

Department of Information Technology
Bishop Heber College (Autonomous), Tiruchirappalli – 620 017

M. Sc. (Information Technology)
(Syllabus for students admitted from 2015 – 2016 onwards)

Sem	Course	Course Title	Course Code	Hours Per Week	Credits	Marks		
						CIA	ESE	TOTAL
I	Core I	C and Data Structures	P15IT101	5	5	25	75	100
	Core II	Multimedia Technologies	P15IT102	5	5	25	75	100
	Core III	Data Communication Networks	P15IT103	5	5	25	75	100
	Core Prac.-I	C and Data Structures Lab	P15IT1P1	6	4	40	60	100
	Core Prac.-II	Multimedia Lab	P15IT1P2	5	3	40	60	100
	Elective-I	Software Engineering	P15IT1:1	4	4	25	75	100
		Open Source Technologies	P15IT1:2					
		Human Computer Interaction	P15IT1:3					
II	Core IV	Operating Systems	P15IT204	4	4	25	75	100
	Core V	Object Oriented Programming and Java	P15IT205	4	4	25	75	100
	Core VI	Web Programming	P15IT206	4	4	25	75	100
	Core Prac.-III	Java Programming Lab	P15IT2P3	4	2	40	60	100
	Core Prac.-IV	Web Programming Lab	P15IT2P4	4	2	40	60	100
	Elective-II	Unified Modeling Language /	P15IT2:1	4	4	25	75	100
		Cryptography and Network Security /	P15IT2:2					
		Software Testing	P15IT2:3					
	ED 1	Programming the World Wide Web	P15IT2E1	4	4	25	75	100
VLO	RI/MI	P08VL2:1 P08VL2:2	2	2	25	75	100	
III	Core VII	Database Management Systems	P15IT307	5	5	25	75	100
	Core VIII	Mobile Technologies	P15IT308	5	5	25	75	100
	Core IX	DOT.NET Technologies	P15IT309	5	5	25	75	100
	Core Prac.- V	RDBMS Lab	P15IT3P5	6	4	40	60	100
	Core Prac.-VI	DOT.NET Programming Lab	P15IT3P6	5	3	40	60	100
	Elective-III	Web Services /	P15IT3:1	4	4	25	75	100
		Grid Computing /	P15IT3:2					
		Service Oriented Architecture	P15IT3:3					
IV	Core X	Advanced Data Analytics	P15IT410	6	5	25	75	100
	Elective-IV	Cloud Computing	P15IT4:1	4	4	25	75	100
		Parallel Computing	P15IT4:2					
		Semantic Web	P15IT4:3					
	Core Project	PROJECT WORK	P15IT4PJ	--	5	---	---	100

Core Theory : 10 Elective : 4 Total Credits : 92

Core Practicals : 6 Core Project : 1

Value Education : 1 NMEC :1

ED Course offered by the I. T. Department: Programming To The World Wide Web (P15IT2E1)

M. Sc. [IT] - Semester I
Core Course - I

C AND DATA STRUCTURES
(Course Code : P15IT101)

Objective : *To provide problem solving and programming skills with the facilities in C language and to understand the fundamentals of Data Structures.*

Unit -1 (12 Hrs.)

Overview of C: History & Importance - Basic Structure of C programs, **Variables and Data types:** Character Set – C tokens – keywords and Identifiers – Constants - Variables – Data types – Declaration of variables – Assigning values to variables – Symbolic constants - **Operators and Expressions:** Introduction – Arithmetic operators – Relational Operators – Logical operators– Assignment Operators – Increment and Decrement operators – Conditional operators- Bitwise Operators – Special Operators – Expressions – **Managing input and output operators:** Reading a character – Writing a Character – Formatted input and output - **Decision making and Branching:** If -Switch – goto – **Decision Making and Looping:** While – Do-while – For.

Unit – 2 (12 Hrs.)

Arrays: One, Two and Multidimensional arrays – **Functions :** User defined functions – Mathematical and String Handling functions - Category of functions – Recursion – Scope and life time of variables in functions - **Structures and Unions:** Introduction – Structure definition – Giving values to members – Structure Initialization – Comparison of Structure variables – Arrays of structures–Arrays within structures–Structures within structures–Structures and functions–Unions.

Unit – 3 (12 Hrs.)

Pointers: Introduction – Understanding pointers – Accessing the address of a variable through input pointer – Pointer expressions – Pointer Increments and Scale factor – Pointers and Arrays – Pointers and character strings – Pointers to functions – Pointers and structures – Points on pointers – **File Management:** Introduction – Defining and opening a file – Closing a file – Input or Output operations on files.

Unit – 4 (12 Hrs.)

Arrays and Sequential Representations – Ordered Lists – Stacks and Queues – Evaluation of Expressions – Multiple stacks and queues – Singly Linked Lists – Linked Stacks and Queues – Polynomial Addition – Doubly Linked Lists.

Unit – 5 (12 Hrs.)

Trees – Binary tree representations – Tree traversal – Threaded binary trees – Binary tree representation of trees – Set representations – decision trees –Counting Binary Trees – Graphs and Representations – Traversals.

Books for Study :

1. Balagurusamy E., **“Programming in ANSI C”**, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.
2. Ellis Horowitz and Sartaj Sahni, **“Fundamentals of Data Structures”**, Galgotia Publications., Delhi, Reprint 2001.

Book for Reference :

1. Ashok N. Kamthane, **“Programming with ANSI and TURBO C”**, Pearson Education, 2004.
2. Yashavant Kanetkar, **“Let us C”**, 3rd Edition, BPB Publications, New Delhi, 1999.
3. Seymour Lipschutz, **“Data Structures with C”**, Tata McGraw Hill, Schaum’s Outline Series, 2011.

M. Sc. [IT] - Semester I
Core Course – II

MULTIMEDIA TECHNOLOGIES
(Course Code : P15IT102)

Objective : *To impart basic knowledge required to work with various components of multimedia such as text, graphics, animation, audio and video.*

Unit 1 (10 Hrs.)

Introduction to Multimedia : – What is Multimedia – Multimedia and Hypermedia – World Wide Web – Overview of Multimedia Software Tools – **Multimedia Authoring and Tools :** - Multimedia Authoring – Some Useful Editing and Authoring Tools – VRML.

Unit 2 (12 Hrs.)

Graphics and Image Data Representation : - Graphics / Image Data Types – Popular File Formats - **Color in Image and Video :** - Color Models in Images – Color Models in Video

Unit 3 (13 Hrs.)

Fundamental Concepts in Video : - Types of Video Signals – Analog Video – Digital Video – **Basics of Digital Audio :** - Digitization of Sound – Musical Instrument Digital Interface – Quantization and Transmission of Audio

Unit 4 (15 Hrs.)

Lossless Compression Algorithms : - Introduction – Run-Length Coding – Variable Length Coding – Lossless Image Compression – **Lossy Compression Algorithms :** - Introduction – Distortion Measures – The Rate-Distortion Theory – Quantization.

Unit 5 (10 Hrs.)

Image Compression Standards : - The JPEG Standard – **MPEG Video Coding :** – MPEG 1 - MPEG 2 – Overview of MPEG 4

Book for Study

1. Ze-Nian Li, Mark S. Drew, *“Fundamentals of Multimedia”*, Pearsons Education, New Delhi, 2005.

Books for Reference:

1. John F. Koegel Bufford, *“Multimedia Systems”*, Pearson Education, Delhi, 2005.
2. Ralf Steinmetz, Klara Nahrstedt, *“Multimedia Computing, Communications & Applications”*, Pearsons Education Inc., New Delhi, 2006.
3. David Hillman, *“Multimedia Technology & Applications”*, Galgotia Publications, New Delhi, 2010.

M. Sc. [IT] - Semester I
Core Course - III

DATA COMMUNICATION NETWORKS

(Course Code : P15IT103)

***Objective :** To impart good Understanding on the Characteristics, Specifications, Standards, Protocols and Techniques of the modern Computer based Communication Systems.*

Unit – 1 (12 Hrs.)

Overview: A Communication model - Data Communications – Networks – The Internet – **Protocol Architecture:** The need for a Protocol Architecture – The TCP/IP protocol Architecture. – The OSI Model –Standardization within a Protocol Architecture - **Data Transmission:** Concepts & terminology–Analog & Digital Data Transmission – Transmission Impairments **Guided & Wireless Transmission:** Guided Transmission Media – Wireless Transmission – Wireless Propagation.

Unit – 2 (12 Hrs.)

Digital Data Communication Techniques: Asynchronous and Synchronous Transmission – Types of Errors–Error Detection – Error Correction – Line Configurations - **Data Link Control Protocols:** Flow Control – Error Control – High Level Data Link Control (HDLC) - **Multiplexing:** Frequency Division Multiplexing – Synchronous Time Division Multiplexing – Statistical Time Division Multiplexing – Asymmetric Digital Subscriber Line – xDSL.

Unit – 3 (12 Hrs.)

Circuit Switching and Packet Switching: Switched Communications Networks–Circuit Switching Networks – Circuit Switching Concepts – Soft switch Architecture – Packet Switching Principles–X.25–Frame Relay **Asynchronous Transfer Mode:** Protocol Architecture – ATM Logical Connections – ATM Cells – Transmission of ATM Cells – ATM Service Categories.

Unit – 4 (12 Hrs.)

Routing in Switched Networks : Routing in Packet Switching Networks – Least Cost Algorithms. **Congestion Control in Data Networks:** Effects of Congestion – Congestion Control - Traffic Management. **Local Area Networks – LAN Overview:** Background – Topologies and Transmission Media – LAN Protocol Architecture – Bridges – Layer2 and Layer3 Switches.

Unit – 5 (12 Hrs.)

Communication Architecture and Protocols: - Internetwork Protocols: Basic Protocol Functions – Principles of Internetworking – Internet Protocol Operation – Internet Protocol – IPV6. - **Transport Protocols:** Connection Oriented Transport Protocol Mechanisms – TCP –TCP Congestion Control – UDP. **Internet Applications :** Electronic Mail – SMTP and MIME – Network Management (SNMP) – Internet Directory Service – Web Access - HTTP.

Book for Study

1. William Stallings, *“Data and Computer Communications”*, 8th Edition, Pearson Education, 2007.

Books for References:

1. Behrouz A. Forouzan, *“Data Communications and Networking”*, 4th Edition, Tata McGraw Hill Publishing Company, 2006.
2. Andrew S. Tannenbaum, David J. Wetherall, *“Computer Networks”*, 5th Edition, Pearsons Education, 2011.

**M. Sc. [IT] - Semester I
Core Practical Course – I**

**C AND DATA STRUCTURES LAB
(in LINUX Environment)
(Course Code : P15IT1P1)**

Objective : *To enrich programming skills in C Language under LINUX platform; involving problems in general, data structures and algorithm domains.*

1. Write a program to find the factorial of n numbers using recursion.
2. Write a program to reverse the string.
3. Write a program to check the string is palindrome or not.
4. Write a program
 - (i) List of names in alphabetical order.
 - (ii) List of numbers in ascending and descending order.
5. Perform Matrix Manipulation using functions.
6. Prepare an Electricity Bill using structures.
7. Perform string manipulation using pointers.
8. File processing – pay slip.
9. Write a program to perform
 - (i) Stack Operation
 - (ii) Queue Operation
 - (iii) Linked List Operation
10. Sorting
 - (i) Bubble Sort
 - (ii) Selection Sort

M. Sc. [IT] - Semester I
Core Practical Course – II

MULTIMEDIA LAB
(Course Code : P15IT1P2)

Objective: *To provide hands on training required to handle various components of Multimedia such as text, graphics, animation, audio and video.*

1. Working with Text and Styles using Adobe Photoshop.
2. Creating shapes and painting in Adobe Photoshop (Using Drawing tool, Pen tool, Painting tools, and Brush tools).
3. Working with Image size and Resolution in Adobe Photoshop.
4. Working with Layers in Adobe Photoshop.
5. Transforming and Retouching Images using Adobe Photoshop (Cropping, Transforming objects, Clone stamping, Retouching).
6. Working with color Adjustments in Adobe Photoshop.
7. Creating Frame-by-Frame Animation & Tweened Animation–(motion tween and shape tween) using Macromedia Flash.
8. Working with textual effects in Macromedia Flash.
9. Creating buttons and working with scenes in Macromedia Flash.
10. Creating animation with sound using Macromedia Flash.
11. Recording, Editing and Mixing audio clips using Adobe Audition.
12. Capturing, Editing and Rendering video clips using Adobe Premier.

M. Sc. [IT] - Semester I
Elective Course - IA
SOFTWARE ENGINEERING
(Course Code : P15IT1:1)

Objective: *To provide exposure on the principles and practices used in Software Development.*

Unit – 1 (12 Hrs.)

Need for S/w Engineering: Need for S/w engineering – About software and S/w engineering – A systems approach, - Engineering approach – Members of the development team – Change in S/w engineering. - Modeling the process and Life cycle: The meaning of process – S/w process models – Tools and techniques for process modeling – Practical process modeling.

Unit – 2 (10 Hrs.)

Planning and Managing the project: Tracking progress – Project personnel – Effort estimation – Risk management – The project plan – Process models and project management.

Unit – 3 (13 Hrs.)

Capturing the requirements : The requirement process – Types of Requirements – Characteristics of requirements – Expressing requirements – Additional requirements notations – Prototyping requirements – Requirements Documentation – Participants in the requirements process – Requirements validation – Measuring requirements – Choosing a requirements specification Techniques.

Unit – 4 (12 Hrs.)

Designing the system : Design Introduction – Decomposition and Modularity – Architectural styles and strategies – Characteristics of good design – Techniques for improving design – Design evaluation and validation – Documenting the design – Programming standards and procedures – Programming guidelines – Documentation.

Unit – 5 (13 Hrs.)

Testing Strategies : Testing strategic issues – Test strategies for conventional S/w – Test strategies for object oriented S/w – Validation testing – system testing – S/w testing. Fundamentals – Black-box and White-box testing – White box testing – Black box testing – McCall's Quality factors – ISO 9126 - QF – S/w Engineering – S/w Maintenance – A S/w engineering process model.

Books for Study :

1. Shari Lawrence P. Fleeger, "*Software Engineering Theory and Practice*", 2nd Edition, Pearson Education, Delhi, 2001. [(for Units 1–4) Chapters 1, 2, 3, 4, 5, 7]
2. Roger S. Pressman, "*Software Engineering A Practitioner's Approach*", 6th Edition, Tata McGraw Hill Publication, [(for Unit 5) Chapters : 13, 14, 15, 31]

Books for Reference :

1. Ian Sommerville, "*Software Engineering*", 6th Edition, Pearson Education, Delhi, 2005.
2. Douglas Bell, "*Software Engineering for Students-A Programming Approach*", 4th Edition, Pearson Education, Delhi 2007.

M. Sc. [IT] - Semester I
Elective Course - IB
OPEN SOURCE TECHNOLOGIES
(Course Code : P15IT1:2)

***Objective :** To impart knowledge on Open Source Technologies involving Linux, Apache, MySQL and Perl.*

Unit – 1 : (10 Hrs.)

Introduction: - Open Source Software – Web Explained - Working – Security – **Linux:** - Overview – Basic UNIX

Unit – 2 : (10 Hrs.)

Apache Web Server: - Introduction – Starting, Stopping and Restarting Apache – Configuration – Securing Apache – Web Site Creation – Apache Log Files.

Unit – 3 : (12 Hrs.)

Perl : - Introduction – Perl Documentation – Perl Syntax Rules – Introduction to Object Oriented Programming – **MySQL:** - Introduction – Commands - SHOW DATABASES - CREATE DATABASES – USE – CREATE TABLE – SHOW TABLES – DESCRIBE – INSERT – SELECT – UPDATE – DELETE – Administrative Details – Database Independent Interface – Table Joins – Loading and Dumping Database.

Unit – 4 : MYSQL (14 Hrs.)

Website META Language: - Introduction – Installation – Basics – Creating a Template – Other Helpful Includes – Diversion – A Better Template – Configuring WML with .wmlrc – MACROS- Creating Custom Tags – Programming Code – eperl – Project Creation – **Common Gateway Interface:** - Introduction – Apache Configuration – First CGI Program – Introduction of CGI.pm – CGI.pm HTML Shortcuts – Information Received by the CGI Program - Form Widget Methods – CGI Security Considerations – die() function – **mod-Perl:** - Introduction – Configuration – Turning CGIs into mod-perl Programs – Pure mod-perl Programming.

Unit – 5 : (14 Hrs.)

Server Side Includes: - Introduction – Security Considerations – **Embperl (HTML::Embperl):** – Introduction – Installation – Apache Configuration – Example Program – Embperl Commands – Posted Data and %fdat – Other Embperl Variables - Embperl Project – **Mason (HTML::Mason):** – Introduction – Installation – Apache Configuration – Example Program – Inline Perl Sections – Handling Posted Data with % ARGS and <%args> - Mason Components – Mason Project

Book for Study

1. James Lee and Brent Ware, "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", Dorling Kindersley(India) Pvt. Ltd, 2009.

Book for Reference

1. Eric Rosebrock, Eric Filson, "Setting up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

M. Sc. [IT] - Semester I
Elective Course - IC

HUMAN COMPUTER INTERACTION
(Course Code : P15IT1:3)

Objective: To provide a vivid understanding on the concepts and technologies that enables and governs the interaction between Human Beings and Computers.

Unit – 1 (13 Hrs.)

Introduction: Cognitive Psychology and Computer Science–Capabilities–Goals–Roles–Basic UI – Advanced UI Justification of Interdisciplinary nature – Standard Framework – Design Principles – Interface Levels – Steps in Designing HCI Applications – GUI Design- Popular HCI Tools – Architecture of HCI Systems – Advances in HCI – **Usability Engineering:** - Introduction – HCI and Usability Engineering–Usability Engineering Attributes–Process of Usability–Need for Prototyping.

Unit – 2 (12 Hrs.)

Modeling of Understanding Process - : Introduction – GOMS- CCT – ACTR – SOAR – BDI – ICARUS – Clarion – Subsumption Architecture – **Spoken Dialogue System:**- Introduction- Factors Defining Dialogue System – General Architecture of a Spoken Dialogue System – Dialogue Management Strategies – Computational Models for Dialogue Management – Statistical Approaches to Dialogue Management Learning Automata as Reinforcement Learners – Software and Toolkits for Spoken Dialogue System Development – **Case study:** - Learning Dialogue Strategy Using Interconnected Learning Automata.

Unit – 3 (12 Hrs.)

Recommender Systems : Introduction – HCI Study Based on Personalization – Personalization in Recommender Systems – Relation between Information Filtering and Recommender Systems – Application Areas of Recommender Systems – Recommender System Field as an Interdisciplinary Area of Research- Phases of Recommender Systems – User Profiling Approaches – Classification of Recommendation Techniques – Advantages and Disadvantages of Recommender Systems – Evaluating Recommender Systems – Integrated Framework of Recommender Systems – **Case Study:** - Music Recommender System.

Unit – 4 (10 Hrs.)

Advanced Visualization Techniques: Ontology Definition – Ontology Visualization Methods – Space Dimension of Ontology Visualization – Ontology Languages – Ontology Visualization Tools – Ontology Reasoning – Reasoner – **Case Studies:** - Teaching Ontology with C Programming Language – Activity for Ontology Creation with a case of a Software Company Scenario – Activity for History Ontology Creation.

Unit – 5 (13 Hrs.)

Ambient Intelligence : The New Dimension of HCI – Introduction – Ambient Intelligence Definition – Context Aware Systems and Human Computer Interaction – Middleware – Modeling Data for Aml Environment- Case Studies: - Development of Context – Awareness Feature in smart Class Room – context Aware Agents for developing Aml Applications.

Book for Study:

1. K.Meena, R.Sivakumar, “Human Computer Interaction”, - PHI Learning Pvt.Ltd.2015.

Book for Reference:

1. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, **“Human-Computer Interaction”**, Pearson Education, 2009.
2. John M.Carroll, ”Human computer Interaction-in the New Millennium”, Pearson Education,2007

M. Sc. [IT] - Semester II
Core Course - IV

OPERATING SYSTEMS
(Course Code : P15IT204)

***Objective:** To impart knowledge on aspects related with the working and scope of Operating Systems used in Personal Computers.*

Unit - 1 (10 Hrs.)

Operating System Overview : Operating systems objectives and functions – The Evolution of Operating Systems – Developments leading to Modern Operating Systems. - **Process Description and Control:** What is a process? – Process states – Process Description – Process control.

Unit - 2 (13 Hrs.)

Threads, SMP and Micro Kernels - Processes and Threads - Symmetric Multiprocessing – Microkernels - **Concurrency : Mutual Exclusion and Synchronization:** – Principles of Concurrency - Mutual Exclusion Hardware Support – Semaphores – Monitors – Message Passing – Readers/Writers Problem.

Unit - 3 (13 Hrs.)

Concurrency : Deadlock: – Principles - Deadlock Prevention - Deadlock Detection - Deadlock Avoidance - Deadlock Detection - An Integrated Deadlock Strategy – Dining Philosophers Problem - **Memory Management:** – Memory Management Requirements – Memory Partitioning – Paging – Segmentation - **Virtual Memory:** - Hardware and Control Structures – Operating System Software.

Unit - 4 (10 Hrs.)

Scheduling: – Types of Uniprocessor Processor Scheduling – Uniprocessor Scheduling algorithms – Multi-Processor Scheduling – Real Time Scheduling.

Unit - 5 (14 Hrs)

I/O Management: - I/O Devices – I/O Functions – I/O Design Issues – I/O Buffering – Disk Scheduling – RAID – Disk Cache - **File Management:** – Overview - File Organization and Access – File Directories - File Sharing – Record Blocking - Secondary Storage Management – File System Security.

Book for Study:

1. William Stallings, *“Operating Systems Internal and Design Principles”*, Sixth Edition, Pearsons Education, 2009.

Book for Reference:

1. Abraham Silberchatz, Peter Baer Galvin, Greg Gagne, *“Operating System Concepts”*, 9th Edition, John Wiley and Sons, 2013.

M. Sc. [IT] - Semester II
Core Course - V

OBJECT ORIENTED PROGRAMMING AND JAVA
(Course Code : P15IT205)

Objective : *To provide programming experience and problem solving expertise with exposure to Object Oriented Programming techniques and other facilities available in JAVA.*

Unit – 1 (12 Hrs.)

Fundamentals of Object Oriented Programming – Overview of JAVA Language – Introduction to Classes – Class Fundamentals – Declaring Objects – Constructors – Methods – Overloading Methods – Inner Classes – Inheritance – Method Overriding – Packages – Interfaces

Unit – 2 (12 Hrs.)

Exception Handling – Types of Exceptions – Try and Catch – Nested Try – Throw and throws – Multithreading – Thread Priorities – Main thread – Synchronization.

Unit – 3 (12 Hrs.)

The Collections Framework: The Collection Interfaces-The collection Classes –Accessing a Collection via an Iterator - Storing User-Defined Classes in Collections - Working with Maps - The Legacy Classes and Interfaces.

Unit – 4 (12 Hrs.)

Applet class – Applet Architecture – The HTML Applet tag – Passing parameters in Applets- AWT classes – Window fundamentals – AWT controls – Layout Managers - Menus. Swing: JApplet-Icons and Labels-TextFields-Buttons-Combo Boxes-Tabbed Panes-ScrollPanels-Tables-Trees.

Unit – 5 (12 Hrs.)

JAVA Database Connectivity – JDBC / ODBC bridge – JAVA SQL package – JDBC Exception Class – Connection to remote database – Data Manipulation – Data Navigation. Introduction to Java Beans.

Books for Study:

1. Herbert Schildt, *“JAVA 2 Complete Reference”*, 4th Edition, TMH Publications, 2001. (for Units 1 to 4)
2. Ivan Bayross, *“JAVA 2.0 (Web enabled commercial application development)”*, BPB Publications, 2000 (for Unit 5)

M. Sc. [IT] - Semester II
Core Course - VI

WEB PROGRAMMING

(Course Code : P15IT206)

Objective : To familiarize Web based Programming with Client as well as Server side scripting.

Unit – 1 (10 Hrs.)

Introduction : - HTML, XML & WWW – **HTML**: - Basic HTML – Document Body – Text – Hyperlinks – More Formatting – Lists – Colors and Images – Images - **More HTML**: – Tables – Multimedia Objects – Frames – Forms – HTML Document Head in Detail – XHTML

Unit – 2 (12 Hrs)

Style Sheets: - **Cascading Style Sheets**: – Introduction – Using Styles – User Defined Styles – Properties and Values in Styles – Style Sheets-A Worked Example – Formatting Blocks of Information – Layers - **CSS2**: - Design of CSS2 – Styling for Paged Media – Using Aural Presentation – Counters and Numbering

Unit – 3 (12 Hrs.)

JavaScript: - **Introduction**: – DHTML – JavaScript Basics – Variables – String Manipulations – Mathematical Functions – Statements – Operators – Arrays – Functions - **Objects in JavaScript**: – Data & Objects in JavaScript – Regular Expressions – Exception Handling – Built-in Objects – Cookies – Events

Unit – 4 (14 Hrs.)

DHTML with JavaScript: - Data Validation Opening a New Window – Messages and Confirmations – Status Bar – Writing to a Different Frame – Rollover Buttons – Moving Images – Multiple Pages in a Single Download – Text-only Menu System – Floating Logos.

Unit – 5 (12 Hrs.)

PHP: - **Introduction to PHP**: - Overview – Including PHP in a page – Data Types – Program Control – Arrays – User-Defined Functions – Built-in Functions – Regular Expression – Using Files – **Building Web Applications with PHP**: - Tracking Users – Using Databases – Handling XML.

Book for Study:

1. Chris Bates, *“Web Programming : Building Internet Applications”*, 3rd Edition, Wiley India, Delhi, 2011.

Books for Reference:

1. Eric Ladd, Jim O'Donnell, et al., *“Using HTML 4, XML, and Java 1.2”*, Platinum Edition, PHI Publications, New Delhi, 2003
2. N. P. Gopalan, J. Akilandeswari, *“Web Technology : A Developer's Perspective”*, PHI Publication, New Delhi, 2007.
3. Paul J. Deitel, Harvey M. Deitel, *“Internet & World Wide Web : How to Program”*, 4th Edition, Pearson Education, New Delhi, 2011.

M. Sc. [IT] - Semester II
Core Practical Course – III

JAVA PROGRAMMING LAB
(Course Code : P15IT2P3)

Objective : *This practical course provide hands on experience in Object Oriented Programming techniques using the facilities available in JAVA.*

1. Classes and Objects
2. Inheritance
3. Interfaces
4. Packages
5. Exception Handling
6. Multithreading
7. Usage of Applets
8. Usage of AWT
9. Login Screen using swing display
10. Implementation of User Interfaces using JDBC
11. Insert, update and delete records in an access table using JDBC

M. Sc. [IT] - Semester II
Core Lab Course - IV

WEB PROGRAMMING LAB

(Course Code : P15IT2P4)

Objective : To provides hands on training in programming for the world wide web.

1. Create Web Pages for I. T. Department using features in HTML.
2. Create Web Pages for a travel agency using frames, tables and lists.
3. Create Web Pages to display the menu card of a hotel using style sheets.
4. Create Web Pages using forms for College Students Admission Process. (Use list box, Push button, Radio button, Command Button, Rich text box, text box, etc where ever applicable).
5. Create a Registration Form using Java Script. Apply appropriate data validations.
6. Write a program using Java Script to display the calculator in a web page.
7. Create web pages using Java Script to display the product details of a vehicle dealer for a given date and time. Use necessary controls where ever applicable.
8. Write a program in PHP to test string functions.
9. Write a PHP program using forms to display student record stored in My-SQL.
10. Write a program in PHP to maintain employee records using files.
11. Write a PHP program using XML style sheet.

M. Sc. [IT] - Semester II
Elective Course - IIA

UNIFIED MODELING LANGUAGE
(Course Code : P15IT2:1)

Objective : *To provide basic understanding on the modeling mechanisms, facilities, tools and techniques available for the design and development of software applications.*

Unit – 1 (12 Hrs.)

Principles of Modeling – Object Oriented Modeling – Introduction to UML.

Basic Structural Modeling:

Classes – Relationships – Common mechanisms – Diagrams – Class diagrams.

Unit – 2 (12 Hrs.)

Advanced Structural Modeling:

Advanced Classes – Advanced Relationships – Interfaces, Types and Roles – Packages - Instances – Object diagrams.

Unit - 3 (12 Hrs.)

Basic Behavioural Modeling:

Interactions – Use Cases – Use Case Diagrams – Interaction Diagrams – Activity Diagrams.

Unit – 4 (12 Hrs.)

Advanced Behavioural Modeling:

Events and Signals – State Machines – Processes and Threads – Time and Space – State chart Diagrams.

Unit – 5 (12 Hrs.)

Architectural Modeling:

Components – Deployment – Collaborations – Patterns and Frameworks – Component Diagrams – Deployment Diagrams – Systems and Models.

Book for Study

Grady Booch, James Rumbaugh and Ivar Jacobson,, *“The Unified Modeling Language User Guide”*, Addison Wesley – Fourth Indian Reprint 2000.

M. Sc. [IT] - Semester II
Elective Course - IIB
CRYPTOGRAPHY AND NETWORK SECURITY
(Course Code : P15IT2:2)

Objective: *To provide understanding on Internet based Cryptographic Techniques & Security Systems.*

Unit 1 (10 Hrs.)

Need for Security – Security Approaches – Principles of Security – Types of Attacks –
Cryptography: - Introduction – Plain Text and Cipher Text – Substitution Techniques –
Transposition Techniques – Encryption and Decryption – Symmetric and Asymmetric Cryptography
– Steganography

Unit 2 (12 Hrs.)

Symmetric Key Algorithms: - Algorithm Types and Modes – An Overview – DES – IDEA – RC4
– RC5 – Blowfish – AES – **Asymmetric Key Algorithms:** - An Overview – RSA Algorithm –
Symmetric and Asymmetric Key Cryptography Together.

Unit 3 (12 Hrs.)

Digital Signatures: - Introduction – Message Digests – MD5 – SHA – SHA-512 – Message
Authentication Code – HMAC - Digital Signature Techniques – **Digital Certificates and Public
Key Infra Structure:** - Digital Certificates – Public Key Management – The PKIX model – Public
Key Cryptography Standards

Unit 4 (13 Hrs.)

Internet Security Protocols: - Basic Concepts – SSL - TLS – SHTTP – TSP – Secure Electronic
Transactions (SET)– Electronic Money – Email Security – WAP Security – GSM Security – **User
Authentication and Kerberos:** - Authentication Basics – Passwords – Authentication Tokens –
Certificate Based Authentication – Biometric Authentication – Kerberos – Key Distribution Centre –
Security Handshake Pitfalls – Single Sign On Approaches.

Unit 5 (13 Hrs.)

Cryptography in JAVA, .NET and OS:- Cryptographic Solution in Java – Microsoft .NET
Framework – Cryptographic Toolkits – Security and OS – Database Security – **Network Security,
Firewalls and VPN:** - Firewalls – IP Security – Virtual Private Networks – Intrusion.

Book for Study:

1. Atul Kahate, *“Cryptography and Network Security”*, 2nd Edition, 6th Reprint, TMH Publications, New Delhi, 2009.

Book for Reference:

1. William Stallings, *“Cryptography and Network Security: Principles and Practices”*, Fourth Edition, Pearson Education, 2005.

M. Sc. [IT] - Semester II
Elective Course - IIC

SOFTWARE TESTING
(Course Code : P15IT2:3)

Objective: *To provide exposure on the principles and practices used in Software Testing*

Unit - 1 (12 Hrs.)

Software Development Life Cycle Models: – Phases of Software Project – Quality, Quality Assurance and Quality control – Testing, Verification & Validation – Process Model – Life Cycle Models - **White Box Testing:** What is White Box Testing? – Static Testing – Structural Testing – Challenges - **Black Box Testing:** What is Black Box Testing? – Why Black Box Testing? – When to do Black Box Testing? – How to do Black Box Testing?

Unit - 2 (12 Hrs.)

Integration Testing: What is Integration Testing? – Integration Testing as a Type of Testing – Integration Testing as a Phase of Testing – Scenario testing – Defect Bash - **System and Acceptance Testing:** Overview – Why System Testing? – Functional Vs Non Functional Testing – Functional System Testing – Non Functional Testing – Acceptance Testing – Summary of Testing Phases.

Unit - 3 (12 Hrs.)

Performance Testing: Factors governing Performance Testing – Methodology for Performance Testing – Tools for Performance Testing – Process for Performance Testing - **Regression Testing:** – What is Regression Testing – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing.

Unit – 4 (12 Hrs.)

Internationalization (I18n) Testing: - Primer – Test Phases – Enabling Testing – Locale Testing – Validation – Language Testing – Localization Testing – Tools – Challenges and Issues – **Ad hoc Testing:** - Overview – Buddy Testing – Pair Testing – Exploratory Testing – Iterative Testing – Agile and Extreme Testing – Defect Seeding – **Usability and Accessibility Testing:** - What is Usability Testing? – Approach – When to do Usability Testing? – How to Achieve Usability? – Quality Factors – Aesthetics Testing – Accessibility Testing – Tools – Lab Setup – Test Roles

Unit - 5 (12 Hrs.)

Test Planning, Management, Execution and Reporting: - Test Planning -Test Management – Test Process – Test Reporting – Best Practices - **Software Test Automation:** What is Test Automation – Terms used in Automation – Skills Needed for Automation – What to Automate, Scope of Automation – Design & Architecture for Automation – Generic Requirement for Test Tool Framework – Process model for Automation – Selecting a Test tool – Automation for Extreme Programming Model – Challenges in Automation.

Book for Study :

1. Srinivasan Desikan, Gopalaswamy Ramesh, **Software Testing – Principle & Practices**, Pearson Education, New Delhi, 2006.

Books for Reference :

1. Ron Patton, **“Software Testing”**, 2nd Edition, Pearson Education, New Delhi, 2006.
2. William E. Perry, **“Effective Methods for Software Testing”**, 3rd Ed., Wiley India, 2006.
3. Renu Rajani, Pradeep Oak, **“Software Testing – Effective Methods, Tools and Techniques”**, TMH Publishing Company Limited, New Delhi, 2004.

M. Sc. [IT] - Semester II
NMEC Course - I

PROGRAMMING THE WORLD WIDE WEB
(Course Code : P15IT2E1)

Objective : *To impart the basic knowledge for creating World Wide Web Programs using HTML and CSS.*

Unit I (12 Hrs.)

Introduction to web development: How web applications work – An introduction to HTML and CSS – Tools for web development – How to view deployed web pages – Three critical web development issues – **How to code, test, and validate a web page:** The HTML syntax – The CSS syntax – How to use Aptana to work with HTML and CSS files – How to test, debug and validate with HTML and CSS files.

Unit II (12 Hrs.)

How to use HTML to structure a web page: How to code the head section – text elements – structure the content of a page – links, lists and images – A structured web page – **How to use CSS to format the elements of a web page:** An introduction to CSS – How to specify measurements and colors –code selectors – work with text - A web page that uses an external style sheet

Unit III (12 Hrs.)

How to use the CSS box model for spacing, borders, and backgrounds: An introduction to box model – How to size and space elements – illustrate sizing and spacing – set borders and backgrounds – **How to use CSS for page layout:** How to float elements in 2- and 3- column layouts – Two web pages that use a 2-column fixed-width layout – text columns – how to position elements

Unit IV (12 Hrs.)

How to work with links and lists – How to format lists – How to code links – How to create navigation lists and bars – **How to work with images:** Basic skills for working with Images – Advanced skills for working with Images – Related skills for working with images

Unit V (12 Hrs.)

How to work with tables: Basic skills for using tables – other skills for working with tables – **How to work with forms:** How to use forms and controls – other skills for working with forms – How to use the HTML5 features for data validation – How to use the HTML5 controls - A web page that uses HTML5 data validation

Book for Study:

1. Zak Ruvalcaba, Anne Boehm, “**HTML5 and CSS3**”, Shroff Publishers & Distributors Pvt. Ltd., 2012

Book for Reference:

1. Thomas A .Powell “**The complete reference HTML & CSS**”, 5th Edition,TATA MCGraw – Hill ,2010.

M. Sc. [IT] - Semester III
Core Course - VII

DATABASE MANAGEMENT SYSTEMS
(Course Code : P15IT307)

Objective : To provide understanding on the popular Relational Database Systems and techniques.

Unit - 1 (12 Hrs.)

Introduction: Database system Applications – Database systems Vs File Systems – View of data – Data models – Database languages – Database users & Administrators – Transaction Management – Database system structure – Application Architectures. **Entity Relationship model :** Basic concepts – constraints – keys – Design issues – Entity – Relationship Diagram – Weak entity sets – Extended E-R Features – Design of an E-R Database schema – Reduction of an E-R schema to Tables.

Unit – 2 (12 Hrs.)

Relational Model : Structure of Relational Databases – The Relational Algebra – Extended relational algebra operations – Modification of the Database – Views – **Relational Databases : SQL** – Background – Basic structure – set operations – Aggregate functions – Null Values – Nested subqueries – Views – Complex Queries – Modification of the Database – Joined relations – Data – Definition Language – Embedded SQL – Dynamic SQL

Unit - 3 (12 Hrs.)

Integrity and security : Domain constraints Referential Integrity – Assertions – Triggers – Security and Authorization – Authorization in SQL – Encryption and Authentication. - **Relational Database Design :** First Normal form – pitfalls in Relational Database Design – Functional Dependencies – Decomposition – Desirable properties of Decomposition – Boyce – Codd Normal form – Third Normal Form – Fourth Normal Form – More normal forms – overall Database Design process.

Unit - 4 (12 Hrs.)

Storage and file structure : Overview of physical storage media – Magnetic Disks – RAID – Tertiary storage – Storage Access – File organization – organization of records in files – Dictionary storage. - **Indexing and Hashing :** Basic concepts – ordered Indices – B+ - Tree Index files – Static Hashing – Dynamic Hashing – Comparison of ordered indexing and Hashing – Index definition in SQL.

Unit - 5 (12 Hrs.)

Transaction Management : Transactions : Concept – Transaction state – Implementation of Atomicity and Durability – Concurrent executions – Serializability – Recoverability – Implementation of Isolation – Transaction Definition in SQL – Testing for serializability. - **Concurrency control :** Lock – Based Protocols – Timestamp – Based protocols – Validation – Based Protocols – Multiple Granularity – Multiversion schemes – Deadlock handling – Insert and Delete operations – Weak levels of consistency – Concurrency in Index structures.

Book for Study:

Abraham Silberchatz, Henry F. Korth and S. Sudharshan – *“Data Base System concepts”* – Mc Graw hill International – Fourth Edition, 2006. (**Chapters :** 1,2,3,4,6,7,11,12,15,16)

Book for Reference :

Atul Kahate, *“Introduction to Database Management Systems”*, 1st Indian Reprint, Pearson Education, Delhi, 2004.

M. Sc. [IT] - Semester III
Core Course – VIII

MOBILE TECHNOLOGIES

(Course Code : P15IT308)

***Objective :** To impart knowledge on Mobile Computing Devices and Technologies and to familiarize with application development for Mobile Devices.*

Unit – 1 (12 Hrs.)

Basics of Communication Technologies : Components of a Wireless Communication System – Architecture of Mobile Telecommunication Systems – Wireless Networking Standards – WLAN – Bluetooth Technology – **Introduction to Mobile Computing and Wireless Networking :** Mobile Computing – Mobile Computing Vs. Wireless Networking – Characteristics of Mobile Computing - Structure of Mobile Computing Applications – Cellular Mobile Communication – GSM – GPRS - UMTS – **MAC Protocols :** Properties – Issues – Taxonomy – Assignment Schemes – MAC Protocols for Ad Hoc Networks.

Unit – 2 (12 Hrs.)

Mobile Internet Protocol : – Mobile IP – Packet Delivery – Overview – Desirable Features – Key Mechanism – Route Optimization – DHCP - **Mobile Transport Layer :** Overview of TCP/IP – Terminologies – Architecture – Operations – Application Layer Protocols of TCP – Adaptation of TCP Window – Improvement in TCP Performance – **Mobile Databases :** Introduction – Issues of Transaction Processing – Transaction Processing Environment – Data Dissemination – Transaction Processing in Mobile Environment - Data Replication.

Unit – 3 (14 Hrs.)

Mobile Ad Hoc Networks (MANETs): – Basic concepts – Characteristics – Applications – Design Issues – Routing – Traditional Routing Protocols – Basic concepts of Routing – Popular MANET Routing Protocols – Vehicular Ad Hoc Networks (VANETs) – MANETs Vs. VANETs – Security Issues – Security Attacks on Ad Hoc Networks – **Wireless Sensor Networks (WSNs) :** Introduction – WSN versus MANET – Applications – Architecture of the Sensor Node – Challenges in the Design of an effective DSN – Characteristics of Sensor Networks – WSN Routing Protocols – Target Coverage - **Operating Systems for Mobile Computing :** Mobile OS Responsibilities – Basic Concepts – Special Constraints and Requirements – Commercial Mobile OSs – Comparative Study of Mobile OSs – OS for Sensor Networks – Mobile Application Development Protocols : - Mobile Devices as Web Clients – WAP – J2ME – Android SDK.

Unit – 4 (12 Hrs.)

Getting Started with Android -- Activities, Fragments and Intents – Android User Interface – Designing User Interface with views – Displaying Pictures and Menus with Views – Data Persistence.

Unit – 5 (10 Hrs.)

Content Providers – Messaging – Location Based Services – Networking – Developing Android Services – Publishing Android Applications.

Books for Study:

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning
2. Wei Meng Lee, “Beginning Android 4 Application Development”, Wiley India Pvt. Ltd., 2012.

Books for Reference:

1. Ashok K Talukder, Hasan Ahmed, Roopa R Yavagal, “Mobile Computing”, 2nd Edition, Tata McGraw Hill Publishing Company Limited, 2010.
2. Jochen Schiller, “Mobile Communications”, Pearsons Education, 2008.
3. Reto Meir, “Professional Android 4 Application Development”, Wiley India Pvt. Ltd., 2012
4. Pradeep Kotari, “Android Application Development Black Book”, Dreamtech Press, 2014.

M. Sc. [IT] - Semester III
Core Course - IX

.NET TECHNOLOGIES
(Course Code : P15IT309)

Objective : *To provide familiarity on Server Side Programming using .NET framework*

Unit - 1 (12 Hrs.)

The .NET Platform and the Web: The Pathway to Web applications - The Web Client/Server model - Components of ASP.NET and the .NET Framework - Overview of Internet Information Server – Overview of ASP.NET - .NET Common Language Runtime and Class Library – Managed Components in .NET – Web Services - Language Independence in the .NET Framework – **Working with ASP.NET:** - The Features of ASP.NET – The Anatomy of ASP.NET Pages – Introducing Web Forms – VS.NET Web Applications and other IDE Basics – Separating Content and Code-the Code-Behind Feature-Application Configuration.

Unit - 2 (12 Hrs.)

Using HTML Controls – Using Web Controls – Web Controls for Displaying and Formatting Data – Web Control for Creating Buttons – Web Controls for Inputting Text – Web Control for Selecting Choices – Web Controls for Creating Lists – Miscellaneous Basic Controls – Creating a Simple ASP.NET Application – ASP.NET Page Directives.

Unit - 3 (12 Hrs.)

ASP.NET Rich Controls - Validation Controls – Data List Controls – User Controls – ASP.NET Intrinsic Objects.

Unit - 4 (12 Hrs.)

Using the .NET Framework Class Library: Common Features of the .NET Framework Class Library – Using Data Collections – Handling File Input/Output and Directories – Using the Windows Events Log – Manipulating XML Data - Sending Internal E-mail.

Unit - 5 (12 Hrs.)

Accessing Data with ADO .NET: Overview of Data access on the Web – ADO.NET: The Next Generation of Data Access – ADO.NET Programming Objects and Architecture – Working with Datasets and Data Table Objects – Maintaining Data Integrity with the Data Relation Classes.

Book for Study:

Matt J. Crouch “*ASP.NET and VB.NET Web Programming*”, Pearson Education. 2010.

Book for Reference:

Matthew Mac Donald, “*ASP.NET:-The Complete Reference*”, TMH, New Delhi, 2002.

M. Sc. [IT] - Semester III
Core Lab Course - V

RDBMS LAB
(Course Code : P15IT3P5)

Objective : *To provide familiarity on working with popular RDBMS packages*

1. Creating updating and inserting into databases & simple queries.
2. Uses of select statement – for queries using
 - i. AND, OR, NOT Operators, WHERE clause.
 - ii. UNION, INTERESECTION, MINUS.
 - iii. Sorting and grouping.
3. Nested queries using SOL
 - i. Sub queries
 - ii. Join
4. Built – in functions of SQL.
5. Creation of simple forms.
6. Use of indexes, creating views and querying in views.
7. Cursors, triggers and stored procedures and functions.
8. Case studies: - Use forms for database manipulations and generate appropriate reports for the following
 - i. Student evaluation systems.
 - ii. Pay – roll system.
 - iii. Income tax calculations
 - iv. Seat reservation Problem
 - v. Mark sheet Preparation.
9. Manipulating the XML Data
 - i. Storing XML data in a Table.
 - ii. Reteriving XML data from the Table.
 - iii. Updataing XML data from the Table.

M. Sc. [IT] - Semester III
Core Lab Course - VI

.NET PROGRAMMING LAB
(Course Code : P15IT3P6)

***Objective :** To provide hands on experience in writing server side programs using ASP.NET*

1. Design ASP.NET Web form using Web Server controls to enter job seeker's details.
2. Create an ASP.NET Web form using web control to enter Email Registration form.
3. Apply appropriate validation techniques in Email registration form using validation controls.
4. Write an ASP.NET application to retrieve form data & display it in the client browser in table format.
5. Create a Web application to store the details of the books available for sale in XML format.
6. Create a Web application using ADO.Net that uses which performs basic data manipulations: (i) Insertion (ii) Updating (iii) Deletion (iv) Selection
7. Create an application using Data grid control to access information's form table in SQL Server.
8. Create a login form using Mobile Control.
9. Write an ASP.NET application for registering in on-line course of Bharathidasan University.
10. Develop a Portal for our College.
11. Display a "HELLO" message using Web Services.

M. Sc. [IT] - Semester III
Elective Course - IIIA
WEB SERVICES
(Course Code : P15IT3:1)

Objective : To impart knowledge on the concepts and applications of Web Services.

Unit - 1 (12 Hrs.)

Introduction: Overview of web services - SOAP WSDL UDDI – Importance of Web Services – Web services and enterprises – **XML Fundamentals:** - Overview of XML – XML Documents – XML Namespaces – XML Schema – Processing XML.

Unit – 2 (12 Hrs.)

SOAP and WSDL: - Overview of SOAP – SOAP Messages – SOAP Encoding – SOAP RPC – Using Alternate SOAP Encodings – Document, RPC, Literal, Encoded – SOAP Web Services and the REST Architecture – WSDL – Using SOAP and WSDL – **UDDI:** - Overview of UDDI – UDDI Business Registry – UDDI under the covers – Accessing UDDI – How UDDI is Playing Out.

Unit – 3 (12 Hrs.)

Conversations: -Overview–Web Services Conversation Language–WSCL Interface Components–Relationship Between WSCL and WSDL–**Workflow:** -Business Process Management–Workflows and Workflow Management System – Business Processing Language for Web Services (BPEL)

Unit – 4 (12 Hrs.)

Transactions: - ACID Transactions – Distributed Transactions and Two Phase Commit – Dealing with Heuristic Outcomes – Scaling Transactions to Web Services – Other Web Service Transaction Protocols – **Security:** - Web Services Security Roadmap – WS-Security.

Unit – 5 (12 Hrs.)

Real World Web Service Application Development-Foundations: - Enterprise Procurement – System Functionality and Architecture – Running the EPS Application – System Implementation - **Real World Web Service Application Development-Advanced Technologies:** - Introduction – Building Evolvable and Composite Workflows – Adding Transaction Support.

Book for Study:

1. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services – An Architect’s Guide”, Pearson Education, 2004.

Book for Reference:

1. Frank. P. Coyle, “XML, Web Services And The Data Revolution”, Pearson Education, 2002.

M. Sc. [IT] - Semester III
Elective Course - IIIB

GRID COMPUTING
(Course Code : P15IT3:2)

Objective : To impart knowledge on architectures, services & toolkits of Grid Computing.

Unit – 1 (12 Hrs.)

Introduction: Early Grid Activities – Current Grid Activities – An Overview of Grid Business Areas - Grid Applications-Grid Infrastructure. **Grid Computing Organizations and Their Roles:** Organizations Developing Grid Standards and Best Practice Guidelines - Organizations Developing Grid Computing Toolkits and the Framework - Organizations Building and Using Grid-Based Solutions to Solve Computing, Data and Network Requirements - **The Grid Computing Anatomy:** The Grid problem.

Unit - 2 (12 Hrs.)

The Grid Computing Road Map: Autonomic Computing - Business On Demand and Infrastructure Virtualization - Service-Oriented Architecture and Grid - Semantic Grids. **Merging the Grid Services Architecture with the Web Services Architecture:** Service-Oriented Architecture - XML-Related Technologies, and their Relevance to Web Services - XML Messages and Enveloping - Service Message Description Mechanisms - Relationship between Web Service and Grid Service.

Unit - 3 (12 Hrs.)

Open Grid Services Architecture(OGSA): Introduction - OGSA Architecture and Goal - **Some Sample Use Cases that Drive the OGSA:** - Commercial Data Center (CDC) - National Fusion Collaboratory (NFS) - Online Media and Entertainment - **The OGSA Platform Components:** - **Open Grid Services Infrastructure (OGSI):** Introduction - Grid Services - A High-Level Introduction to OGSI - Technical Details of OGSI Specification - Introduction to Service Data Concepts.

Unit - 4 (12 Hrs.)

OGSA Basic Service: Common Management Model (CMM) - Service Domains - Policy Architecture - Security Architecture - Metering and Accounting - Common Distributed Logging - Distributed Data Access and Replication - **GLOBUS GT3 Toolkit:Architecture:** - GT3 Software Architecture Model.

Unit – 5 (12 Hrs.)

GLOBUS GT3 Toolkit: Programming Model: Introduction-Service Programming Model - Grid Service Behaviour Implementation - Operation Providers - Grid Service Lifecycle Callbacks and Lifecycle Management - Client Programming Model - **GLOBUS GT3 Toolkit - High Level Services:** Introduction - Resource Discovery and Monitoring - Resource Allocation - Data Management - Information Services - Index Services – Resource Information Provider Service – Resource Management Services – Data Management Services.

Book for Study :

Joshy Joseph, Craig Fellenstein, “*Grid Computing*”, Pearson Education, 2004.

Book for Reference :

Rawel Plaszczall, Richard Wellner Jr. “*Grid Computing*”, Pearson Education, 2006.

M. Sc. [IT] - Semester III
Elective Course - IIIC

SERVICE ORIENTED ARCHITECTURE
(Course Code : P15IT3:3)

Objective : To provide basic understanding on SOA and Distributed Systems Design.

Unit 1 (12 Hrs.)

Motivation: - Characteristics of Large Distributed Systems – History of SOA – **SOA:** - Definitions – Drivers – Concepts – Ingredients – SOA is not a silver bullet – SOA is not a specific technology – SOA versus Distributed Objects – Terminologies – **Services:** - Overview – Interfaces and Contracts – Additional Service Attributes – **Loose Coupling:** - Need for fault tolerance – Forms of Loose Coupling – Dealing with Loose Coupling

Unit – 2 (12 Hrs.)

The Enterprise Service Bus: - Responsibilities – Heterogeneous ESBs – ESB Differences – Value-Added ESB Services – **Service Classification:** - Overview – Basic Services – Composed Services – Process Services – Other Service Classifications – Technical & Infrastructure Services – Beyond Services – **Business Process Management:** - Terminologies – BPM & SOA – BPM Example with services – Business Process Modeling – Other Approaches to identifying Services – Orchestration versus Choreography – **SOA & the Organization:** - Roles & Organizations – Funding Models.

Unit – 3 (12 Hrs.)

SOA in Context: - Architectural Models – Dealing with Frontends & Backends – **Message Exchange Patterns:** -Introduction to MEP –Basic MEPs –Complicated MEPs –Reliability & Errors – Different MEP Layers – Event-Driven Architecture – **Service Lifecycle:** - Services under Development Services in Production – **Versioning:** - Versioning Requirements – Domain-Driven Versioning – Versioning of Data Types – Configuration Management driven Versioning - Versioning in Practice

Unit – 4 (12 Hrs.)

SOA in Performance: - Where Performance matters – From Remote Stored Procedures to Services – Performance and Reusability – Performance and Backward Compatibility – **SOA and Security:** - Security Requirements – SOA security in practice – Security with XML and Web Services – **Technical Details:** - Services and State – Idempotency – Testing and Debugging – Dealing with Technical Data – Data Types – Error Handling – **Web Services:** - Motivation for using Web Services – Standards – Web Services in Practice

Unit – 5 (12 Hrs.)

Service Management: -Service Brokers History –Repositories & Registries –**Model Driven Service Development:** - Generated Service Code – Modeling Services – Meta Models in Practice – Setting up MDSD – Processes –Tools –Avoiding Bottlenecks –**Establishing SOA & SOA Governance:** – Introducing SOA – SOA Governance – SOA step by step – Other SOA Approaches – Additional Recommendations – **Epilogue:** - Is SOA something new? – Does SOA Increases Complexity? – Key Success Factors for SOA – Where is SOA not Appropriate? – Does SOA replace OOP?

Book for Study:

1. Nicolai M. Josuttis, *“SOA in Practice: The Art of Distributed System Design”*, O’reilly, Shroff Publishers & Distributors Pvt. Ltd., 2010.

Book for Reference:

1. Dan Woods, Thomas Mattern, *“Enterprise SOA: Designing IT for Business Innovation”*, O’reilly, Shroff Publishers & Distributors Pvt. Ltd., 2008.

M. Sc. [IT] - Semester IV
Core Course - X

ADVANCED DATA ANALYTICS

(Course Code :

P15IT410)

Objective: To impart knowledge in the domain of Data Mining and Big Data Analytics

Unit - 1 (12 Hrs.)

Introduction: Overview of Data Mining- Data Mining Functionalities-Classification of Data Mining Systems-Data Mining Task Primitives-Integration of Data Mining System with A Database or Data Warehouse System-Major Issues in Data Mining **Data Preprocessing:** Overview- Descriptive Data Summarization-Data cleaning- Data Integration and Transformation-Data Reduction-Data Discretization and Concept Hierarchy Generation.

Unit - 2 (12 Hrs.)

Mining Frequent Patterns, Associations and Correlations: - Basic concepts – Item-Set Mining Methods – Association rules – From Association Mining to Correlation Analysis – Constraint Based Association Mining – **Classification and Prediction:** - Overview – Issues – Classification by Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy of a Classifier or Predictor – Ensemble methods – Model Selection.

Unit - 3 (12 Hrs.)

Cluster Analysis: - Overview – Types of Data in Cluster Analysis – Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical Methods – Density Based methods – Grid Based Methods – Model Based Clustering Methods – Clustering High Dimensional Data – Constraint Based Cluster Analysis – Outlier Analysis – **Mining Object, Spatial, Multimedia, Text And Web Data:** Multidimensional Analysis And Descriptive Mining Of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining The World Wide Web.

Unit - 4 (12 Hrs.)

Fundamentals Of Big Data:- The Evolution Of Data Management – Understanding The Waves Of Managing Data – Defining Big Data – Big Data Management Architecture – **Examining Big Data Types:-** Defining Structured Data – Defining Unstructured Data – Looking At Real Time And Non-Real Time Requirements – **Big Data Technology Components:-** Big Data Stack – Redundant Physical Infrastructure – Security Infrastructure – Operational Databases – Data Services And Tools – Analytical Data Warehouses – Big Data Analytics – Big Data Applications.

Unit - 5 (14 Hrs.)

Big Data Analytics:- Using Big Data To Get Results – Modifying Business Intelligence Products To Handle Big Data – Example – Big Data Analytic Solutions – **Text Analytics And Big Data:-** Unstructured Data-Analysis and Extraction Techniques – Putting Results Together With Structured Data – Putting Big Data To Use – Text Analytics Tool For Big Data – **Operationalizing Big Data:** Big Data As a Part Of The Operational Process – Big Data Work Flows – Ensuring The Validity, Veracity, And Volatility Of Big Data – **Map Reduce Fundamentals:-** Origins Of Map Reduce – Map Function – Reduce Function – Putting Map And Reduce Together – Optimizing Map Reduce Tasks – **Exploring The World Hadoop:-** Overview – Hadoop Distributed File System(HDFS) – Hadoop Map Reduce.

Book for Study:

1. Jiawei Han and Micheline Kamber, *“Data Mining Concepts and Techniques”*, 2nd Edition, Morgan Kaufmann Publishers, An imprint of Elsevier, 2006.(for units 1,2 and 3)
2. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman, *“Big Data for Dummies”*. John Wiley & Sons, 2013.(for units 4 & 5)

M. Sc. [IT] - Semester IV
Elective Course - IVA

CLOUD COMPUTING
(Course Code : P15IT4:1)

Objective: *To provide understanding on concepts & technologies associated with Cloud Computing.*

UNIT – 1

FOUNDATIONS: -Introduction to Cloud Computing : Cloud Computing in a Nutshell – Roots of Cloud Computing – Layers and types of Clouds – Desired features of a Cloud – Cloud Infrastructure Management – Challenges and Risks – **Migrating into a Cloud:** - Introduction – Broad Approaches – The Seven step model – **Enriching the ‘Integration as a Services’ Paradigm for the Cloud Era:** - Introduction – The Evolution of SaaS – The Challenges of SaaS Paradigm – Approaching the SaaS Integration Enigma – New Integration Scenarios – The Integration Methodologies – SaaS Integration Services – **The Enterprise Cloud Computing Paradigm:** - Introduction – Background – Issues – Transition Challenges – The Cloud Supply Chain.

UNIT - 2

INFRASTRUCTURE AS A SERVICE :- Virtual Machine Provisioning and Migration Services: Introduction – Background – Manageability – Migration Services – **Management of Virtual Machines for Cloud Infrastructures:** - Anatomy of Cloud Infrastructures – Distributed Management of Virtual Infrastructures – Scheduling techniques for Advance Reservation of Capacity – **Enhancing Cloud Computing Environments Using a Cluster as a Service:** - Introduction – Related Work – RVWS Design – The Logical Design – **Secure Distributed Data Storage in Cloud Computing:** - Introduction – Cloud Storage from LANs to WANs – Technologies for Data Security – Challenges.

UNIT III

PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) Aneka-Integration of Private and Public Clouds : Introduction– Technologies and Tools – Aneka Cloud Platform - Aneka Resource Provisioning Service – Hybrid Cloud Implementation – **CometCloud: An Autonomic Cloud Engine:** - Introduction – CometCloud – Architecture – Autonomic Behavior of CometCloud – Overview of CometCloud-based Applications – Implementation and Evaluation

UNIT IV

PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) T-Systems Cloud-based Solutions for Business Applications: - Introduction – Enterprise Demand of Cloud Computing – Dynamic ICT Service – Importance of Quality and Security in Clouds – Dynamic Data Centre-Producing Business-ready; Dynamic ICT Services – **The MapReduce Programming Model and Implementations:** - Introduction – MapReduce Programming Model – MapReduce implementations for the Cloud.

UNIT V

MONITORING AND MANAGEMENT: - An Architecture for Federated Cloud Computing – Introduction – A typical Usecase – The Basic Principles of Cloud Computing – A Federated Cloud Computing Model – Security Considerations – **Service Providers Perspective of SLA Management in Cloud Computing:** - Traditional Approaches to SLO Management – Types of SLA – Life Cycle of SLA – SLA Management in Cloud –Automated Policy-based Management – Performance Prediction for HPC on Clouds: - Introduction – Background – Grid and Cloud – Performance related issues of HPC in the Cloud.

Books for Study:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinsky, “**Cloud Computing Principles and Paradigms**”, Wiley India Pvt. Ltd., 2011.

Book for Reference:

1. Barrie Sosinsky, “**Cloud Computing Bible**”, 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2011.

2. Michael Miller, “*Cloud Computing*”, 1st Edition, Pearson Education Inc., New Delhi, 2008.

M. Sc. [IT] - Semester IV
Elective Course – IV B
PARALLEL COMPUTING
(Course Code : P15IT4:2)

Objective : To introduce algorithm design and programming for parallel computing architectures.

Unit - 1 (12 Hrs.)

Introduction to Parallel Computing: Motivating parallelism – Scope of parallel computing – **Parallel Programming platforms:** Implicit parallelism : Trends in Microprocessor Architecture – Limitations of memory system performance – Dichotomy of parallel computing platforms – Physical organization of platforms – Communication costs in parallel machines – Routing mechanisms for interconnection networks – Impact of Process-Process Mapping and Mapping Techniques.

Unit - 2 (12 Hrs.)

Principles of Parallel Algorithm Design: Preliminaries - Decomposition techniques – Parallel algorithm models – **Basic Communication Operations:** One-to-All broadcast and All-to-one reduction – All-to-All broadcast and reduction – All-to-All Personalized communication – Circular shift.

Unit - 3 (12 Hrs.)

Analytical Modeling of Parallel Programs: Performance metrics for parallel systems – The Effect of Granularity on Performance – Scalability of Parallel Systems - **Programming using the Message Passing Paradigm:** Principles – Building blocks – MPI – Topologies and embedding – Overlapping Communication with Computation – Collective Communication and Computation Operations – Groups and Communicators.

Unit - 4 (12 Hrs.)

Programming Shared Address Space Platforms – Thread Basics – The POSIX Thread API – Thread Basics : Creation and Termination – Synchronization Primitives in Pthreads – Controlling Thread and Synchronization Attributes – Thread Cancellation – Composite Synchronization Constructs – OpenMP (Open Multiprocessing) Programming - **Dense Matrix Algorithms:** Matrix-Vector multiplication – Matrix-Matrix multiplication.

Unit - 5 (12 Hrs.)

Sorting: Issues in Sorting on Parallel Computers - Sorting networks – Bubble sort – Quick sort **Graph Algorithms:** Definitions and Representation - Minimum spanning tree – Single-source shortest path – All pairs shortest paths - **Search Algorithms for Discrete Optimization Problems:** Definitions and Examples – Sequential search – Parallel Depth-first search – Parallel Best-first search.

Book for Study:

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, “*Introduction to Parallel Computing*”, Second Edition, Pearson Education., Delhi, 2008

Book for Reference :

1. Barry Wilkinson, Michael Allen, *“Parallel Programming : Techniques and Applications Using Networked Workstations and Parallel Computers”*, Second Edition, Pearson Education., New Delhi, 2005.

M. Sc. [IT] - Semester IV
Elective Course - IVC

SEMANTIC WEB
(Course Code : P15IT4:3)

Objective : To expose the concepts, technologies and applications of Semantic Web.

Unit – 1 (12 Hrs.)

Future of the Internet: - Introduction – Syntactic Web – Semantic Web – How the Semantic Web Works? – What the Semantic Web is not? – Side Effects of Semantic Web – **Ontology in Computer Science:** - Definition – Differences among Taxonomies, Thesauri and Ontologies – Classifying Ontologies – Web Ontology Description Languages – Ontologies, Categories and Intelligence – **Knowledge Representation in Description Logic:** - Introduction – Example – Family of Attributive Languages – Inference Problems.

Unit – 2 (11 Hrs.)

RDF and RDF Schema: - Introduction–XML Essentials – RDF – RDF Schema – **OWL:** - Introduction– Requirements for Web Ontology Description Languages –Header Information, Versioning & Annotation Properties –Properties – Classes – Individuals – Data types – **Rule Languages:** - Introduction – Usage Scenarios – Datalog – RuleML – SWRL – TRIPLE.

Unit – 3 (12 Hrs.)

Semantic Web Services: - Introduction – Web Service Essentials – OWL-S Service Ontology – An OWL-S Example - **Methods for Ontology Development:** - Introduction – Usehold and King Ontology Development Method – Toronto Virtual Enterprise Method – Methontology – KACTUS Project Ontology Development Method – Lexicon-Based Ontology development method – Simplified Methods.

Unit – 4 (11 Hrs.)

Ontology Sources: – Introduction – Metadata – Upper Ontologies – Other Ontologies of Interest – Ontology Libraries – **Semantic Web Software Tools:** - Introduction – Metadata and Ontology Editors – Reasoners – Other Tools – **Software Agents:** - Introduction – Agent Forms – Agent Architecture – Agents in Semantic Web Context.

Unit – 5 (14 Hrs.)

Semantic Desktop: - Introduction – Metadata – Ontologies – Architecture – Related Applications – **Ontology Applications in Art:** – Introduction – Ontologies for the Description of Works of Art – Metadata Schemas for the Description of Works of Art – Semantic Annotation of Art Images – **Geospatial Semantic Web:** - Introduction – Basic Geospatial Concepts – Classifying Geospatial Features – Gazetteers – Geospatial Metadata – The OGC Catalogue Specification – Geospatial Web Services – Examples.

Book for Study:

1. Karin K. Breitman, Marco Antonio Casanova, Walter Truszkowski, *“Semantic Web – Concepts, Technologies & Applications”*, Springer International Edition, Springer India, New Delhi, 2010.

Book for Reference:

1. Grigoris Antoniou, Frank Van Harmelen, “*A Semantic Web Primer*”, 2nd Edition, PHI Publications, New Delhi, 2010

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