M.Sc. Information Technology
Department of Information Technology

SYLLABUS

(For Students admitted on 2018 – 2019)

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 Technol...
Bishop Heber College (Autonomo.. :
Tiruchirappalli - 620 017.

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 2018 – 2019)

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	Prerequisite	Hours Per Week	Credits	CIA	ESE	TOTAL
I	Core I	Object Oriented Programming with Java	P18IT101		5	5	25	75	100
	Core II	Data Communication Networks	P18IT102		5	5	25	75	100
	Core III	Data Structures and Algorithms	P18IT103		5	5	25	75	100
	Core Prac.-I	Java Programming Lab	P18IT1P1	P18IT101	6	4	40	60	100
	Core Prac.-II	Data Communication Networking Lab	P18IT1P2	P18IT102	5	3	40	60	100
	Elective–I	Multimedia Technologies	P18IT1:1		4	4	25	75	100
		Computer Graphics	P18IT1:2						
		Digital Image Processing	P18IT1:3						
II	Core IV	Relational Database Systems	P18IT204		4	4	25	75	100
	Core V	Web Programming	P18IT205		4	4	25	75	100
	Core VI	Advanced Operating Systems	P18IT206		4	4	25	75	100
	Core Prac.-III	Relational Database Systems Lab	P18IT2P3	P18IT204	4	2	40	60	100
	Core Prac.-IV	Web Programming Lab	P18IT2P4	P18IT205	4	2	40	60	100
	Elective–II	Software Engineering /	P18IT2:1		4	4	25	75	100
		Software Testing /	P18IT2:2						
		Software Project Management	P18IT2:3						
	NMEC	Web Concepts	P18IT2E1		4	2	25	75	100
	VLO	RI/MI	P17VL2:1 P17VL2:2		2	2	25	75	100
III	Core VII	Mobile Technologies	P18IT307	P18IT101	5	5	25	75	100
	Core VIII	Programming with Python	P18IT308	P18IT205	5	5	25	75	100
	Core IX	Cloud Computing	P18IT309		5	5	25	75	100
	Core Prac.-V	Mobile Applications Development Lab	P18IT3P5	P18IT307	6	4	40	60	100
	Core Prac.-VI	Python Programming Lab	P18IT3P6	P18IT308	5	3	40	60	100
	Elective–III	Unified Modeling Language /	P18IT3:1	P18IT1:1	4	4	25	75	100
		Object Oriented Analysis and Design /	P18IT3:2	P18IT206					
		Principles of User Experience Design	P18IT3:3						
IV	Core X	Big Data Analytics	P18IT410	P18IT204	6	5	25	75	100
	Elective–IV	Internet of Things	P18IT4:1	P18IT106	4	4	25	75	100
		Artificial Intelligence	P18IT4:2						
		Human Computer Interaction	P18IT4:3						
	Core Project	PROJECT WORK	P18IT4PJ		--	5	---	---	100

Core Theory	: 10	Elective	: 4	Total Credits	90
Core Practical	: 6	Core Project	: 1	Value Education	1

ED Course offered by the I. T. Department : 1. Web Concepts (P18IT2E1)

OBJECT ORIENTED PROGRAMMING WITH JAVA

SEMESTER: 1　　　　　　　　　　　　　　　　**COURSE CODE: P18IT101**
CREDITS : 5　　　　　　　　　　　　　　　　**HOURS/WEEK: 15**

Objectives :
- *To obtain programming experience and problem solving expertise with exposure to Object Oriented Programming techniques and other facilities available in JAVA.*
- *To develop efficient and user-friendly Java based Applications for standalone and distributed environments.*

Unit 1: 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: Exception Handling

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

Unit 3: 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: 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-ScrollPanes-Tables-Trees.

Unit 5: Java Database Connectivity

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

Text Books:
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)**

Reference Books:
1. Kathy Sierra, Bert Bates, **"Head First Java"**, 2nd Edition, O'Reilly Media, 2005.
2. E. Balagurusamy, **"Programming with Java A Primer"**, 5th Edition, McGrawHill Education, 2014.

DATA COMMUNICATION NETWORKS

SEMESTER : I　　　　　　　　　　　　　　**COURSE CODE : P18IT102**
CREDITS : 5　　　　　　　　　　　　　　**HOURS/WEEK : 5**

Objective: To Understand the Characteristics, Specifications, Standards, Protocols and Techniques of the modern Computer based Communication Systems.

Unit 1: Overview, Protocol Architecture, Data Transmission and Guided , Wireless Transmission
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: Digital Data Communication Techniques, Data Link Control Protocols and Multiplexing
Digital Data Communication Techniques: Asynchronous and Synchronous Transmission – Types of Errors–Error Detection – Error Correction - 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 and Asynchronous Transfer Mode
Circuit Switching and Packet Switching: Switched Communications Networks–Circuit Switching Networks – Circuit Switching Concepts – 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, Congestion Control and LAN
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: Communication Architecture and Protocols
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 – UDP. Internet Applications : Electronic Mail – SMTP and MIME – Network Management (SNMP) – Internet Directory Service – Web Access - HTTP.

Text Book
1. William Stallings, **"Data and Computer Communications"**, 8th Edition, Pearson Education, 2007.

Reference Books
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.

DATA STRUCTURES AND ALGORITHMS

SEMESTER : I   **COURSE CODE: P18IT103**
CREDITS   : 5   **HOURS/WEEK : 5**

Objective : *To understand the commonly used Data Structures & Algorithms in software development.*

Unit 1: Linear Data Structure

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: Non Linear Data Structure

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: Divide and Conquer Method

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

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

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

Note : Theorems on correctness procedures and derivations of time complexity are not expected.

Text Books:

1. Ellis Horowitz and Sartaj Sahni, **"Fundamentals of Data Structures"**, Galgotia Publications., Delhi, Reprint 2008.
2. Ellis Horowitz and Sartaj Sahni, **"Fundamentals of Computer Algorithms"**, Galgotia Publications., Delhi, Reprint 2008.

Reference Books:

1. Seymour Lipschutz, **"Data Structure"**, Schaum's Outline Series, Tata McGrawHill Education Pvt. Ltd., 2005.
2. Samanta D., **"Fundamentals of Data Structures for Students"**, Shroff Publishers and Distributers. Pvt. Ltd., Mumbai, 2015.
3. Alfred V. Aho, John E. Hopcroft, Jeffry D. Ullman, **"The Design and Analysis of Computer Algorithms"**, Pearson Education, 2002.

JAVA PROGRAMMING LAB

Total Hours : 60   **Credits : 4**

Semester I   **Course Code: P18IT1P1**

Objective: *To attain experience in Object Oriented Programming with the facilities available in JAVA.*

1. Develop Java Programs using Classes and Objects

2. Implement Java Programs using different types of Inheritance

3. Develop Java Programs using Interfaces

4. Design and develop Packages in Java

5. Write Java Programs to handle Exceptions

6. Develop Java Programs to implement Multithreading

7. Write Java Programs to implement Collection Interfaces

8. Implement Applet Programming in Java

9. Develop Java programs using AWT concepts

10. Write Programs to implement the different concepts in swing

11. Implement JDBC to handle databases in Java.

DATA COMMUNICATIONS NETWORKING LAB

SEMESTER : I   **COURSE CODE : P18IT1P2**
CREDITS   : 3   **HOURS/WEEK :3**

Objective : *To obtain hands on experience with configuring computer based communication networks.*

1. Preparation of Communication Cables (Straight Through and Cross Over Network Cabling)

2. Establishing Peer to Peer Network Communication

3. Configuring Wireless Modems

4. Establishing a Static Routing Network

5. Establishing a Default Routing Network

6. Establishing a Dynamic Routing Network (EIRGP and OSPF)

7. Enabling Network Address Translation (Static and Dynamic)

8. Enabling Point to Point Protocol Authentication

9. Creating Access Lists

10. Setting up of Virtual LANs

MULTIMEDIA TECHNOLOGIES

SEMESTER: I   **COURSE CODE : P18IT1:1**
CREDITS : 4   **HOURS /WEEK : 5**

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

Unit 1:Overview of Multimedia Systems Design
Multimedia Elements - Multimedia Applications - Documenting Imaging - Image Processing and Image Recognition - Full-Motion Digital Video Application - Electronic Messaging - Evolving Technologies for Multimedia Systems: - Multimedia Data Interface Standards -Multimedia Databases: - Multimedia Storage and Retrieval – DBMS for Multimedia Systems – DB Organization for Multimedia Applications - Transaction Management for Multimedia Systems.

Unit 2: Compression and Decompression
Types of Compression - Lossless Compression - Lossy Compression - Color, Gray Scale and Still-Video Image Compression - Audio Compression - Data and File Format Standards: - Rich-Text Format - TIFF File Format - Resource Interchange File Format - MIDI File Format - JPEG File Format for Still and Motion Images.

Unit 3: Multimedia Application Design
Multimedia Applications Classes - Game Systems - Multimedia Repositories - Interactive TV using set-top systems - Types of Multimedia Systems - Virtual Reality Design - Human Factors - Multimedia Inputs and Outputs - Modeling – Design Considerations - Components of Multimedia Systems: - Input-Output-Storage Systems - Application Workflow Design Issues - Distributed Application Design Issues.

Unit 4: Multimedia Authoring and User Interface
Multimedia Authoring Systems - Design Issues for Multimedia Authoring - Approaches to Authoring - Types of MM Authoring - Hypermedia Application Design Considerations: - Integration of Application - Data Exchange – User Interface Design - Navigation Through the Application - Special Metaphors for Multimedia Applications - Information Access.

Unit 5: Hypermedia Messaging
 Mobile Messaging - Hypermedia Message Components - Text - Rich-Text - Voice Messages - Full-Motion Video Management - Hypermedia Linking and Embedding - Creating Hypermedia Messages – Integrated Multimedia Message Standards: - Vendor-Independent Messaging - MAPI Support- Telephony API - Internet Messaging - Integrated Document Management.

Text Book
1.   Prabhat K. Andleigh , Kiran Thakrar, "**Multimedia Systems Design"**, PHI ,New Delhi, 2002.

Reference Books
 1. Ze-Nian Li, Mark S. Drew, **"Fundamentals of Multimedia"**, Pearsons Education, New Delhi, 2005.
 2.   John F. Koegel Bufford, **"Multimedia Systems"**, Pearson Education, Delhi, 2005.
 3. David Hillman, **"Multimedia Technology & Applications"**, Galgotia Publications, New Delhi, 2010.

COMPUTER GRAPHICS

SEMESTER: I   **COURSE CODE: P18IT1:2**
CREDITS : 4   **HOURS/WEEK: 4**

Objective: *To understand the concepts, techniques and applications of Computer based Graphics.*

Unit 1: Output Primitives
Points and Lines - Line Drawing algorithms - Loading frame Buffer - Line function - Circle Generating algorithms - Ellipse – generating algorithms. - Attributes of Output Primitives: Line Attributes - Curve attributes - Color and Grayscale Levels - Area fill attributes.

Unit 2: 2D Geometric Transformations
Basic Transformations – Matrix representations - Composite Transformations-Other Transformations. 2D Viewing : The Viewing pipeline - Viewing coordinate Reference Frame-Window to viewport Coordinate Transformation-2D Viewing Functions-Clipping Operations-Point, Line, Polygon, Curve, Text and Exterior Clippings.

Unit 3: 3D Concepts
3D Display Methods -3D Graphics Packages. 3D Object Representations: Polygon Surfaces- Curved lines and Surfaces-Quadric Surfaces-Super quadrics-Blobby Objects-Spline representations 3D Geometric Modeling and Transformations: Translation-Rotation-Scaling-Other Transformations –Composite Transformations -3D Transformation functions.

Unit 4: Variable –Surface Detection Methods
Classification of Visible –Surface algorithms-Back-Face Detection –Depth Buffer Method-A Buffer method –Scan –Line Method-Depth-Sorting Method-BSP-Tree Method-Area-Subdivision Method-Ray casting Methods-Curved surfaces-Wireframe Methods- Visibility-Detection functions.

Unit 5: Illumination Methods
Properties of Light-Standard Primaries at the Chromaticity Diagram-Intuitive color Concepts-RGB Color Model - YIQ Color Model - CMY Color Model-HSV Color Model –Conversion between HSV and RGB models - Color selection Applications.

Text Books:
1.   Donald D. Hearn, M. Pauline Baker, **"Computer Graphics"**, 2nd edition, Pearson Education, 2002.

Reference Book:
1.   William M. Newman, Robert F. Sproull, **"Principles of Interactive Computer Graphics"**, 2nd edition, TMH Publications, 2001.

DIGITAL IMAGE PROCESSING

SEMESTER: I   **COURSE CODE : P18IT1:3**
CREDITS : 4   **HOURS/WEEK : 4**

Objective: *To acquire the basic knowledge required to work with digital images processing*

UNIT 1: Digital Image Fundamentals
Digital image, applications of digital image processing- elements of digital image processing-digital camera, line scan CCD sensor – display element perception – luminance – brightness, contrast- color models – RGB, CMY, HSI -Fourier transforms.

UNIT 2 : Image Transform
Properties of Unitary transform – 2D DFT – DCT- Discrete wavelet transform- Hoteling Transform – SVD transform – Slant, Haar transforms.

UNIT 3 :Image Enhancement and Restoration
 Contrast stretching – intensity level slicing – Histogram equalization – spatial averaging – smoothing – Median filtering – non linear filters – maximum , minimum, geometric mean – edge detection – degradation model –unconstrained and constrained filtering – removal of blur –Wiener filtering.

UNIT 4 : Image Compression
Huffman‟s coding- truncated Huffman‟s coding – binary codes, arithmetic coding, run length coding- transform coding – JPEG and MPEG coding.

UNIT 5 : Image Segmentation
  Pixel based approach – Feature threshold – choice of feature – optimum threshold – threshold selecting method- region based approach – region growing – region splitting – region merging.

Text Books.
1. Jayaraman S, Esakkirajan S., Veerakumar T., **"Digital Image Processing"**, Tata McGraw Hill Education Private Limited.
2. Gonzalez R.C and Woods R. E, **"Digital Image Processing"** Addison Wesley 2. Anil K Jain Fundamentals of Digital image processing, Prentice Hall.

Reference Books
1. S. Annadurai, R. Shanmugalakshmi, **"Fundamentals of Digital Image Processing"**, Pearson Education.
2. Anil. K. Jain, **"Fundamentals of Image Processing"**, Prentice Hall.
3. Maher A., Sid Ahmad, **"Image Processing-Theory, Algorithms and Architectures"**, McGraw Hill Education Private Limited.

RELATIONAL DATABASE SYSTEMS

SEMESTER: II   **COURSE CODE: P18IT204**
CREDITS : 4   **HOURS/WEEK: 4**

Objective : *To understand the popular Relational Database System concepts and techniques.*

Unit 1: 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 : 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 – other SQL features.

Unit 3: 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: 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 & Hashing: Basic concepts–ordered Indices – B+-Tree Index files–Static Hashing–Dynamic Hashing–Comparison of ordered indexing & Hashing–Index definition in SQL–Multiple–key access.

Unit 5 :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.

Text Book:

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

Reference Books:

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

WEB PROGRAMMING

SEMESTER: II   **COURSE CODE: P18IT205**
CREDITS: 4   **HOURS/WEEK 60**

Objective: *To acquire knowledge in using HTML, XHTML, CSS, JavaScript, JQuery, and .NET Web Programming.*

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

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

Unit 3
JQuery and C#: 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
Defining Classes: Class Definitions in C# - System Object – Constructors and Destructors. **Defining Class Members:** Member Definitions – Interface Implementation.

Unit 5
Web Programming: ASP.NET Web Programming – Web Services – Deploying Web Applications.

Text Books
1. Jon Duckett, "**Beginning HTML, XHTML, CSS, and JavaScript**", Wiley Publishing Inc. 2010. (for unit 1)
2. Richard York, "**Beginning JavaScript and CSS Development with JQuery**", Wiley Publishing Inc., 2009. (for unit 2, 3)
3. Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon Reid, and Morgan Skinner, "**Beginning Visual C# 2010**", Wiley Publishing, Inc., 2010. (for units 3, 4 & 5)

ADVANCED OPERATING SYSTEMS

SEMESTER II   **COURSE CODE : P18IT206**
CREDITS : 4   **HOURS/WEEK   : 4**

Objective: *To know the concepts and functions of Operating Systems used in modern Computing Systems.*

Unit 1: Basics of Operating System

Basics of Operating Systems: Overview of an Operating System – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments - Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks – Prevention – Avoidance – Detection – Recovery.

Unit 2: Distributed Operating System

Distributed Operating Systems: - Issues – Communication Primitives – Lamport's Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution - distributed file systems –design issues – Case studies – The Sun Network File System-Coda.

Unit 3: Real Time Operating System

Real-time Operating Systems: Introduction- Applications of Real Time Systems-Basic Model of Real Time System – Characteristics – Safety and Reliability –Real Time Task Scheduling.

Unit 4: Operating System for Handheld Systems

Operating Systems for Handheld Systems: Requirements- Technology Overview-Handheld Operating Systems- palmOS -Symbian Operating System-Android –Architecture of android –Securing handheld Systems.

Unit 5: Case Studies

Case Studies: Linux System Introduction-Memory Management- Process Scheduling- Scheduling Policy- Managing I/O devices- Accessing Files-iOS: Architecture and SDK Framework- Media Layer –Services Layer- Core OS Layer- File System.

Text Book:
1. Abraham Silberschatz, Peter B. Galvin, Greg Gange, **"Operating System Concept"**,   9th Edition, Wiley India Pvt. Ltd., 2015.

Reference Books:
1. William Stallings, **"Operating Systems Internal and Design Principles"**, Sixth Edition, Pearsons Education, 2009.
2. Thomas Anderson, Michael Dahlin, **"Operating Systems: Principles and Practice"**, 2nd Edition, Recursive Books, 2014.
3. Andrew S. Tanenbaum, Herbert Bos, **"Modern Operating Systems"**, 4th Edition, Pearson Education, 2014.

RELATIONAL DATABASE SYSTEMS LAB

SEMESTER: II   **COURSE CODE : P18IT2P3**
CREDITS   : 4   **HOURS/WEEK : 5**

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

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

WEB PROGRAMMING LAB

SEMESTER: II   **COURSE CODE: P18IT2P4**
CREDITS: 4   **HOURS/WEEK: 6**

Objectives : *To obtain 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.

SOFTWARE ENGINEERING

SEMESTER: II   **COURSE CODE: P18IT2:1**
CREDITS : 4   **HOURS/WEEK: 4**

Objective: *To understand the principles and practices used in Software Development.*

Unit 1:Need for Software Engineering
Need for Software 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
Tracking progress – Project personnel – Effort estimation – Risk management – The project plan – Process models and project management.

Unit 3: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: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:Testing Strategies
Testing strategic issues – Test strategies for conventional Software – Test strategies for object oriented Software – Validation testing – System testing – Software Testing Fundamentals – Black-box and White-box testing – White box testing – Black box testing – Mccall's Quality factors – ISO 9126 - QF – Software Reengineering: – Software Maintenance – A Software Reengineering process model.

Text Books:
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]

Reference Books:
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 TESTING

SEMESTER: II   **COURSE CODE: P18IT2:2**
CREDITS : 4   **HOURS/WEEK: 4**

Objectives: *To acquire knowledge on the principles and practices used in Software Testing*

Unit 1:Software Development Life Cycle Models, White and Black Box Testing
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: Overview of White Box Testing – Static Testing – Structural Testing – Challenges - Black Box Testing: Overview of Black Box Testing – Need for Black Box Testing – When to do Black Box Testing? – How to do Black Box Testing?

Unit 2:Integration Testing, and **System and Acceptance Testing**
Integration Testing: Overview of 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 – Need for System Testing – Functional Vs Non Functional Testing – Functional System Testing – Non Functional Testing – Acceptance Testing – Summary of Testing Phases.

Unit 3:Performance Testing and Regression Testing
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 (I$_{18}$n) Testing,Ad hoc Testing and Usability and Accessibility Testing
Internationalization (I$_{18}$n) 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: - Overview of 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, 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.

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

Reference Books
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.

SOFTWARE PROJECT MANAGEMENT

SEMESTER: II   **COURSE CODE: P18IT2:3**
CREDITS : 4   **HOURS/WEEK: 4**

Objective: *To know the basics of Software Project Management, responsibilities of Software Project Manager and Risk Management.*

Unit 1:Software Project Management
Introduction to Software Project Management Project Definition – Contract Management – Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

Unit 2:Project Evaluation
Project Evaluation: Strategic Assessment – Technical Assessment – Cost Benefit Analysis–Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

Unit 3:Activity Planning
Activity Planning Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

Unit 4:Monitoring and Control
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
Managing People And Organizing Teams :Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.

Text Book
1.   Bob Hughes, Mike Cotterell, **"Software Project Management"**, 4th edition. TMH, 2009

Reference Books
1.   Walker Royce, **"Software Project Management"**, Pearson Education, 1998.
2.   Pankaj Jalote, **"Software Project Management in Practice"**, Pearson Education, 2002.

WEB CONCEPTS

Semester II   **Course Code : P18IT2E1**
Credits : 4   **Total Hours/Week : 6**

Objectives : To acquire basic understanding of Internet and Web Content Creation using HTML and DHTML.

UNIT – 1
Introduction to the Internet : 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 : 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 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 : - 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 : 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 : P18IT307**
Credits : 4   **Total Hours/Week : 4**

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

Unit 1:Basics of Communication Technologies
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
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: 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 :** Basic Concepts – Special Constraints and Requirements – Commercial Mobile OSs – Comparative Study of Mobile OSs – OS for Sensor Networks.

Unit 4: 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: Content Providers
Content Providers – Messaging – Location Based Services – Networking – Developing Android Services – Publishing Android Applications.

Text Books
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.

Reference Books
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.

PROGRAMMING WITH PYTHON

SEMESTER: III
CREDITS : 5

COURSE CODE: P18IT308
HOURS/WEEK: 5

Objective: *To gain knowledge on programming and problem solving using Python.*

Unit 1:Introduction to Python
Introduction to Python: Introduction – Python Overview – Getting started with python – Comments – Python Identifiers – Reserved Keywords – Variables – Standard Data Types – Operators – Standard and Expressions – String Operations – Boolean Expressions – Control Statements – Iteration – Input from Keyboard.

Unit 2:Functions:
Functions: Introduction – Built-in Functions – Composition of Functions – User Defined Functions – Parameters and Arguments – Function Calls – The return statement – Python Recursive functions – The anonymous functions – Writing python scripts

Unit 3: Strings, Lists, Tuples and Dictionaries
Strings and Lists: Strings – Compound Data type – len Function – String Slices – Strings are Immutable – String Traversal – Escape Characters – String Formatting Operator – String Formatting Functions - Lists – Values and accessing elements – Lists are Mutable – Traverse – Deleting elements from list – Built-in list operators – Built-in List methods - Tuples and Dictionaries: Tuples – Creating Tuples – Accessing values in Tuples – Basic Tuple Operations – Built-in Tuple Functions - Dictionaries.

Unit 4:Files and Exceptions
Files and Exceptions: Text Files – Opening a File – Closing a File – File Object Attributes – Reading from a file – Writing to a file – Renaming a file – Deleting a file – File related methods. - Directories – Exceptions – Built-in Exceptions – Handling Exceptions - Exception with arguments – User defined Exceptions

Unit 5:Classes and Objects
Classes and Objects: Overview of OOP – Class Definition – Creating Objects – Objects as Arguments – Objects as Return values – Built-in class attributes – Inheritance – Method Overriding – Data Encapsulation – Data Hiding.

Text Book
1.   Balagurusamy E, **"Introduction to Computing and Problem Solving Using Python"**, 1ˢᵗ Edition, McGraw Hill Education(India) Private Limited, 2017.

Reference Books
1. Reema Thareja, **"Python Programming using Problem Solving Approach"**, Oxford University Press, 2017.
2. Ashok Namdev Kamthane and Amit Ashok Kamthane, **"Programming and Problem Solving with Python"**, McGrawHill Education, November 2017.
3. Mark Lutz, **"Learning Python"**, O'Reilly, Shroff Publishers & Distributors Private Ltd.,June 2017.

COURE-IX: CLOUD COMPUTING

SEMESTER :III   **COURSE CODE : P18IT309**
CREDITS : 5   **HOURS/WEEK : 5**

Objectives:
- *To understand the Fundamental concepts of Cloud Computing*
- *To acquire knowledge on the Cloud Computing Architectures, infrastructure models and services.*

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(IAAS)
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 3 : 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 4 :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 5: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.

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

Reference Books
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.

Mobile Applications Development Lab

Semester III   **Course Code : P18IT3P5**
Credits : 4   **Total Hours/week : 6**

Objective: *To obtain hands-on experience in Mobile Application Development for Android operated devices.*

1. Create a simple application that displays "Hello World" with text and background colours.
2. Create an application that will display toast (Message).
3. Create an application to demonstrate list view.
4. Create sample application for login module.
5. Create an application that will change the colour of the screen based on selected options from the menu.
6. Create an application to change the image displayed on the screen using radio button.
7. Create an application to demonstrate alert dialog box.
8. Create an application to demonstrate countdown timer.
9. Create an application to create a new contact using Intent.
10. Create an application to call specific entered number by user in the edit text.
11. Create an application to animate a bitmap.
12. Create an application to play a media file from the menu card.
13. Create an application to make database operations.
14. Understanding 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.
15. Create an application to take picture using native application.

PYTHON PROGRAMMING LAB

Objective: *To enrich programming and problem solving skills with python programming.*

1. Write a program to calculate the average of numbers in a given list.
2. Write a program to accept three digits and print all possible combinations from the digits.
3. Write a program to count number of digits in a number.
4. Write a program to compute prime factors of an integer.
5. Write a program to find LCM and GCD of two numbers.
6. Write a program to check if a number is a perfect number.
7. Write a program to remove the duplicate items from a list.
8. Write a program to find union and intersection of two lists.
9. Write a program to swap the first and last value of a list.
10. Write a program to count the number of vowels in a string.
11. Write a program to calculate the number of digits and letters in a string.
12. Write a program to form a new string by exchanging the first and the last characters.
13. Write a program to add a key-value pair to the dictionary.
14. Write a program to map two lists into dictionary.
15. Write a program to sum all the items in a dictionary.
16. Write a program to check common letters in two input strings.
17. Write a program to find the Fibonacci series using recursion.
18. Write a program to flatten a nested list using recursion.
19. Write a program to find the length of a list using recursion.
20. Write a program to count the number of words in a text file.
21. Write a program to copy the contents of one file into another.
22. Write a program to read the contents of a file in reverse order.
23. Write a program to append, delete and display elements of a list using classes.
24. Write a program to create a class which performs basic calculator operations.
25. Write a program to create a class and get all possible subsets from a set of distinct integers.

UNIFIED MODELING LANGUAGE

SEMESTER: III   **COURSE CODE: P18IT3:1**
CREDITS : 4   **HOURS/WEEK: 4**

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

Unit 1:Principles and Basic Structural Modeling

Principles of Modeling – Object Oriented Modeling – Introduction to UML.Basic Structural Modeling:

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

Unit 2:Advanced Structural Modeling

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

Unit 3:Basic Behavioural Modeling

Basic Behavioural Modeling:Interactions – Use Cases – Use Case Diagrams – Interaction Diagrams – Activity Diagrams.

Unit 4:Advanced Behavioural Modeling

Advanced Behavioural Modeling:Events and Signals – State Machines – Processes and Threads – Time and Space – State chart Diagrams.

Unit 5:Architectural Modeling

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

Text Book
1.   Grady Booch, James Rumbaugh and Ivar Jacobson,, **"The Unified Modeling Language User Guide"**, Addison Wesley – Fourth Indian Reprint 2000.

OBJECT ORIENTED ANALYSIS AND DESIGN

SEMESTER :III   **COURSE CODE : P18IT3:2**
CREDITS   : 4   **HOURS/WEEK :4**

Objective : *To acquire knowledge on employing Object Oriented Analysis and Design techniques in software designing..*

Unit 1: UML Diagrams
Introduction to OOAD - Unified Process - UML diagrams - Use Case-Class Diagrmas - Interaction Diagrams - State Diagrams - Activity Diagrams - Package, Component and Deployment Diagrams.

Unit 2: Design and Patterns
GRASP-Designing objects with responsibilities-Creator-Information expert-Low Coupling-High Cohesion-Controller-Design   Patterns-Creational-Factory method-Structural-Bridge-Adapter-Behavioural –Strategy-Observer.

Unit 3: Case Study
The next Gen POS system, Inception-Use case modelling-Relating Use cases-include, extend and generalization-Elaboration-Domain Models- Finding conceptual classes and description classes-Associations-Attributes-Domain model refinement-Finding conceptual class hierarchies-Aggregation and Composition.

Unit 4: Applying Design Patterns
System sequence diagrams-Relationship between sequence diagrams and use cases logical architecture and UML package diagram-Logical architecture refinement-UML class diagrams-UML interaction diagram-Applying GoF design patterns.

Unit 5: Coding and Testing
Mapping design to code-Testing: Issues in OO Testing-Class Testing-OO Integration Testing-GUI Testing-OO System Testing

Text Book
1.   Craig Larman,**"Applying UML and Patterns: An Introduction to   Object-Oriented Analysis and Design and Iterative Development",** Third Edition, Pearson Education, 2005.

References:
1. Simon Bennett, Steve Mc Robb and Ray Farmer, **"Object Oriented Systems Analysis and Design using UML",** Fourth Edition ,Mc-Graw Hill Education ,2010.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, **"Design Patterns: Elements of Reusable Object Oriented Software"**, Addison Wesley, 1995.

PRINCIPLES OF USER EXPERIENCE DESIGN

SEMESTER: III   **COURSE CODE: P18IT3:3**
CREDITS : 4   **HOURS/WEEK: 4**

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

Unit 1:The Tao of UXD,The Project Ecosystem,Proposals for Consultants and Freelancers and Project Objectives and Approach
The Tao of UXD: 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,Site Maps and Task Flows,Wireframes and Annotations and Prototyping
User Research: 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,Navigation, Signposts, and Wayfinding and Organizing the Page: Layout of Page Elements
Organizing the Content: 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:Doing Things,Showing Complex Data and Getting Input from Users
Doing Things: Actions and Commands: 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,Going Mobile and Making It Look Good
Using Social Media: 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.

Text Books
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)

BIG DATA ANALYTICS

SEMESTER: IV   **COURSE CODE : P18IT410**
CREDITS : 5   **HOURS/WEEK : 75**

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

Unit 1: Introduction
Motivation Behind Data Mining – Importance of Data Mining– Overview of Data Mining — Kinds of Data – Data Mining Functionalities – Kinds of Patterns 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
Need for Preprocessing 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: An Overview
Overview of 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
Overview of Big Data – Characteristics of Big Data - Data in Warehouse and Data in Hadoop – Importance of Big Data – Considering Big Data Solution - Big Data Use Cases -Patterns for Big Data Deployment.

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

Text Books:
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).

INTERNET OF THINGS

SEMESTER: IV   **COURSE CODE: P18IT4:1**
CREDITS: 4   **HOURS/WEEK 60**

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

Unit 1: Introduction to Internet of Things

Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates.

Unit 2: Domain Specific IoTs

Introduction – Home automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle – **IoT and M2M:** Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – Software Defined Networking – Network Function Virtualization.

Unit 3: IoT Platforms Design Methodology

Introduction – IoT Design Methodology – **IoT Physical Devices and Endpoints**: – What is an IoT device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.

Unit 4: Case Studies Illustrating IoT Design

Introduction – Home Automation – Smart Lighting – Home Intrusion Detection – Cities – Smart Parking – Environment –Weather Monitoring System – Weather Reporting Bot – Air Pollution Monitoring – Forest Fire Detection – Agriculture – Smart Irrigation – Productivity Applications.

Unit 5: Data Analytics for IoT

Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie – Apache Spark – Apache Storm – Using Apache Storm for Real-time data analysis. **Tools for IoT:** Introduction – Chef – Chef case studies – Puppet – Puppet case study.

Text Books

1. Arshdeep Bahga, Vijay Madisetti, **"Internet of Things – A Hands-on Approach"**, Universities Press(India) Private Limited, 2016.

Reference Books

1. Peter Waher**, "Learning Internet of Things"**, PACKT Publishing, 2015.
2. Cuno Pfister, **"Getting Started with the Internet of Things"**, O'Rielly Publication.
3. Francis DaCosta, **"Rethinking the Internet of Things-A Scalable Approach to Connecting Everything",** Apress open publication, 2013 Edition.

ARTIFICIAL INTELLIGENCE

SEMESTER : IV   **COURSE CODE :P18IT4:2**
CREDITS   :4   **HOURS/WEEK   : 4**

Objective : To understand the concepts and technologies of Artificial Intelligence.

Unit 1:Overview of Artificial Intelligence

The AI Problems – The Underlying Assumption – AI Technique – Problems, Problem Spaces and Search: - Defining the problem as a state space search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in design of search programs – Heuristic Search Techniques: - Generate-and-Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction.

Unit 2 :Knowledge Representation Issues

Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem – Using Predicate Logic: - Representing simple facts in Logic – Representing Instances and ISA Relationships – Computable Functions and Predicates – Resolution – Natural Detection – Representing Knowledge using Rules: - Procedural Versus Declarative Knowledge – Logic Programming – Forward versus Backward Reasoning – Matching – Control Knowledge.

Unit 3 :Symbolic Reasoning under Uncertainty

Symbolic Reasoning under Uncertainty: - Introduction to Non-Monotonic Reasoning – Logics for Non-Monotonic Reasoning – Implementation Issues – Augmenting a Problem Solver – Implementing Breadth First and Depth-First Searches – Statistical Reasoning: - Probability and Baye's Theorem – Certainty Factors and Rule Based Systems – Bayesian Networks – Dempster-Shafer Theory – Fuzzy Logic.

Unit 4 :Weak Slot and Filler Structure

Semantic Nets - Frames - Strong Slot and Filler Structure: - Conceptual Dependency – Scripts – CYC – Knowledge Representation Summary: - Syntactic-Semantic Spectrum of Representation – Logic and Slot-and-Filler Structures – Other Representational Techniques – Summary of the Role of Knowledge – Game Playing: - Overview – The Minimax Search Procedure – Adding Alpha-Beta Cut-offs – Additional Refinements – Iterative Deepening.

Unit 5 :Planning

Overview – An Example Domain: The Blocks World – Components of a Planning System – Goal Stack Planning – Non-linear Planning using Constraint Posting – Hierarchical Planning – Reactive Systems – Other Planning Techniques – Understanding: - Overview of Understanding – What makes Understanding hard – Natural Language Processing: - Introduction – Syntactic Processing – Semantic Analysis.

Text Book

1.   Elain Rich, Kevin Knight, Shivashankar B. aNair, "Artificial Intelligence", 3rd Edition, TMH Publications, 2009.

HUMAN COMPUTER INTERACTION

SEMESTER : IV   **COURSE CODE : P18IT4:3**
CREDITS   : 4   **HOURS/WEEK   : 4**

Objective: To understand the facilities and technologies available for interaction between Human Beings and Computers.

Unit 1 : Models, Theories, and Frameworks
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
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
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
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
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.

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

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