M.Sc. Information Technology
Department of Information Technology

SYLLABUS
(For Students admitted in the academic year 2017 – 2018)

Bishop Heber College (Autonomous)

Affiliated to Bharathidasan University
(Reaccredited with 'A' Grade by NAAC with a CGPA of 3.58 out of 4)
Recognized by UGC as "College of Excellence"
Tiruchirappalli – 620 017
South India

Signature of the HOD

Dr.J.JOHN RAYBIN JOSE
Associate Professor & Head
Department of Information Techno...
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Department of Information Technology
Bishop Heber College (Autonomous), Tiruchirappalli – 620 017
M. Sc. (Information Technology)
(Syllabus applicable to the students admitted in the academic year 2017 – 2018 onwards)

Eligibility: B.C.A. or B. Sc. Computer Science or B. Sc. Information Technology or B. Sc. Software Development or any other degree with Mathematics as an allied/major subject or with Mathematics or Computer Science or Business Mathematics or Statistics at + 2 level.

Sem	Course	Course Title	Course Code	Hours Per Week	Credits	CIA	ESE	TOTAL
I	Core I	Object Oriented Programming with Java	P16IT101	5	5	25	75	100
	Core II	Operating Systems	P16IT102	5	5	25	75	100
	Core III	Data Structures and Algorithms	P16IT103	5	5	25	75	100
	Core Prac.-I	Java Programming Lab	P16IT1P1	6	4	40	60	100
	Core Prac.-II	Operating Systems Lab	P16IT1P2	5	3	40	60	100
	Elective–I	Software Engineering /	P16IT1:1	4	4	25	75	100
		Software Project Management /	P16IT1:2					
		Multimedia Technologies	P16IT1:3					
II	Core IV	Database Systems	P16IT204	4	4	25	75	100
	Core V	Web Programming	P16IT205	4	4	25	75	100
	Core VI	Data Communication Networks	P16IT206	4	4	25	75	100
	Core Prac.-III	Database Systems Lab	P16IT2P3	4	2	40	60	100
	Core Prac.-IV	Web Programming Lab	P16IT2P4	4	2	40	60	100
	Elective–II	Unified Modeling Language /	P16IT2:1	4	4	25	75	100
		Open Source Technologies /	P16IT2:2					
		User Experience Design Principles	P16IT2:3					
	ED 1	Web Concepts	P16IT2E1	4	4	25	75	100
	VLO	RI/MI	P17VL2:1 P17VL2:2	2	2	25	75	100
III	Core VII	Mobile Technologies	P16IT307	5	5	25	75	100
	Core VIII	Sharepoint Technologies	P16IT308	5	5	25	75	100
	Core IX	Cloud Computing	P16IT309	5	5	25	75	100
	Core Prac.- V	Mobile Applications Lab	P16IT3P5	6	4	40	60	100
	Core Prac.-VI	Sharepoint Applications Lab	P16IT3P6	5	3	40	60	100
	Elective–III	Software Testing /	P16IT3:1	4	4	25	75	100
		Cryptography and Network Security /	P16IT3:2					
		Parallel Computing	P16IT3:3					
IV	Core X	Big Data Analytics	P16IT410	6	5	25	75	100
	Elective–IV	Internet of Things	P16IT4:1	4	4	25	75	100
		Semantic Web	P16IT4:2					
		Human Computer Interaction	P16IT4:3					
	Core Project	PROJECT WORK	P16IT4PJ	--	5	---	---	100

Core Theory : 10 Elective : 4 Total Credits : 92

Core Practicals : 6 Core Project : 1 Value Education 1

ED Course offered by the I. T. Department : 1. Web Concepts (P16IT2E1)

OBJECT ORIENTED PROGRAMMING WITH JAVA

Semester: I   **Course Code: P16IT10**
Credits: 5   **Hours/Week: 5**

Objectives:

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

Unit – 1: Fundamentals of Object Oriented Programming (12 Hours.)

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

Unit – 2: Exception Handling (12 Hours.)

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

Unit – 3: The Collections Framework (12 Hours.)

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: Applet class (12 Hours.)

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-ScrollPanes-Tables-Trees.

Unit – 5: Java Database Connectivity (12 Hours.)

Java Remote Method Invocation (RMI) – Java Servlets: JSDK – The Servlet API – Life Cycle of a Java Servlet – Creating Servlets.

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)**

OPERATING SYSTEMS

Semester: I   **Course Code: P16IT102**
Credits: 5   **Hours/Week: 5**

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

Unit – 1: Operating System Overview   **(12 Hours.)**
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: Threads, SMP and Micro Kernels   **(12 Hours.)**
Processes and Threads **Concurrency : Mutual Exclusion and Synchronization**: – Principles of Concurrency - Mutual Exclusion Hardware Support. - **Concurrency : Deadlock**: – Principles - Deadlock Prevention - Deadlock Detection - Deadlock Avoidance Deadlock Detection – An Integrated Deadlock Strategy.

Unit – 3: Memory Management   **(12 Hours.)**
Memory Management Requirements – Memory Partitioning – Paging – Segmentation - **Virtual Memory:** - Hardware and Control Structures – Operating System Software.

Unit – 4: Scheduling   **(12 Hours.)**
Scheduling: – Types of Uniprocessor Processor Scheduling – Uniprocessor Scheduling algorithms – Multi-Processor Scheduling – Real Time Scheduling.

Unit – 5: I/O Management   **(12 Hours.)**
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. Charles Crowley, *"Operating System – A Design Oriented Approach"*, IRWIN Publications Chicago, 1997.

DATA STRUCTURES AND ALGORITHMS

Semester: I   **Course Code: P16IT103**
Credits: 5   **Hours/Week: 5**

Objectives:
- *To provide a good understanding of commonly used Data Structures and Algorithms.*

Unit – 1: Arrays   (12 Hours.)

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 – 2: Trees   (12 Hours.)

Trees – Binary tree representations – Tree traversal – Threaded binary trees – Binary tree representation of trees – Set representations – decision trees – Game Trees and counting Binary Trees – Graphs and Representations – Traversals. – Activity Networks – Topological sort.

Unit – 3: Algorithms   (12 Hours.)

Algorithms – Conventions – Writing Structured programs – Analyzing algorithms – Sorting – Heap sort – Binary Search – Finding the maximum and minimum – Merge sort – Quick sort – Selection Problem.

Unit – 4: Greedy Method   (12 Hours.)

Greedy Method: The general method – Optimal storage on tapes – Knapsack problem – Job sequencing with deadlines – Optimal merge patterns – Minimum spanning trees – Single source shortest paths.

Unit – 5: Backtracking   (12 Hours.)

Backtracking: The General method – 8-Queen's problem – Sum of subsets – Graph colouring – Hamiltonian cycles – Knapsack problem.

Books for Study:

1. Ellis Horowitz and Sartaj Sahni, **"Fundamentals of Data Structures"***,* Galgotia Publications., Delhi, Reprint 2001.
2. Ellis Horowitz and Sartaj Sahni, **"Fundamentals of Computer Algorithms"**, Galgotia Publications., Delhi, Reprint 2001.

JAVA PROGRAMMING LAB

Semester: I   **Course Code: P16IT1P1**
Credits: 4   **Hours/Week: 6**

Objectives:
- *To provide Object Oriented Programming expertise with the facilities available in JAVA.*

1. Classes and Objects
2. Inheritance
3. Interfaces
4. Packages
5. Exception Handling
6. Multithreading
7. Collection Interfaces
8. Applet Programming
9. Applying AWT concepts
10. Applying swing concepts
11. JDBC

OPERATING SYSTEMS LAB

Semester: I
Credits: 3

Course Code: P16IT1P2
Hours/Week: 5

Objectives:
- *To provide hands on experience with LINUX Operating System and Shell Scripting.*

1. Simple Shell Commands
2. Directory Commands
3. Vi Editor Commands
4. Searching a word in a file
5. Display the content of a file.
6. Display Login Greeting Script
7. Display current date, time, username and current directory.
8. Printing the given number in reverse order.
9. Mark list preparation
10. Menu driven program to create, sort and display a file.
11. Menu driven program to copy, edit, rename and delete a file.
12. Sorting numbers in ascending and descending order.
13. Sorting names in ascending and descending order.
14. User Creation
15. Group Creation

SOFTWARE ENGINEERING

Semester: I   **Course Code: P16IT1:1**
Credits: 4   **Hours/Week: 4**

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

Unit – 1: Need for S/w Engineering   **(12 Hours.)**
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 processional modeling – Practical process modeling.

Unit – 2: Planning and Managing the project   **(12 Hours.)**
: Tracking progress – Project personnel – Effort estimation – Risk management – The project plan – Process models and project management.

Unit – 3: The requirement process   **(12 Hours.)**
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: Design Introduction   **(12 Hours.)**
Designing the system :– 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: Test strategies   **(12 Hours.)**
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.

SOFTWARE PROJECT MANAGEMENT

Semester: I   **Course Code: P16IT1:2**
Credits: 4   **Hours/Week: 4**

Objectives:

- *To impart knowledge on the basics of Software Project Management, responsibilities of Software Project Manager and Risk Management.*

Unit 1 : Introduction to SoftwareProject Management   **(12 Hours)**
Project Definition – Contract Management – Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

Unit:2: Project Evaluation   **(12 Hours)**
Strategic Assessment – Technical Assessment – Cost Benefit Analysis–Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

Unit:3: Activity Planning   **(12 Hours)**
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   **(12 Hours)**
Monitoring and Control: Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Priortizing 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   **(12 Hours)**
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.

Book for Study
1. Bob Hughes, Mikecotterell, "Software Project Management", 3rd Edition, Tata McGraw Hill, 2004.

Book for References
1. Royce, "Software Project Management", Pearson Education, 1999.
2. Jalote, "Software Project Management in Practice", Pearson Education, 2002.

MULTIMEDIA TECHNOLOGIES

Semester: I   **Course Code: P16IT1:3**
Credits: 4   **Hours/Week: 4**

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

Unit 1: Introduction to Multimedia   **(12 Hours.)**
: – 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: Graphics and Image Data Representation   **(12 Hours.)**
Graphics / Image Data Types – Popular File Formats - **Color in Image and Video** : - Color Models in Images – Color Models in Video

Unit 3: Fundamental Concepts in Video   **(12 Hours.)**
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: Lossless Compression Algorithms   **(12 Hours.)**
Introduction – Run-Length Coding – Variable Length Coding – Lossless Image Compression – **Lossy Compression Algorithms :** - Introduction – Distortion Measures – The Rate-Distortion Theory – Quantization.

Unit 5: Image Compression Standards   **(12 Hours.)**
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, *"Mutimedia 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.

DATABASE SYSTEMS

Semester: II   **Course Code: P16IT204**
Credits: 4   **Hours/Week: 4**

Objectives :
- *To provide understanding on the popular Relational Database Systems and techniques.*

Unit – 1: Introduction to Database System   (12 Hours.)

-What is Database Management Systems? - File Management Systems - Database Management Systems - File Management Systems Vs Database Management Systems - An Overview of Database Management Systems - Data Model

Unit – 2: Relational Model   (12 Hours.)

Relational Database Primer - Relational Database Characteristics - Database Integrity – Keys - Entity and Referential Integrity - Views.

Unit – 3: Database Design   (12 Hours.)

Design Consideration - Functional Dependency - Normalization and Normal Forms (1NF, 2NF, 3NF, 4NF, 5NF) - E/R Modeling

Unit – 4: Transaction   (12 Hours.)

Recovery - Concurrency – problems – Locking – Deadlocks - Transaction serializability. - Database security: Data classification - Threats and Risk – Cryptography - Digital signature - Database control - Users and Database Privileges - Types of Privileges.

Unit – 5: Query Execution and Optimization   (12 Hours.)

Query Processing – Using Indexes - Distributed Database - Distributed Database concepts: Database Architecture - Advantages of Distributed Database - Distributed Database Techniques - Distributed concurrency - Control and Recovery.

Book for Study:

Atul Kahate, "Introduction to Database Management Systems", 1st Indian Reprint, Pearson Education, Delhi, 2004. (**Chapters:** 2, 3, 4, 6, 7, 8)

Book for Reference :

Abraham Silberchatz, Henry F. Korth and S. Sudharshan, "Data Base System concepts" Mc Graw Hill International – Fourth Edition.

WEB PROGRAMMING

Semester: II   **Course Code: P16IT205**
Credits: 4   **Hours/Week: 4**

Objectives:
- *To provide exposure in HTML, XHTML, CSS, JavaScript, JQuery, and .NET Web Programming.*

Unit -1: HTML and XHTML   (12 Hours.)
Structuring Documents for the Web - Links and Navigation - Images, Audio, and Video – Tables – Forms – Frames.

Unit – 2: CSS and JavaScript   (12 Hours.)
Cascading Style Sheets - More Cascading Style Sheets - Learning JavaScript - Working with JavaScript – HTML5.

Unit – 3: JQuery and C#   (12 Hours.)
Introduction to jQuery - Selecting and Filtering – Events - Arrays and Iteration – AJAX. **Introducing C#:** What is the .NET Framework? - What is C#? Writing a C# Program – Variables and Expressions – Flow Control – Functions.

Unit – 4: Introduction to Object-Oriented Programming   (12 Hours.)
OOP Techniques. **Defining Classes:** Class Definitions in C# - System Object – Constructors and Destructors. **Defining Class Members:** Member Definitions – Interface Implementation.

Unit – 5: Web Programming   (12 Hours.)
ASP.NET Web Programming – Web Services – Deploying Web Applications.

Books for Study:

1. Jon Duckett, *"Beginning HTML, XHTML, CSS, and JavaScript"*, Wiley Publishing Inc. 2010.

2. Richard York, "*Beginning JavaScript and CSS Development with JQuery*", Wiley Publishing Inc., 2009.

3. Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon Reid, and Morgan   Skinner, *"Beginning Visual C# 2010"*, Wiley Publishing, Inc., 2010.

DATA COMMUNICATION NETWORKS

Semester: II   **Course Code: P16IT206**
Credits: 4   **Hours/Week: 4**

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

Unit – 1: Overview   (12 Hours.)

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: Data Communication Techniques   (12 Hours.)

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: Circuit Switching and Packet Switching   (12 Hours.)

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: Routing in Switched Networks   (12 Hours.)

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: Communication Architecture and Protocols   (12 Hours.)

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.

DATABASE SYSTEMS LAB

Semester: II
Credits: 2

Objectives:
- *To provide hands on experience in working with essential facilities available in popular RDBMS software.*

1. DDL statements and simple queries.
2. DML statements and simple queries.
3. Queries using
    i. WHERE clause, HAVING clause, LIKE operator, BETWEEN clause.
    ii. logical operators.
    iii. Set operators.
    iv. Sorting and grouping.
4. Nested queries using SOL
    i. Sub queries.
    ii. Join operators .
5. Built – in functions (string functions, character functions, date functions, conversion functions, and aggregate functions).
6. Use of indexes, creating views and querying in views.
7. Functions.
8. Procedures.
9. Cursors.
10. Triggers.
11. Exceptions.
12. Case studies in PL/SQL:
    i. Splitting of tables.
    ii. Joining of tables.
    iii. Pay bill preparation

WEB PROGRAMMING LAB

Semester: II   **Course Code: P16IT2P4**
Credits: 2   **Hours/Week: 4**

Objectives :
- *To provide hands on experience in writing client and server side programs using JavaScript, JQuery and C#.*

HTML, CSS, JavaScript and JQuery:

1. Create Web Pages for I. T. Department using features in HTML (use frames, tables, links and navigation).

2. Create Web Pages for a travel agency using frames, tables and lists. Also use images, audio and video attributes.

3. Create Web Pages to display the menu card of a hotel using CSS 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 and JQuery to display the calculator in a web page.

ASP.NET with C#:

7. Create an ASP.NET Web form using web control to enter Email Registration form and also apply appropriate validation techniques in Email registration form using validation controls.

8. Write an ASP.NET application to retrieve form data & display it in the client browser in table format (apply CSS styles for look and feel).

9. Create a Web application to store the details of the books available for sale in XML format.

10. Create a Web application using ADO.Net that performs basic data manipulations such as :
    (i) Insertion (ii) Updation (iii) Deletion (iv)Selection

11. Create an application using Data grid control to access information's form table in SQL Server.

12. Develop a Job Portal.

13. Write an ASP.NET application for registering in an on-line course of Bharathidasan University.

14. Develop a Portal for Bishop Heber College.

15. Display a "HELLO" message using Web Services.

UNIFIED MODELING LANGUAGE

Semester: II   **Course Code: P16IT2:1**
 Credits: 4   **Hours/Week: 4**

Objectives :

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

Unit – 1: Principles of Modeling   (12 Hours.)

Principles of Modeling – Object Oriented Modeling – Introduction to UML.**Basic Structural
Modeling:**Classes – Relationships – Common mechanisms – Diagrams – Class diagrams.

Unit – 2: Advanced Structural Modeling   (12 Hours.)

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

Unit – 3: Basic Behavioral Modeling   (12 Hours.)

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

Unit – 4: Advanced Behavioral Modeling   (12 Hours.)

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

Unit – 5: Architectural Modeling   (12 Hours.)

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.

OPEN-SOURCE TECHNOLOGIES

Semester: II   **Course Code: P16IT2:2**
Credits: 4   **Hours/Week: 4**

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

Unit – 1: Introduction   **(10 Hours.)**
Open-Source Software – Web Explained - Working – Security – **Linux:** - Overview – Basic UNIX

Unit – 2: Apache Web Server   **(10 Hours.)**
: - Introduction – Starting, Stopping and Restarting Apache – Configuration – Securing Apache – Web Site Creation – Apache Log Files.

Unit – 3: Perl & MySQL   **(12 Hours.)**
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: Website META Language   **(14 Hours.)**
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: Server Side Includes   **(14 Hours.)**
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.

USER EXPERIENCE DESIGN PRINCIPLES

Semester: II   **Course Code: P16IT2:3**
Credits: 4   **Hours/Week: 4**

Objectives:
- *To provide exposure on the application of design learning to real-life situations, where communication and collaboration are vital.*

Unit -1: The Tao of UXD   **(12 Hours.)**
What Is User Experience Design – About UX Designers – Where UX Designers Live? **The Project Ecosystem:** Identify the Type of Site - Choose Your Hats. **Proposals for Consultants and Freelancers:** Proposals - Creating the Proposal - Statements of Work. **Project Objectives and Approach:** Solidify Project Objectives - Understand the Project Approach.

Unit – 2: User Research   **(12 Hours.)**
Choosing Research Techniques. **Site Maps and Task Flows**: What Is a Site Map? - What Is a Task Flow? - Tools of the Trade - Basic Elements of Site Maps and Task Flows - Common Mistakes - Advanced Site Maps - Breaking the Site Map Mold - Task Flows - Taking Task Flows to the Next Level. **Wireframes and Annotations:** What Is a Wireframe? - What Are Annotations? - Who Uses Wireframes? - Start Simply: Design a Basic Wireframe. **Prototyping:** What Is Prototyping? - How Much Prototype Do I Need? - Paper Prototyping - Digital Prototyping - Prototype Examples.

Unit – 3: Organizing the Content   **(12 Hours.)**
Information Architecture and Application Structure: The Big Picture - The Patterns. **Getting Around: Navigation, Signposts, and Wayfinding:** Staying Found - The Cost of Navigation - Navigational Models - Design Conventions for Websites - The Patterns. **Organizing the Page: Layout of Page Elements:** The Basics of Page Layout - The Patterns.

Unit – 4: Actions and Commands   **(12 Hours.)**
Doing Things: Pushing the Boundaries - The Patterns. **Showing Complex Data: Trees, Charts, and Other Information Graphics:** The Basics of Information Graphics - The Patterns. **Getting Input from Users: Forms and Controls:** The Basics of Form Design - Control Choice - The Patterns.

Unit – 5: Using social media   **(12 Hours.)**
The Basics of Social Media - The Patterns. **Going Mobile**: The Challenges of Mobile Design -The Patterns. **Making It Look Good: Visual Style and Aesthetics:** The Basics of Visual Design - What This Means for Desktop Applications - The Patterns.

Books for Study:
1. Russ Unger and Carolyn Chandler, *"A Project Guide to UX Design - For user experience designers in the field or in the making"*, New Riders is an imprint of Peachpit, a division of Pearson Education, 2009 Edition. (For Units – 1 and 2)
2. Jenifer Tidwell, *"Designing Interfaces"*, Second Edition, Published by O'Reilly Media. (For Units – 3, 4 and 5)

WEB CONCEPTS

Semester: II   **Course Code: P16IT2E1**
Credits: 4   **Hours/Week: 4**

Objectives:

- *To impart basic understanding of Internet and Web Content Creation using HTML and DHTML.*

UNIT – 1: Introduction to the Internet   **(12 Hours.)**
Computers in Business – Networking – Internet – Email – Resource sharing – Gopher – World Wide Web – Usenet – Telnet – Bulletin Board Service - **Internet Technologies :** Modem – Internet Addressing – Physical Connections – Telephone Lines – **Internet Browsers :** Internet Explorer – Netscape Navigator.

UNIT – 2: Introduction to HTML   **(12 Hours.)**
History of HTML – HTML generations – HTML Documents – Anchor Tag – Hyperlinks – **Head and Body Sections :** Header Section – Title – Prologue – Links – Colorful Web Page – Comments – Sample HTML Documents.

UNIT – 3: Designing and Table Handling   **(12 Hours.)**
Designing the Body Section : Heading Printing – Aligning the Headings – Horizontal Rule – Paragraph – Tab Settings – Images and Pictures – Embedding PNG Format Images – **Ordered and Unordered Lists :** Lists – Unordered Lists – Headings in a List – Ordered Lists – Nested Lists – **Table Handling :** Tables – Table Creation in HTML – Width of the Table and Cells – Cells Spanning Multiple Rows / Columns – Coloring Cells – Column Specifications – Some Sample Tables.

UNIT – 4: DHTML and Style Sheets   **(12 Hours.)**
Defining Styles – Elements of Styles – Linking of Style Sheet to a HTML Document – Inline Styles – External Style Sheets – Internal Style Sheets – Multiple Styles – **Frames :** Frameset Definition – Nested Framesets.

UNIT – 5: Web Page Design Project   **(12 Hours.)**
Frameset Definition **–** Example Projects – **Forms :** Action Attribute – Method Attribute – Enctype Attribute – Drop down list – Sample Forms.

Book for Study:
1. Xavier C., *"World Wide Web Design with HTML"*, TMH Publishing Company, New Delhi, 2006.

MOBILE TECHNOLOGIES

Semester: III   **Course Code: P16IT307**
Credits: 5   **Hours/Week: 5**

Objectives:

- *To impart knowledge on the working of mobile communication systems and expertise in application development for Mobile Computing systems.*

Unit – 1: Basics of Communication Technologies   (12 Hours.)

Types of Telecommunication Networks – 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: Mobile Internet Protocol   (12 Hours.)

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 – **Mobile Commerce :** - Applications of M-Commerce – B2B Applications – Structure of M-Commerce – Pros and Cons of M-Commerce – Mobile Payment Systems.

Unit – 3: Mobile Ad Hoc Networks (MANETs)   (14 Hours.)

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: Android User Interface   (12 Hours.)

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

Unit – 5: Content Providers   (10 Hours.)

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", PHILearning
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 Comunications", 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.

SHAREPOINT TECHNOLOGIES

Semester: III   **Course Code: P16IT308**
Credits: 5   **Hours/Week: 5**

Objectives:
- *This SharePoint 2013 core course is designed for IT students who wish to gain knowledge of using SharePoint in data center or cloud.*

Unit -1: Introduction to SharePoint (15 Hours.)
Getting to Know SharePoint: Defining SharePoint by Function - Defining SharePoint by User - Introducing the User Interface - Introducing the Structure – **Addressing the needs of the developer:** Extending SharePoint 2013 – Breaking It Down for Developers - **SharePoint 2013: The Platform:** SharePoint Installation Types - SharePoint 2013 Capabilities - Site Collections and Sites - SharePoint 2013 APIs - **SharePoint Central Administration. Overview of the SharePoint 2013 App Model:** SharePoint 2013 App Model – Moving to the Cloud – Understanding the three Apps for SharePoint Deployment Models.

Unit – 2: Developer Tooling for SharePoint (13 Hours.)
SharePoint Development Across Developer Segments –Web-Based Development in SharePoint - Site Settings - Developing SharePoint Applications Using SharePoint Designer - Developing SharePoint Applications Using Visual Studio 2012 - Other Tools for SharePoint Development. **Understanding your Development Options:** Application and Solution Types - Common Developer Tasks.

Unit – 3: Overview of Windows Azure (10 Hours.)
Defining the Cloud – Defining Windows Azure – Windows Azure Platform. **Developing, Integrating, and Building Applications in SharePoint 2013:** Development Models Available in SharePoint 2013 - Application Integration Options in SharePoint 2013. **Packaging and Deploying SharePoint 2013 Apps:** Anatomy of an App - Packaging and Publishing an App - Deploying an App.

Unit – 4: Remote APIs (12 Hours.)
Overview of the Client-Side Object Model and REST APIs: Introducing Remote APIs in SharePoint 2013 - Client-Side Object Model (CSOM) Basics - Managed Code (.NET) – JavaScript - Windows Phone - REST and OData - Client-Side Object Model API Coverage.

Unit – 5: Workflow Applications (10 Hours.)
Developing Workflow Applications for SharePoint 2013: Introducing Workflow Manager - The Big New Features for SharePoint Designer - Visio Professional, SharePoint Designer, and Workflow - Workflow and Visual Studio - Workflow in Apps for SharePoint.

Books for Study:
1. Steve Fox, Chris Johnson and Donovan Follette, *"Beginning SharePoint 2013 Development"*, John Wiley & Sons, Inc., Indianapolis, IN 46256.

Book for Reference:
1. Darvish Shadravan, Penelope Coventry, Thomas Resing, Christina Wheeler, *"Microsoft SharePoint 2013 Inside Out",* published with the authorization of Microsoft Corporation by: O'Reilly Media, Inc.

CLOUD COMPUTING

Semester: III   **Course Code: P16IT309**
Credits: 5   **Hours/Week: 5**

Objectives:
- *To impart knowledge on Cloud Computing basics and the various Cloud Computing Architectures, infrastructure models and the Fundamental Concepts cloud services.*

Unit – I: Beyond the Desktop   **(12 Hours.)**
Introduction to the Cloud Computing- Are you ready for computing the Cloud? -Developing Cloud Services.

Unit – II: Cloud Computing for Everyone   **(12 Hours.)**
Cloud Computing for the Family- Cloud Computing for the Community- Cloud Computing for the Corporation.

Unit – III: Using cloud Services   **(12 Hours.)**
Collaborating on Calendars, Schedules, and Task Management - Collaborating on Event Management -Collaborating on Contact Management -Collaborating on Project Management

Unit – IV: Using cloud Services   **(12 Hours.)**
Collaborating on Word - Collaborating on Spreadsheets- **Collaborating on Presentations**: Preparing Presentations Online-Evaluating Web-Based Presentation Applications

Unit – V: Using cloud Services   **(12 Hours.)**
Using cloud Services: Collaborating on Databases- Storing and Sharing files and other online content: Understanding Cloud storage- Evaluating Online File Storage and Sharing Services.

Book for Study :
1. Michael Miller, "Cloud Computing", Pearson Education Inc, 7th Edition, 2012

Book for References:
1. Rajkumar Buyya & Co., "Cloud Computing Principles and Paradigms", John Wiley & Sons Publications, 2011.

Mobile Application Lab

Semester: III   **Course Code: P16IT3P5**
Credits: 4   **Hours/Week: 6**

Objectives:

- *To provide hands-on experience in Mobile Application Development for Android operated devices.*

1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the red color with white background.

2. Create sample application with login module.(Check username and password)
   On successful login, go to next screen, and on login fail, alert user using Toast (Message).
   Also pass username to next screen
   .

3. Create an application that will pass some number to the next screen, and on the next screen that number of items should be display in the list.

4. Create an application that will change color of the screen, based on selected options from the menu.

5. Create an application that will display toast(Message)

6. Create an application to make Insert, update, Delete and retrieve operation on the database.

7. Create an application that will play a media file from the memory card.

8. Create an application to call specific entered number by user in the EditText

9. Understanding of UI :
   a. Create an UI such that , one screen have list of all the types of cars.
   b. On selecting of any car name, next screen should show Car details like : name , launched date ,company name, images(using gallery) if available, show different colors in which it is available.

10. Create an application to take picture using native application.

SHAREPOINT APPLICATIONS LAB

Semester: III   **Course Code: P16IT3P6**
Credits: 5   **Hours/Week: 3**

Objectives:
- *To enrich multi technical skills (UX, Script, Design, and Client object model and workflow solutions) in SharePoint.*

1. Create a SharePoint Team site and apply different themes.

2. Create a SharePoint site collection and set different permission levels and also create custom permissions.

3. Create a SharePoint List and customize the forms by using Content Editor and Script Editor Web parts (Use JavaScript, JQuery, and ECMAScript and CSS styles).

4. Create a SharePoint survey with custom design and options.

5. Create a SharePoint Task list and use SharePoint Designer workflow to send the alerts for the high priority tasks.

6. Create a SharePoint Document Library and send change alerts in 3 different ways.

7. Create a SharePoint Custom List and customize the views by applying filters, sorting and Total options. Also create a Datasheet view and apply formulas.

8. Create a SharePoint Custom List and use different formulas for different fields.

9. Import an Excel data to the SharePoint List and also sync two way.

10. Export a SharePoint List data to Excel and MS Access and synchronize the data.

11. Build a task form using SharePoint Designer/InfoPath.

12. Customize the master page and branding design.

13. Create custom search option for a List/Library using JavaScript/JQuery.

14. Create a cascading drop down functionality for the list fields.

15. Create Event receiver for a List using Client object model.

16. Create a custom workflow for an automated functionality/task.

17. Create a blog, add posts and pages, and editing a page.

18. Create a SharePoint Site and List template with content and use the same in different site.

19. Use SPServices and CAML query to read, update and delete the items in the List.

   Create a workflow for Employee Time Card Approval with Visio and SharePoint Designer.

SOFTWARE TESTING

Semester: III   **Course Code: P16IT3:1**
Credits: 4   **Hours/Week: 4**

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

Unit – 1: Software Development Life Cycle Models   **(12 Hours.)**
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: Integration Testing   **(12 Hours.)**
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: Performance Testing   **(12 Hours.)**
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: Internationalization   **(12 Hours.)**
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: Test Planning   **(12 Hours.)**
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.

CRYPTOGRAPHY AND NETWORK SECURITY

Semester: III   **Course Code: P16IT3:2**
Credits: 4   **Hours/Week: 4**

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

Unit 1: Need for Security   (10 Hours.)
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: Symmetric Key Algorithms   (12 Hours.)
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: Digital Signatures   (12 Hours.)
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: Internet Security Protocols   (13 Hours.)
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: Cryptography   (13 Hours.)
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.
2. Charlie kaufman, Radia Perlman, Mike Speciner, **"Network Security – Private Communication in a Public World"**, 2nd Edition, PHI Publications, 2002.

PARALLEL COMPUTING

Semester: III   **Course Code: P16IT3:3**
Credits: 4   **Hours/Week: 4**

Objectives:
- *To introduce algorithm design and programming for parallel computing architectures.*

Unit – 1: Introduction to Parallel Computing   (12 Hours.)
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: Principles of Parallel Algorithm Design   (12 Hours.)
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: Analytical Modeling of Parallel Programs   (12 Hours.)
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: Programming Shared Address Space Platforms   (12 Hours.)
Thread Basics – The POSIX Thread API – Thread Basics : Creation and Termination – Synchronization Primitives in Pthreads – Controlling Thread and Synchronization Attributes – Thread Cancellation – Composite Synchronization Contructs – OpenMP (Open Multiprocessing) Programming - **Dense Matrix Algorithms:** Matrix-Vector multiplication – Matrix-Matrix multiplication.

Unit – 5: Graph Algorithms   (12 Hours.)
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.**

BIG DATA ANALYTICS

Semester: IV   **Course Code: P16IT410**
Credits: 5   **Hours/Week: 6**

Objectives:
- *To impart knowledge in Mining concepts and techniques. and* Big data basics and the Analytics for Enterprise class Hadoop

Unit – 1: Introduction   (12 Hours.)
What Motivated Data Mining – Why is it Important– What is Data Mining – Data Mining – On What Kind of Data – Data Mining Functionalities –What Kinds of Patterns Can Be Mined– 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.

Unit – 2: Data Preprocessing   (12 Hours.)
Why Preprocess the Data– Descriptive Data Summarization – Data leaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Unit – 3: Data Warehouse and OLAP Technology   (12 Hours.)
An Overview: What is a Data Warehouse – A Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From Data Warehousing to Data Mining.

Unit – 4: Big Data: From the Business Perspective   (12 Hours.)
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 – 5: Big Data: From the Technology Perspective   (12 Hours.)
The History of Hadoop- Components of Hadoop – Application Development in Hadoop- Getting Your Data into Hadoop- Other Hadoop Components.

Book for Study:
1 .Jiawei Han and Micheline Kamber**, *"Data Mining Concepts and Techniques"*,** Morgan Kaufmann Publishers, An imprint of Elsevier, 2006, Second Edition (for units 1, 2 and 3)

2 Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch,George Lapis **"Understanding Big Data: Anaytics for Enterprise Class Hadoop and Streaming Data",** McGraw-Hill, 2012. (for Units 4 & 5).

Books for Reference:
1. Sean Keely, *"Data Warehousing in Action"*, John Wiley, 1997.
2. Peter Adriannas, Dolf Zantinge, *"Data mining"*, Addison Wesley, 1996.

INTERNET OF THINGS

Semester: IV   **Course Code: P16IT4:1**
Credits: 4   **Hours/Week: 4**

Objectives:
- *To understand the underlying concepts in Internet of Things (IoT) and to provide in-depth knowledge on state of the art in the IoT, challenges and future directions.*

UNIT-I: Introduction to IoT   **(12 Hours.)**
Requirements of IoT: The definition of the Internet of Things, Main Assumptions and Perspectives - Platform for IoT devices. - Economics and Technology of the IoT – Issues in IoT and solutions- Architecture of IoT. - **Anatomy of IoT:** Traditional Internet Protocol Vs Chirps –Applying network intelligence at propagator nodes-Transport and functional architectures.

UNIT-II: IoT devices   **(12 Hours.)**
IoT Devices - Temporary and Ad-hoc devices-Addressing issues-End devices in dedicated networks- Converting states to chirps-RFID integration in the IoT-End devices with higher demands- Small data- Building a web of things-Autonomy and Co-ordination-Structuring a tree-Housekeeping message- Role of integrator function-Degrees of functionality-Aggregating end points-Packaging options.

UNIT-III: Data and Human Interaction   **(13 Hours.)**
Data and Human Interaction: Functions of IoT-Analysis and control-Neighborhood and affinities- Public private and other kinds of data- Publishing agent- Searching for and managing agents- High and low level loops- Human interface and control points- Collaborative scheduling tools-Packaging and provisioning- Distributed integrator functions- Filtering the streams-IP Alternative-Protocol based on category classification-Skeletal architecture of chirp packets- Pattern driven-Propagator node networks and operation-Power of local agents and integrator functions-High level interchange.

UNIT-IV: IoT Applications   **(12 Hours.)**
Moore's Law –Intelligence near the edge- Incorporating legacy devices- Staying in the loop -Social machines-Applications of IoT–Agriculture- Home healthcare-Efficient process control-Factory application- Home automation- Natural sciences- Living applications- Origin of IoT- Open source networking solutions- Shared software and business process vocabularies.

UNIT-V: Creating IoT projects   **(11 Hours.)**
Creating the IoT projects: Sensor project-Actuator project – Controller-Camera. Using an IoT service platform- Selecting an IoT. **Platform**- The clayster platform- Interfacing our devices using XMPP- Creating control application.

Books for Study

1. Francis DaCosta, *"Rethinking the internet of things-A scalable approach to connecting everything",* Apress open publication, 2013 Edition.
2. Peter Waher, *"Learning Internet of Things"*, PACKT Publishing,-Birmingham-mumbai-2015 Edition.

Books for Reference:

1. Arhdeep Bahga, Vijay Madisetti *"Internet of Things: A Hands on Approach*", (http://www.internet-of-things-book.com/).
2. Cuno Pfister, *"Getting started with the internet of things",* O'Rielly Publication.

SEMANTIC WEB

Semester: IV   **Course Code: P16IT4:2**
Credits: 4   **Hours/Week: 4**

Objectives:
- *To expose the concepts, technologies and applications of Semantic Web.*

Unit – 1: Future of the Internet   (12 Hours.)
Introduction – Syntatic 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: RDF and RDF Schema   (11 Hours.)
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: Semantic Web Services   (12 Hours.)
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: Ontology Sources   (11 Hours.)
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: Semantic Desktop   (14 Hours.)
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.

HUMAN COMPUTER INTERACTION

Semester: IV   **Course Code: P16IT4:3**
Credits: 4   **Hours/Week: 4**

Objectives:

- *To provide a vivid understanding on the facilities and technologies available for interaction between Human Beings and Computers.*

Unit – 1: Models, Theories, and Frameworks   (13 Hours.)

A Effective Use and Reuse of HCI Knowledge – Macrotheory for System of Interactors – Design in the MoRAS – Distributed Cognition : Toward a New Foundation for Human-Computer Interaction Research. – **User Interface Software and Tools :** - Past, Present, and Future of User Interface Software Tools – Creating Creativity : User Interfaces for Supporting Innovations – Interaction Spaces for Twenty-First-Century Computing.

Unit – 2: Usability Engineering Methods and Concepts   (12 Hours.)

The Strategic Use of Complex Computer Systems – User Interface Evaluation : How Cognitive Models can Help – HCI in the Global Knowledge-Based Economy : Designing to Support Worker Adaptation – A Reference Task Agenda for HCI – The Maturation of HCI: Moving beyond Usability toward Holistic Interaction.

Unit – 3: Groupware and Cooperative Activity   (12 Hours.)

Computer-Mediated Communications for Group Support : Past and Future – The Intellectual Challenge of CSCW : The Gap between Social Requirements and Technical Feasibility – Social Translucence: Designing Systems That Support Social Processes – Transcending the Individual Human Mind : Creating Shared Understanding through collaborative Design – The Development of Cooperation: Five Years of Participatory Design in Virtual School – Distance Matters.

Unit – 4: Media and Information   (10 Hours.)

Designing the User Interface for Multimodal Speech and Pen-Based Gesture Applications: State-of-the-Art Systems and Future Research Directions – Technologies of Information : HCI and Digital Library – Interface that Give and Take Advice – Beyond Recommender Systems : Helping People Help Each Other.

Unit – 5: Integrating Computation and Real Environments   (13 Hours.)

Charting Past, Present, and Future Research in Ubiquitous Computing – Situated Computing : The Next Frontier for HCI Research – Roomware : Toward the Next Generation of Human – Computer Interaction based on an Integrated Design of Real and Virtual Worlds. – Emerging Framework for Tangible User Interfaces – **HCI and Society** : Learner-Centered Design : Reflections and New Directions – HCI Meets the "Real World" : Designing Technologies for Civic Sector Use – Beyond Blowing Together : Socio Technical Capital.

Book for Study:

1. John M. Carroll, *"Human Computer Interaction–in the New Millennium"*, Pearson Education, 2007.

Book for Reference:

1. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, *"Human-Computer Interaction"*, Pearson Education, 2009.