. Get knowledge on Analytics for Enterprise class Hadoop with java.

Unit 1: Big Data: From the Business Perspective: What is Big Data? – Characteristics of Big Data - Data in Warehouse and Data in Hadoop. Why is Big Data Important? – When to consider a Big Data Solution- Big Data Use Cases: Patterns for Big Data Deployment.

Unit 2: Big Data: From the Technology Perspective: The History of Hadoop- Components of Hadoop – Application Development in Hadoop- Getting Your Data into Hadoop- Other Hadoop Components.

Unit 3: Storing Data in Hadoop: HDFS –HBase- combining HDFS and HBase for effective data storage using Apache Avro - Managing metadata with HCatalog.

Unit 4: Processing your data with Map Reduce: Getting to know Map Reduce - Your first MapReduce Application - Designing Map Reduce Implementations. Building Reliable MapReduce Application: Local Application Testing with Eclipse – Using logging for Hadoop Testing – Reporting Metrics with job counters – Defensive programming in Map Reduce.

Unit 5: Customizing MapReduce execution – Controlling MapReduce Execution with Input format - Reading Data your way with custom Record Reader- Organizing Output data with Custom Output Format – Writing Data your way with custom Record Writer- Optimizing Your MapReduce Execution with Combiner- Controlling Reduce Execution with Partitioner – Using Non-Java code with Hadoop.

Text Books:

1. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGraw-Hill, 2012.(Units I & II)
2. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Jhon Wiley & Sons, 2013(Units: III,IV & V).

Reference Book:

1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics For Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012.

COMPILER DESIGN

Objectives:

On the completion of the course, the students will

1. Understand various phases of a compiler.
2. Elucidate the working principles and usage of phases of a compiler.

UNIT 1: Introduction to compilers.- Compilers and Translators - Assembly language Macros - Structure of compilers - Compiler writing tools - Boot strapping. Lexical analysis - Role of lexical analyzer - Regular expression - Finite Automata - Implementation of lexical analyzer - context free grammars - Derivation and parse trees

UNIT 2: Parser - Shift reduce parsing - Operator precedence parsing -Top down parsing - Predictive parsers - LR Parsers - Constructing SLR Parsing tables - Constructing canonical LR Parsing tables - Constructing LALR Parsing tables - Using ambiguous grammar.

UNIT 3: Syntax directed translation schemes - Implementation of syntax directed translation schemes - Intermediate code - Postfix notation - Parse tree and Syntax tree Three address code - Quadruples and Tuples - Translation of assignment statements Boolean expression.

UNIT 4: Symbol table - Contents of symbol table - Data structures for symbol tables Implementation of simple stack allocation scheme - Implementation of block structure languages - Storage allocation in FORTRAN - Storage allocation in block structured language Errors - Lexical phase errors - Syntactic phase errors - Semantic errors.

UNIT 5: Code optimization: The Principle sources of optimization - Loop optimization - DAG Representation in basic blocks Code generation - Problem in code generation - A simple code generator - Register allocation and assignment - Code generation from DAG's - Peephole optimization.

Text Book:

1. A.V. Aho and Jeffery Ullman, "The Principles of Compiler Design", Narosa Publishing House, 2002.

Reference Book:

1. A.V. Aho, Ravi Sethi and Jeffry D Ullman, "Compiler Principles, Techniques And Tools", Pearson Education Asia, 2002.

Elective - 3a) DATA MINING AND DATA WARE HOUSING

Objectives:

By the end of the course, the students will

1. Obtain the knowledge on organization of data in the form of data warehouse
2. Comprehend the various techniques to mine the data.

UNIT 1: Introduction: Data Mining - Data Mining Functionalities - Classification of Data Mining Systems - Major Issues in Data Mining.

Data Warehouse and OLAP Technology for Data Mining: Data Warehouses - A multidimensional Data Model- Data Warehouse Architecture.

UNIT 2: Data Pre Processing: Data Cleaning - Data Integration and Transformation - Data Reduction. Data Mining Primitives , Languages, and System Architectures: Data Mining Primitives - A Data Mining Query Language - Designing Graphical User Interfaces Based on a Data Mining Query language - Architecture of Data Mining System.

UNIT 3: Mining Association Rules in Large Data bases: Association Rule Mining - Mining Single Dimensional Boolean Association Rules from Transactional Data Bases- Mining Multilevel Association Rules from Transactional Databases- Mining Multidimensional Association Rules from Relational Databases and Data Warehouses.

UNIT 4: Cluster Analysis: Cluster Analysis - Categorization of Major Clustering Methods Partitioning Methods -Hierarchical Methods - Density Based Method

UNIT 5: Mining Complex Types Of Data: Mining of Complex data Objects - Mining Spatial Data Bases - Mining Multimedia Databases - Mining Time - Series and Sequence Data - Mining Text databases - Mining the World Wide Web - Data Mining Applications.

Text Book:

1. Jiawei Han and Micheline Kamber,“Data Mining: Concept and Techniques”, Morgan Kaufmann Publishers, San Francisco, USA, First Indian Reprint, 2002.

Reference Books:

1. Margaret H.Dunham,“Data Mining Introductory and Advanced Topics”, Pearson Education, Inc,2003
2. Amitesh Sinha,“Data Warehousing”, Thomson Asia Pvt. Ltd., 2002

Elective - 3b) MOBILE COMPUTING

Objectives:

On the completion of the course, the students will

1. Acquire knowledge on Middleware and Gateways
2. Know the technology and working principles of Blue Tooth, and GPRS

Unit 1: Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications-Security in Mobile Computing – Architecture of Mobile Computing-Three-Tier Architecture-Design Consideration for Mobile Computing-Mobile Computing through Internet-Mobile Computing through Telephone-Developing an IVR Applications.

Unit 2: Bluetooth-RFID-Wireless Broadband (WiMax)- Mobile IP – IPV6-Java Card –Global System for Mobile Communications – GSM Architecture – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation – Authentication and Security- Mobile Computing Over SMS – SMS-Value Added Services through SMS.

Unit 3: GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations –Data Services in GPRS- Applications for GPRS – Limitations of GPRS- Spread Spectrum Technology- CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G – Wireless LAN Advantages – Wireless LAN Architecture- Mobility in Wireless LAN – Deploying Wireless LAN – Wireless LAN Security.

Unit 4: Mobile Phones – PDA- Design Constraints in Applications for Handheld Devices – Palm OS Architecture – Communications in Palm OS – Introduction to Symbian – Symbian OS Architecture – Applications for Symbian – Security on the Symbian OS- JAVA in the Handset – Java 2 Micro Edition Technology – Different Flavours of Windows CE- Windows CE Architecture.

Unit 5: Voice over IP- H.323 Framework for Voice Over IP- Session Initiation Protocol (SIP)- Comparison between H.323 and SIP – Real Time Protocols – Voice Over IP Applications – Security Techniques and Algorithms – Security Protocols – Public Key Infrastructure – Security Models-Security Framework for Mobile Environment.

Text Book:

1. Asoke K Talukder and Roopa R Yuvagal, “*Mobile Computing*”, Tata McGraw Hill Publishing Company Limited, 2005.

Reference Book:

1. Jochen Schiller, “*Mobile Communications*”, PHI, Second Edition, 2007

Elective - 3c) DISTRIBUTED OBJECT TECHNOLOGY

Objectives:

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

1. Understand the Software process assessment, Configuration management.
2. Know the concepts of Testing and Defect preventions.

Unit 1: Introduction – Software Process Assessment Overview – Assessment phase – Assessment principles – Assessment conduct – Implementation consideration – Quality Management – Quality Assurance Plan – Consideration – Verification and Validation.

Unit 2: Configuration Management – The need for Configuration Management – Software product nomenclature – Basic configuration management functions – Baselines – Responsibilities – Need for Automated tools – Configuration Management Plan – SCM support functions – The requirement phase design control – The implementation phase – Test phase – SCM for Tools – Configuration Accounting and Audit.

Unit 3: Software Standards and Inspection – Definitions – The reasons for software standards – Benefits of standards – Establishing standards – Guidelines – Types of reviews – Inspection of objectives – Basic Inspection Principles – The conduct of Inspection – Inspection Training.

Unit 4: Testing and Managing Software Quality – Testing principles – Types of tests – Test planning – Test Development – Test execution and reporting – Test tools and methods – Real time testing – Quality Management paradigm – Quality motivation – Measurement criteria – Establishing a software quality program – Estimating software quality.

Unit 5: Defect Prevention – Principles of software defect prevention – Process change for defect prevention – Defect prevention considerations – Management role – Framework for software process change – Managing resistance to software process change – Case studies.

Text Book:

1. Watts S. Humphrey, *“Introduction to the Team Software Process”*, Addison Wesley, 2000.

Reference Books:

1. Watts S. Humphrey, *“Introduction to the Personal Software Process”*, Addison Wesley, 2000.
2. Watts S. Humphrey, *“Managing the Software Process”*, Addison Wesley, 1999.

BIG DATA ANALYTICS LAB

Objectives:

On the completion of the course, the students will be able to

1. Work in Eclipse IDE Big Data, the Data Analytics lifecycle, Machine Learning (ML)
2. Develop the map reduce for Hadoop

1. Write a Word count Mapper program.
2. Design a Word count Reducer program using Java.
3. Develop a Word count Main program using Java.
4. Construct a program to Configure a Job using Mapper.
5. Prepare a program to Run a job using MapReduce.
6. Write a program for Running a Java map/reduce program on the cluster
7. Design a program for Reporting Metrics with job counters.
8. Develop a program for Reading Data your way with custom Record Reader.
9. Construct a program for Organizing Output data with Custom Output Format.
10. Prepare a program for Writing Data your way with custom Record Writer.
11. Write a program for Optimizing Your MapReduce Execution with Combiner.
12. Develop a program to Control Reduce Execution with Partitioner.

SOFTWARE ENGINEERING CASE TOOLS LAB
(Open Source Case Tool)

Objectives:

On the completion of the course, the students will able to

1. Develop the Software Engineering CASE Tools

2. Prepare the Software requirements specification.

1. Program Analysis and Project Planning.
 - a. Thorough study of the problem – Identify project scope, Objectives, Infrastructure.
2. Software requirement Analysis
 - a. Describe the individual phases / Modules of the project, Identify deliverables.
3. Data Modeling Use work products
 - a. Data dictionary, Use diagrams and activity diagrams, build and test class diagrams, Sequence diagrams and interface to class diagrams.
4. Software Development and Debugging
5. Software Testing Prepare test plan
 - a. Perform validation testing, Coverage analysis, memory leaks, develop test case hierarchy.

Note:

A list of Applications may be suggested for the students to develop documentation.

Also a set of open source case tools may be suggested for preparing the documentation.

Case Tools:

- | | | | |
|-------|---------------|---|---|
| (i) | UMLeT | - | Unified Modeling Language |
| (ii) | MSViSiO | - | Software Requirement |
| (iii) | WINRUNNER | - | Online Validation |
| (iv) | QPT | - | Online Validation |
| (v) | D'ZiNE Ver1.0 | - | OOAD |
| (vi) | ArchE | - | Architects explore architectural designs driven by quality attributes |

SOFT COMPUTING

Objectives

On the completion of the course, the students will

1. Comprehend soft computing, the components and building block hypothesis of genetic algorithm, the features of neural network and its applications
2. Understand the fuzzy logic components, neuro fuzzy modeling and control, machine learning through support vector machines

UNIT 1: INTRODUCTION TO SOFT COMPUTING

Evolution of computing – soft computing constituents – from conventional AI to computational intelligence – machine learning basics.

UNIT 2: GENETIC ALGORITHMS

Introduction, building block hypothesis, working principle, basic operators and terminologies like individual, gene, encoding, fitness function and reproduction, genetic modelling: significance of genetic operators, inheritance operator, cross over, inversion & deletion, mutation operator, bitwise operator, GA optimization problems, JSPP(Job Shop Scheduling problem), TSP(Travelling Salesman Problem), differences & similarities between GA & other traditional methods, applications of GA

UNIT 3: NEURAL NETWORKS

Machine learning using neural network, adaptive network – Feed Forward Networks – Supervised Learning neural networks – Radial Basics Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural networks.

UNIT 4: FUZZY LOGIC

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions – Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT 5: NEURO-FUZZY MODELING

Adaptive Neuro – Fuzzy Inference Systems – Coactive Neuro – Fuzzy Modeling - Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro - Fuzzy Control - Case Studies.

Text books:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mijutani, *“Neuro-Fuzzy and Soft Computing”*, Prentice-Hall of India, 2003. For Unit I
2. Davis E. Goldberg, *“Genetic Algorithms: Search, Optimization and Machine Learning”*, Addison Wesley, N.Y., 1989. For Unit II
3. S. Rajasekaran and G.A.V.Pai, *“Neural Networks, Fuzzy Logic and Genetic Algorithms”*, PHI, 2003. For Units III, IV & V.

Reference Book:

1. Kwang H. Lee, *“First course on Fuzzy Theory and Application”*, Springer-Verlag Berlin Heidelberg, 2005.

Elective - 4a) CRYPTOGRAPHY AND NETWORK SECURITY

Objectives:

On the completion of the course, the students will

1. Know various techniques in Cryptography
2. Understand the issues in security.

Unit 1:

Introduction: The Need for security – Security Approaches – Principles of Security – Types of Attacks – Theoretical Concepts.

Cryptographic Techniques: Introduction – Plain Text and cipher Text – Substitution techniques – Transposition techniques – Encryption and - Decryption – Symmetric and Asymmetric key cryptography – Steganography – Key range and Key size.

Unit 2:

Computer – Based Symmetric Key Cryptography Algorithms: Introduction – Algorithms types and modes – Overview of symmetric key cryptography – Data Encryption standard (DES) – IDEA – RC5 – BLOWFISH – Adv. Encryption std (AES).

Computer Based Asymmetric Key Cryptography Algorithm.: Introduction – History of Asymmetric Key Cryptography - The RSA Algorithm – Digital Signatures.

Unit 3:

Public Key Infrastructure - Introduction – Digital certificate – Private key Mgt – The PKIX Model – Public key cryptography Standards (PKCS) – XML, PKI and security.

Unit 4:

Internet Security Protocol: Basic concepts – SECURE SOCKETS LAYER (SSL) – Secure Hyper Text Transfer protocol (SHTTP) – Secure Electronic Transaction (SET) – SSL Vs SET – 3-D secure protocol – Electronic Money – email security – WAP security – Security in GSM.

Unit 5:

User Authentication Mechanisms: Introduction – Authentication Basics – Password – Authentication Tokens – Certificate Based Authentication – Biometric Authentication – Kerberos – Single sign-on Approaches. .

Practical Implementation Of Cryptography - Cryptography solution using JAVA – Cryptography Tool kits

Text Book:

1. Atul Kahate, “*Cryptography and Network Security*”, TataMcGraw – Hill Publication 2003.

Reference Book:

1. William Stallings, “*Cryptography and Network Security: Principles and Practices*”, Pearson Publications , Fourth Edition. 2008

Elective - 4b) SEMANTIC WEB

Objective :

By the end of the course, the students will

1. Acquire knowledge on Semantic Web
2. Know the application of Semantic Web

UNIT 1: The Semantic web Vision: Today Web – From Today’s Web the Semantic Web – Examples – Semantic web Technologies – A Layered Approach – Structured Web Documents in XML: Introduction the XML Language – Structuring - Name Spaces.

UNIT 2: Addressing and Quieting XML Documents – Processing – Describing Web Resources in RDF: Introduction – RDF: Basic Ideas – RDF XML – Based Syntax – RDF Schema Basic Ideas – RDF Schema: The Language – RDF and RDF Schema in RDF Schema.

UNIT 3: An Axiomatic Semantic for RDF and RDF Schema – A Direct Inference System for RDF and RDFS – Querying in RQL – Web Ontology Language: Introduction – The OWL Language – Examples – OWL in OWL.

UNIT 4: Future Extensions Logic and Inference: Example of Monotonic Rules: Family Relationship – Monotonic Rules: Syntax – Semantics – Non – Monotonic Rules: Motivation and Syntax – Example of Non – Monotonic Rules: Brokered Trade – Rule Markup in XML: Monotonic Rules – Non monotonic Rules.

UNIT 5: Applications: Introduction – Horizontal Information Products at Elsevier – Data Integration at Audi – Skill Finding at Swiss Life – Think Tank Portal at Enersearch – e – Learning – Web Services-Ontology Engineering: Introduction – Constructing ontologies – Manually – Resuing Existing ontologies – Using semiautomatic methods - On – to – knowledge Semantic web Architecture.

Text Book:

1. Grigoris Antoniou and Frank Van Harmelen, “*Semantic Web Primer*”, The MIT Press Cambridge, Massa Chusetts London, England.

Reference Books:

1. Christopher Walton, “*Agency and the Semantic Web*”, Oxford University Press, 2007
2. AF Salam and Jason R Stevens, “*Semantic Web Technologies and e-Business*”, Idea Group Publications, 2007

Elective - 4c) ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

Objectives:

On the completion of the course, the students will

1. Obtain knowledge on 8086, 80286, Pentium, architectures and assembly language programs and microcontrollers.
2. Know the details about various interfacing devices like 8255, 8253, 8259, 8279, 8251, 8257.

UNIT 1: Register organization of 8086- Architecture- Signal description of 8086 - Minimum mode 8086 system and timings - Maximum mode 8086 System and Timings - Machine Language Instruction format - Addressing modes of 8086 - Instruction set of 8086 - Assembler directives and operators.

UNIT 2: A few machine level programs - Machine coding the programs - Programming with an assembler - Assembly language example programs. Introduction to stack - STACK structure of 8086 - Interrupts and Interrupt Service Routines.

UNIT 3: Salient features of 80286 - Internal Architecture of 80286 - Signal descriptions of 80286 - Real addressing mode - Protected Virtual Addressing Mode (PVAM) - Privilege - Protection - 80286 Bus Interface - Basic bus operations - Interfacing Memory and I/O devices with 80286 - Instruction set features.

Salient features of 80586 (PENTIUM) - A few relevant concepts of computer architecture - System architecture - Enhanced Instruction set of Pentium.

UNIT 4: PIO 8255 - programmable Interval Timer 8253 - Programmable Interrupt Controller 8259 - Keyboard / Display Controller 8279 - Programmable Communication Interface 8251 USART - DMA Controller 8257. Intel MMX Architecture – MMX Instruction set.

UNIT 5: Architecture of 8051 - Signal Description of 8051 - Register set of 8051 - Important operational features of 8051 - Memory and I/O Addressing by 8051 - Interrupts of 8051 - Instruction set of 8051 - Design of a MicroController 8051 Based Length Measurement System for continuously Rolling Cloth or Paper.

Text Book:

1. A.K. Ray and Bhurchandi , *"Advanced Microprocessor And Peripherals"*, TMH, 2000

Reference Books:

1. Myke Predko , *"Programming and Customizing the 8051 Microcontroller"*, TMH
2. Douglas V. Hall *"Microprocessors and Interfacing Programming and Hardware"*, Tata McGraw - Hill Publishing Company Limited, Second Edition.

SEMESTER : IV
CODE : P16CS4PJ

TOTAL HOURS: 225
CREDITS : 8

Core Project-I: PROJECT

AIM: To expertise in industry-standard project practices and to practice different phases of software/system development life cycle.

OBJECTIVE

- To apply the knowledge gained through various courses in solving a real life problem
- To get accustomed to professional environment and style typical of a global IT industry
- To get an opportunity for effective, real-life, technical documentation.
- To practice time, resource and person management.

PROJECT EVALUATION

- **Internal Assessment**

There shall be six components that will be considered in assessing a project work with weightage as indicated.

- Timely completion of assigned tasks as evidenced by team meeting minutes
- Individual involvement, team work and adoption of industry work culture
- Quality of project documentation (Precision, stylistics etc)
- Achievement of project deliverables
- Effective technical presentation of project work
- Viva

Based on the above 6 components internal mark can be awarded

- **External Assessment**

Dissertation/Project submitted at the end of third year shall be valued by two examiners appointed by the Controller for the conduct of practical exam. The board of examiners shall award 60 marks based on the following components.

- Achievement of project deliverables
- Effective technical presentation of project work
- Project Viva