

# **North Maharashtra University, Jalgaon**



**Syllabus for**  
**M.Sc. (Information Technology)**  
**[Affiliated Colleges]**  
**Faculty of Science and Technology**

**With Effect from Academic Year 2017-18**

**Degree Name: Master in Science (Information Technology)  
[M. Sc. (Information Technology)]**

**Duration: 02 years' Full Time course (Semester Pattern, 04 semesters)**

**Examination Pattern:**

**60 % ( External Assessment) +40%(Internal  
Assessment) with separate head of passing for each  
Assessment**

**Evaluation Mode: CGPA**

**Lecture: Clock hour (60 minutes)**

**SYLLABUS for M. Sc. (Information Technology)  
(With effect from June 2017-2018)**

**Semester-I**

- IT-101 Theoretical Computer Science
- IT-102 Digital Image Processing
- IT-103 Advance C++ Programming
- IT-104 Web Designing and Navigation
- IT-Lab-I Lab on DIP& Advance C++ Programming
- IT-Lab-II Lab on Web Designing and Navigation

**Semester-II**

- IT-201 Web Publishing & Data Storage Technologies
- IT-202 Advance Java
- IT-203 C# using .NET Framework
- IT-204 Internet Programming
- IT-Lab-III Lab on C# & PHP Programming
- IT-Lab-IV Lab on Java Programming

**Semester-III**

- IT-301 Object Oriented Analysis & Design
- IT-302 Mobile Computing
- IT-303 Windows Programming
- IT-304 Advance Operating Systems
- IT-Lab-V Lab on Mobile Computing & Windows Programming
- IT-Lab-VI Lab on OS Administration

**Semester- IV**

- IT-401 Software Engineering
- IT-402 Current Computing Trends
- IT-403 Cloud Computing
- IT-404 Project
- IT-Lab-VII Lab on Current Computing Trends

## Semester- I

### IT-101 Theoretical Computer Science

**Unit I. Finite Automata:** [L12 M15]

Sets, relations, functions, graphs, trees, mathematical induction, Finite Automata(FA), definition, description, transition systems, acceptability of a string, NFA, DFA, equivalence of DFA and NFA, Melay Moore model, minimization of automaton, Applications

**Unit II Formal Languages:** [L06 M10]

Formal languages, Chomsky classification of languages, languages, their relation and automaton.

**Unit III Regular Expressions:** [L12 M15]

Regular expressions, FA and regular expressions, pumping lemma for regular sets, applications of pumping lemma, closure properties of regular sets, regular sets and regular grammars.

**Unit IV Context Free Languages:** [L12 M20]

CFLs and derivation trees, ambiguity in Context-Free Grammars (CFGs), simplification of CFGs, Normal Forms for CFGs(CNF and GNF), pumping lemma for CFLs, decision algorithms for CFLs.

**Unit V Push Down Automata:** [L12 M15]

Pushdown Automaton (PDA), informal description, basic definitions, acceptance by a PDA, PDA and CFLs

**Unit VI Turing Machine:** [L06 M15]

Turing Machine, Model, computable languages and function, representation of TMs, Language Acceptability by TMs, Design of TM, Halting Problem of TMs.

**References:**

1. SmitaRajpal ,Theory of Automata and Formal Languages, GALGOTIA Publications.
2. J.E.Hopcraft, R. Motwani and J.D.Ullman, Introduction to Automata Theory languages & Computation, Pearson Education Asia.
3. K.L.P.Mishra, N. Chandrashekharan, Theory of Computer Science, PHI.
4. Martin John C., Introduction to Language & Theory of computation(TMh).

**IT-102 Digital Image Processing****Unit I Introduction:****[L08 M10]**

Introduction to DIP, Application of Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image data types, image file formats(GIF,BMP,TIFF,JPEG).

**Unit II Image Processing Fundamental:****[L08 M10]**

Elements of Visual Perception. Image Sensing and Acquisition. Image Sampling and Quantization. Some Basic Relationships Between Pixels. Linear and Nonlinear Operations.

**Unit III Image Enhancement:****[L10 M15]**

Background. Some Basic Gray Level Transformations. Histogram Processing. Enhancement Using Arithmetic/Logic Operations. Basics of Spatial Filtering. Smoothing Spatial Filters. Sharpening Spatial Filters. Combining Spatial Enhancement Methods. Introduction to the Fourier Transform and the Frequency Domain. Smoothing Frequency- Domain Filters. Sharpening Frequency Domain Filters. Homomorphic Filtering. Implementation.

**Unit IV Image Restoration and Transforms:****[L08 M15]**

A Model of the Image Degradation/Restoration Process. Noise Models. Restoration in the Presence of Noise Only-Spatial Filtering. Periodic Noise Reduction by Frequency Domain Filtering. Linear, Position-Invariant Degradations. Estimating the Degradation Function. Inverse Filtering. Minimum Mean Square Error (Wiener) Filtering. Constrained Least Squares Filtering. Geometric Mean Filter. Geometric Transformations. Discrete Fourier transform, Walsh transform(WT), Hadamard transform, Cosine transform, Haar transform, Wavelet transform.

**Unit V Color Image Processing:****[L 08 M 10]**

Color Fundamentals. Color Models. Pseudocolor Image Processing. Basics of Full-Color Image Processing. Color Transformations. Smoothing and Sharpening Concept of Image, Audio and Video Compression.

**Unit VI Morphological Image Processing & Segmentation:****[L 08 M 15]**

Detection of Discontinuities, Edge linking & Boundary Detection, Thresholding, Region based segmentation Laplacian of Gaussian, Derivative of Gaussian, Canny Edge Detection, Morphological operation: Dilation erosion, Opening & Closing, Basic Morphological Algorithm, Image representation schemes.

**Unit VII MATLAB Image Processing:****[L 10 M 15]**

Introduction to matrix operations, introduction to image processing tool box Image read & write, filters (spatial, frequency domain), Image Restoration and Reconstruction, morphological operations, edge detection and linking, segmentation.

**References:**

1. Gonzalez & Woods, Digital Image Processing, 2<sup>nd</sup> Ed., Pearson Education.
2. S. Jayaraman, Digital Image Processing, TMH (McGraw Hill) publication
3. A.K. Jain, Fundamentals of Image processing, Prentice Hall of India Publication, 1995.

- 4.S.Shridhar Oxford,Digital Image Processing.  
5., Gonzalez, Woods Digital Image Processing using MATLAB

### **IT-103 : Advance C++ Programming**

**Unit I:** **[L 10 M 15]**

Review of basic C++ concepts like data type, control structures, Functions, Passing Variables, Pass By Value, Function Types, Inline Functions, Default Arguments, Function Overloading, Recursion, Structures, Accessing Structure Members, Initializing Structure Members, Array of Structures, Array in structure, Structure in structure, Passing structure to function, Structure returned by function, Union

**Unit II:** **[L 12 M 20]**

Constants, References, Pointers, Pointer arithmetic, String literals, Pointers in to arrays, void Pointer, Array of Pointers to Objects, Inheritance, Pointer to base class object, Pointers to Derived Class object, Typecasting, Virtual Functions, Pure Virtual Functions, Abstract Classes, Polymorphism, Compile time polymorphism, Run time polymorphism, Array of pointer to the derived class, Virtual Destructor, Reference Variables, Using reference variables in passing arguments, Returning by Reference, const references

**Unit III:** **[L 08 M 10]**

Exception handling, Uncaught exceptions, Standard exceptions. Namespaces, using namespaces, avoiding name clashes, name lookups, namespace composition, namespaces aliases, Namespace and 'C' code.

**Unit IV:** **[L 10 M 15]**

Classes For File Stream Operations, Opening and Closing a File, Opening Files Using Constructor, Opening Files by using open() function, File mode Parameters, File Pointers, Sequential File, Detecting End-of-File, Functions for Manipulation of File Pointers, Specifying the Offset, Binary File, Reading and Writing a Class Object, Updating a File, Command-Line Arguments, this Pointer

**Unit V:** **[L 08 M 10]**

Templates, Template functions, specializing a template function, Disambiguation under specialization, Template classes, Instantiating a template class object, Rules for templates

**Unit VI:** **[L 12 M 20]**

Standard Ternplate Library (STL), STL generic Programming, organization of STL, header filers, containers, container types, Sequence containers, sorted associated containers: Iterators, Iterator types, Generic STL algorithms, Adaptors: Container adaptors, Iterator adapter, Function adaptors, Function object

**References:**

1. B. M. Harwani, "C++ for Beginners", Shroff publishers and Distributors Pvt. Ltd., ISBN: 9788184046564
2. Bjarne Stroustrup, "The C++ Programming language", 3rd Edition, Person Education Asia, 2000, ISBN 81-7808-126-1.
3. Danny Kaleve, "The ANSI/ISO C++ Professional programmer's Handbook" Printice hall India. Indian Reprint, 1999, ISBN 81-203-1630-4.

4. David R. Musser, AtulSaini, "STL Tutorial & Reference guide", Person Education Asia, Second Indian Reprint 2000, ISBN-81-7808-132-6.

### **IT 104 : Web Designing & Navigation**

**Pre-requisite:** Basic knowledge of HTML, Preliminary information about websites and internet surfing

**Unit I Internet Basics:** [L08 M10]

History & structure of the Internet, Internet connection types & devices, Internet browsers & client side technologies, web sites: classification, structure, anatomy of urls and domain specifiers

**Unit II Advance HTML & CSS:** [L10 M20]

Linking with anchor tag including internal links, absolute & relative referencing of web resources, borders & margins, imagery, unicode fonts, div & span tags, HTML table tags, html form tags, positioning & floating, introduction to css: typography, consistency, types of styles, specifying class within html document

**Unit III Web Site Design process:** [L08 M15]

Design goals: site purpose, usability & accessibility, web content: Conceptualization & research, content organization, planning 'look & feel'

**Unit IV Web Navigation Foundation:** [L14 M20]

Need for navigation, web navigation design, understanding navigation, information seeking, seeking information online, web browsing behavior, information shape, experiencing information, navigation mechanism: step navigation, paging navigation, breadcrumb trail, tree navigation, site maps, directories, tag clouds, A-Z Indexes, navigation bars and tabs, vertical menu, dynamic menus, drop-down menus, visualizing navigation, browser mechanisms, types of navigation, categories of navigation, page types, labeling navigation, vocabulary problem, aspects of good labels, labeling systems, persuasive labels, sources of labels

**Unit V Web Navigation Design Framework:** [L 20 M25]

Qualities of successful navigation, evaluation methods, Persuasive architecture, creating a navigation concept and concept diagrams, Information structures: Linear structures, webs, hierarchies, facets, emergent structures, Organizational schemes and categories, creating site maps and detailed site plans, Layouts: determining navigation paths, visual logic, page template, wireframes, navigation in the context of search, faceted browse, navigating, rich web applications, browser controls, the back button, and pop-up windows, types of interaction, capturing and refinding information, designing web applications for interaction, inductive user interfaces

#### **Reference:**

- 1) Jennifer Niederst Robbins, Learning Web Design, 2007, 3rd Edition, O'Reilly, ISBN-10: 0-596-52752-7 ISBN-13: 978-0-596-52752-5 [C]
- 2) Jennifer Niederst Robbins, Web designing in Nut Shell (Desktop Quick Reference), O'Reilly ISBN: 1-56592-515-7 [M]
- 3) James Kalbach, Designing web navigation, 2007, O'Reilly publication, IS BN-10: 0-596-52810-8 IS BN-13: 978-0-596-52810-2 [L]

**IT-Lab-I Lab on DIP& C++****DIP:**

1. Display of Grayscale Images, Color images.
2. Arithmetic Operation on Images
3. Histogram Equalization
4. Conversion between color spaces.
5. Max-min Non-linear Filtering.
6. Median Non-Linear Filter
7. 2-D DFT and DCT.
8. Filtering in frequency domain.
9. Edge detection .
10. Segmentation using Thresholding.

**C++ Lab:**

1. Design a C++ program that demonstrates language basics such as data types, controls structures, functions, structures, passing structure to function, Structure returned by function, Union etc.
2. Demonstrate following
  - a. Pointer arithmetic
  - b. Pointers in to arrays and Array of Pointers to Objects
  - c. Pointer to base and Derived Class object
3. Demonstrate compile time and run time polymorphism in C++.
4. Demonstrate exception handling in C++.
5. Demonstrate file handling in C++.
6. Demonstrate function templates, class templates and specialization in C++.
7. Implement a C++ program that demonstrates sequence containers of STL.
8. Implement a C++ program that demonstrates associative containers of STL.
9. Write a program to demonstrate generic algorithm for sorting, search, conditional search, fill, generate, replace, reverse, rotate, swap, heap operation merge.
10. Implement a C++ program that demonstrates adaptors of STL.
11. Implement a C++ program that demonstrates function objects.

**IT-Lab-II Lab on Web Designing and Navigation**

- 1 Design a web page to demonstrate various HTML elements like List, Anchor, Table, Image, Image map, Frames etc..
- 2 Design a web site to demonstrate step navigation
- 3 Design a web site to demonstrate paging navigation
- 4 Design a web site to demonstrate breadcrumb trail
- 5 Design a web site to demonstrate site maps
- 6 Design a web site to demonstrate A–Z Indexes
- 7 Design a web site to demonstrate navigation bars
- 8 Design a web site to demonstrate vertical menu



## Semester- II

### IT-201 Web Publishing & Data Storage Technologies

**Unit I:** [L 10 M 15]

Overview of web client/server architectures, HTML and CSS & JavaScript, Building dynamic web pages using server-side includes and environment variables.

**Unit II:** [L 25 M 30]

Introduction to XML, XML advantages, XML Implementations, XML approach to web designing, logical and physical structure of XML documents Writing well-formed and valid XML documents based on W3C specifications, Creating valid XML documents using document type definitions (DTDs), elements, attributes, entities, Working with XML schemas, Formatting XML using cascading style sheets, Introduction to powerful Extensible Style sheet Language Transformations (XSLT), Using data binding and XML Document Object Model (XML DOM) scripts to display XML in HTML Web pages.

**Unit III:** [L 20 M 30]

Introduction to PHP, PHP Installation & Configuration, PHP syntax, PHP variables and constants, Control structures, Data structures, Functions, Object Oriented Programming with PHP. Processing HTML forms and dynamically generating HTML documents, File processing with PHP, Building applications with cookies and session objects, Sending emails with PHP. Introduction to PHP programming with XML.

**Unit IV:** [L 05 M 15]

Introduction to MySQL database management and SQL Language, How to develop PHP/MySQL applications.

**References:**

1. Beginning PHP5 Publisher: Wrox Press Inc; ISBN: 0-7645-5783-1
2. XML Step by Step, 2nd Ed. Publisher.- Microsoft Press Inc; ISBN: 0-7356-1465-2
3. Author: James Jaworski, Mastering JavaScript, Publisher: Sybex, ISBN: 0-7821-21:19-X'

**Web References :**

<http://www.php.net>  
<http://www.w3c.org>

### IT-202 Advance Java Programming

**Unit I Java Basics Review:** [L 12 M 18]

Java streams- Text input and output, Reading and writing Binary data, Object serialization; Networking- Socket Programming; Exception Handling, Multithreading; Collection Classes- HashSet , LinkedHashSet ,Stack, LinkedList , ArrayList , Vector ,HashMap, Hashtable, Arrays

**Unit II Distributed Computing:** [L 12 M 18]

Remote Method Invocation- Introduction, Architecture, RMI Object services, stub and Skeleton, Steps of developing an RMI system; Overview- IIOP, Interface definition language, CORBA , JINI, JNI.

**Unit III Java Beans and EJB:** [L 12 M 18]

Java Bean- Concepts, Writing process, Applications, Properties and Events, Property Editors, Customizer , Persistence; Enterprise JavaBeans- Introduction, Specification, Architecture, Container, Types, Life cycle, Applications.

**Unit IV Servlets and Java Server Pages** [L 16 M 24]

Servlets – Concepts, Architecture, Servlet Container Writing Process, API, Life Cycle, Hierarchy, ServletConfig, ServletContext, Programming and deployment, Servlet and HTML Form, Session Management, JDBC ;Java Server Pages – Introduction, JSP Tags (Scripting Elements), JSP Containers, Architecture, API, JSP Objects, JSP and JavaBeans, JSP and Servlets

**Unit V Struts:** [L 08 M 12]

Introduction, Understanding Scopes, Custom Tags, The MVC Design Pattern, Simple Validation, Processing Business Logic, Basic Struts Tags, Configuring Struts; Introduction-Spring , Hibernate

**References:**

1. Arnold Doray by Apress, Beginning Apache Struts From Novice to Professional, ISBN: 978-1-59059-604-3
2. Eric Pugh, Joseph D. Gradecki ,Professional Hibernate, by Wiley Publishing, Inc., ISBN: 0-7645-7677-1
3. Craig Walls, Ryan Breidenbach ,Spring In Action, Manning Publishing Co., ISBN: 1-932394-35-4
4. "Core Java Vol 1 and Vol 2",Gary Cornell and Cay S. Horstmann, Sun Microsystems Press,Eight Edition.
5. SoumadipGhosh, “Web Technology with Advanced Java”, University Science Press, ISBN:978-93-80856-78-0.

**IT-203:C# using .NET Framework****Unit I C# and the .NET Framework:** [L 06 M 12]

Before .NET, Enter Microsoft .NET, Compiling to the Common Intermediate Language , Compiling to Native Code and Execution , The Common Language Runtime, The Common Language Infrastructure, The Evolution of C#

**Unit II Overview of C# Programming:** [L 06 M 12]

Identifiers, Keywords, Main, Types, Storage, and Variables, Value Types and Reference Types, Storing Members of a Reference Type Object, Categorizing the C# Types variables, statements, Arrays, Enumerations, struts

**Unit III Classes: The Basics:** [L 14 M 18]

Overview of Classes, Programs and Classes: A Quick Example, Declaring a Class , Class Members, Fields, Methods, Creating Variables and Instances of a Class, Allocating Memory for the Data, Instance Members, Access Modifiers Private and Public Access . Accessing Members from Inside the Class, Accessing Members from Outside the Class Static Fields, Static Function Members, Other Static Class Member Types, Member Constants, Properties, Constructors, Destructors, The readonly Modifier, The this Keyword, Indexers

**Unit IV Classes and Inheritance [L 12 M 12]**

Class Inheritance, Accessing the Inherited Members, All Classes Are Derived from Class object, Masking Members of a Base Class, Base Access, Using References to a Base Class, Constructor Execution, Inheritance Between Assemblies, Member Access Modifiers, Abstract Members, Abstract Classes, Sealed Classes, Static Classes, Extension Methods, Interfaces

**Unit V Operators and Conversions [L 06 M 12]**

Operators, Operator overloading, What Are Conversions, Implicit Conversions, Explicit Conversions and Casting, Types of Conversions, Numeric Conversions, Reference Conversions, Boxing Conversions, Unboxing Conversions, User-Defined Conversions, The is Operator, The as Operator

**Unit VI Delegates and Events [L 10 M 12]**

An Overview of Delegates, Declaring the Delegate Type, Creating the Delegate Object, Assigning Delegates, Combining Delegates, Adding Methods to Delegates, Removing Methods from a Delegate, Invoking a Delegate, Invoking Delegates with Return Values, Invoking Delegates with Reference Parameters, Anonymous Methods. Lambda Expressions, Publishers and Subscribers, Overview of Source Code , Components, Declaring an Event, Subscribing to an Event, Raising an Event, Standard Event Usage, Event Accessors

**Unit VII Generics [L 06 M 12]**

What Are Generics? Generics in C#, Generic Classes, Declaring a Generic Class, Creating a Constructed Type, Creating Variables and Instances, Constraints on Type Parameters, Generic Methods, Extension Methods with Generic Classes, Generic Struts, Generic Delegates, Generic Interfaces, Covariance, Contra variance

**References:**

1. Daniel Solis, Illustrated C# 2012, 2nd edition, Publisher: Apress 2012, ISBN: 1430242795, 9781430242796
2. bChristian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, Professional C# 2005 by Wiley Publishing Inc. ISBN: 978-0-470-19137-8

**IT-204 Internet Programming****Unit I: [L 12 M 18]**

Application and Page Frameworks , Asp .Net Server Controls and Client Side Scripts, Asp .Net Web Server Controls., Validation Server Control, Working with Master Pages, Themes and Skins

**Unit II: [L 14 M 24]**

Data Binding in Asp .Net 3.5, Data Management with ADO .Net, Querying with LINQ, Site Navigation, Personalisation, Membership and Role Management, Portal Framework with Web Parts

**Unit III: [L 14 M 24]**

Asp .Net Ajax, Security, State Management, Caching, User and Server Controls, File I/O and Streams, Building and Consuming Services, Packing and Deploying Asp .Net Application.

**Unit IV Introduction to LINQ:** [L 10 M 12]

What Is LINQ? LINQ Providers, Method Syntax and Query Syntax, Query Variables, The Structure of Query Expressions, The Standard Query Operators, LINQ to XML

**Unit V Windows forms** [L 10 M 12]

Overview, The Form class, The class hierarchy of Windows Forms, The controls and components that are part of the System, Windows. Forms namespace, Menus and toolbars, Creating controls, Creating user controls

**References:**

1. Professional Asp .Net 3.5 in C# and VB by Bill Evjen, Scott Hanselman, Devin Rader, by Wiley Publishing Inc. ISBN:978-0-470-18757-9.
2. Programming Microsoft ASP.NET 3.5, Dino Esposito, Microsoft Press, 2008.

**IT-Lab-III Lab on C#.NET & PHP****C#:**

1. Implement a C# program that demonstrates fundamental concepts such as data types, arrays, enumerations, structures etc.
2. Design a class having various members such as readonly fields, static and instance methods, properties, constructors etc.
3. Demonstrate the concept of Implementation and Interface Inheritance in C#.
4. Demonstrate inheritance between assemblies.
5. Demonstrate built in and user defined type conversions in C#.
6. Demonstrate unary and binary operator overloading in C#.
7. Demonstrate generics used in C# programs.

**PHP:**

1. Implement a XML based application demonstrate validation using DTDs.
2. Implement a XML based application to demonstrate validation using XML Schema.
3. Implement a XML based application to transform XML w.th XSLT.
4. Implement a XML based application to access XML data using DOM (Document Object Model).
5. Implement a PHP program to display a Well-Come page based on client browser.
6. Implement a PHP program to process HTML forms.
7. Implement a PHP program to demonstrate Object Oriented Programming in PHP
8. Implement a PHP program to demonstrate use of Cookies & Session objects.
9. Implement a PHP program to demonstrate database handing.
10. Implement a PHP program to access XML data.

**IT-Lab-IV Lab on JAVA Programming**

1. Write java program(s) that demonstrates Java streams.
2. Implement the Java program(s) for server and client to demonstrate networking in Java using Sockets. (Single server and single client, Single server and multiple clients).
3. Write java program(s) that demonstrates concept of Exceptions.
4. Write java program(s) that demonstrates concept of Multithreading.
5. Write a Java program(s) that demonstrates the use of Collection Classes.

6. Write a Java program(s) that demonstrates the use of RMI technology.
8. Write a Java program(s) that demonstrates Java Bean.
9. Write a Java program(s) that demonstrates EJB.
10. Write a Java program(s) that demonstrates use of Servlets.
11. Write a Java program(s) that demonstrates JSP.
12. Write a Java program(s) that demonstrates the use of struts.
13. Write a window program to Move a ball horizontally inside the client area using timer. At each time lapse the ball should move left of the window and when it touches the left boundary of the window it should go to, the right of the window and so on
14. Write a window program to display the characters entered by user from the keyboard.  
[Consider only alphabets and numbers only.]

**Semester- III****IT-301 :Object Oriented Analysis and Design****Unit I Introduction:** [L 12 M 18]

An overview – Object basics, Object state and properties, Behavior, Methods, Messages Information hiding, Class hierarchy, Relationships, Associations, Aggregations, Identity, Dynamic binding, Persistence, Metaclasses, Object oriented system development life cycle.

**Unit II Methodology and UML:** [L 12 M 18]

Introduction – Survey, Rumbugh, Booch, Jacobson methods, Patterns, Frameworks, Unified Approach, Unified modeling language, Static and Dynamic models, UML diagrams, Class Diagram, Usecase diagrams, Dynamic modeling, Model organization, Extensibility.

**Unit III Object Oriented Analysis:** [L 12 M 18]

Identifying Usecase, Business object analysis, Usecase driven object oriented analysis, Usecase model, Documentation, Classification, Identifying object, relationships, attributes, Methods, Super-sub class, A part of relationships Identifying attributes and methods, Object Responsibility

**Unit IV Object Oriented Design:** [L 14 M 24]

Design process, Axioms, Colollaries, Designing classes, Class visibility, Refining attributes, Methods and protocols, Object storage and object interoperability, Databases , Object relational systems, Designing interface objects, Macro and Micro level processes, The purpose of a view layer interface

**Unit V Software Quality** [L 10 M 12]

Quality assurance, Testing strategies, Object orientation testing, Test cases, Test Plan Debugging principles, Usability, Satisfaction, Usability testing, Satisfaction testing.

**References:**

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 1999.
2. Booch, Jacobson, Rumbaugh, Object Oriented Analysis and Design with Applications, Third Ed., Pearson Education, 2010.

**IT-302 Mobile Computing****Unit I Device Application Development:** [L 08 M 12]

Introduction to handheld devices (Palm, Pocket Pc, Symbian OS smart phones, MS windows based smart phones, BlackBerry, iphone etc.), features of handheld devices, , Device Applications Vs Desktop application, overview of application development platforms (OS- Palm OS, Symbian, BlackBerry, Windows CE, OS for iphone, Android), Programming Languages (C/C++, JAVA), IDE tools. Android comparison with other OS.

**Unit II Hello, Android:** [L 16 M 24]

A Little Background, What It Isn't. An Open Platform for Mobile Development. Native Android Applications. Android SDK Features. Introducing the Open Handset Alliance. What Does Android Run On? Why Develop for Android?, Introducing the Development Framework. What Comes in the Box.. Developing for Android., Developing for Mobile Devices. To-Do List Example. Android Development Tools.

**Unit III Creating Applications and activities and User Interfaces:** [L 12 M 18]

What Makes an Android Application? Introducing the Application Manifest. Using the Manifest Editor. The Android Application Life Cycle. Understanding Application Priority and Process States. Externalizing Resources. A Closer Look at Android Activities. Fundamental Android UI Design. Introducing Views. Introducing Layouts. Creating New Views. Creating and Using Menus.

**Unit IV Intents, Broadcast Receivers, Adapters, and the Internet:** [L 08 M 12]

Introducing Intents. Introducing Adapters. Using Internet Resources. Introducing Dialogs. Creating an Earthquake Viewer.

**Unit V Working in the Background:** [L 08 M 12]

Introducing Services, Using Background Worker Threads, Using Toast, Introducing Notifications, Using Alarms.

**Unit VI Data Storage, Retrieval, and Sharing:** [L 08 M 12]

Android Techniques for Saving Data. Saving Simple Application Data. Saving and Loading Files. Databases in Android. Introducing Content Providers.

**References:**

1. Reto Meier ,Professional Android Application Development ISBN: 978-0-470-34471-2 (Wrox Publications.)
2. Rick Rogers, John Lombardo, Zigurd Mednieks, G. Blake Meike, Android Application Development: Programming with the Google SDK ISBN: 0596521472 (O'Reilly)

### **IT-303 Windows Programming**

**UNIT I Introduction to Windows Programming:** [L 12 M 18]

Windows environment, a sample windows program, windows and messages, creating the window, displaying the window, message loop, the window procedure, message processing.

**UNIT II Windows, Messages and Textout:** [L 08 M 12]

window architecture, creating, displaying, WM\_PAINT, WM\_DESTROY, Painting and Repainting, GDI, Scroll bars.

**UNIT III Basic Drawing** [L 08 M 12]

Structure of GDI, Device Context, Dots , Lines, Filled areas, Rectangles, Regions and Clipping, Mapping mode.

**UNIT IV Keyboard, Mouse and Timer:** [L 12 M 18]

Keyboard: KeyStroke, character, keyboard messages, Character sets Mouse: mouse messages, capturing, timer control.

**UNIT V Child Window Controls, Menus , Dialogs:** [L 12 M 18]

Child Window Controls: Button, static, scroll bar, edit, list box classes, controls and colors.

Menus: Creating menus, accelerators Dialogs: modal, modeless, common dialogs

**Unit VI Multiple Document Interface and DLLS :** [L 08 M 12]

Multiple Document Interface: Concepts, implementation DLLS: basics, linking without library.

**References:**

1. Charles Petzold, "Windows Programming", Microsoft Press, 2007

**IT-304 Advance Operating Systems**

**Unit I Overview Of UNIX Operating System:** [L 08 M 12]

Architecture of UNIX/LINUX Operating System, Introduction to Kernel, Intro Introduction to shell programming and Unix commands.

**Unit II File Subsystem:** [L 16 M 24]

Inodes, structure of regular file, Conversion of a path name to an Inode, Super block, Inode assignment to a new file, Allocation of disk blocks. System calls for File system: Open – Read – Write – Adjusting the position of file I/O lseek –Close, File creation – Changing directory, root, owner, mode, stat and fstat, Pipes – Dup, Mounting and unmounting file systems - Link – unlink.

**Unit III Processes:** [L 08 M 12]

Process states and transitions, The context of a process, Saving the context of a process, Manipulation of the process address space - Sleep.

**Unit IV Process Control:** [L 16 M 24]

Process creation, Signals, Process termination, awaiting process termination, Invoking other programs – user id of a process – Changing the size of a process, Shell – System boot and the INIT process– Process Scheduling and time.

**Unit V Memory Management:** [L 12 M 18]

Memory Management Policies: Swapping, Demand paging, Driver Interface, Disk Drivers, Terminal Drivers, Streams, Inter process communication.

**Reference:**

1. Maurice J. Bach, The Design of the Unix Operating System, Pearson Education.
2. B. Goodheart, J. Cox, The Magic Garden Explained, Prentice Hall of India.
3. S. J. Leffler, M.K. McKusick, M. J. Karels and J. S. Quarterman., The Design and Implementation of the 4.3 BSD Unix Operating System, Addison Wesley.
4. J. Hart, Windows System Programming, Pearson Education, 2008.
5. A. Robbins, Linux Programming by Example: The Fundamentals, Pearson Education, 2008.



**IT-Lab-V Lab on Current Computing Trends I & Windows Programming****Mobile Computing**

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 android application with login module.(Check username and password) On successful login, go to next screen. And on failing login, alert user using Toast.
3. Create List with strings taken from resource folder(res >> value folder).On changing list value, change image.
4. Create an application that will change color of the screen, based on selected options from the menu.
5. Create android application that will display toast(Message) on specific interval of time.
6. Create android background application that will open activity on specific time.
7. Create android application that will display toast(Message) on android life cycle stages.
8. Create android UI such that , one screen have radio button of the types of cars.On selecting of any car name, next screen should show Car details like : name ,company name, images if available, show different colors in which it is available.
9. Create android application that read phonebook contacts using content providers and display in list on selecting specific contact makes a call to selected contact.
10. Create android application to make Insert , update , Delete and retrieve operation on the employee database.

**Windows Programming:**

1. Write a window program to demonstrate line drawing with left mouse button. The color& width of the line should change with every new line
2. Write a Window Program that displays a small rectangle with every left mouse button. Double Clicking on existing rectangle should erase the rectangle.
3. Write a Window Program to display size of window and no. of left clicks; no. of right clicks and no. of double clicks. The data should be display at the center of the window. Size should be updated when user resizes the window object.
4. Write a Window Program to create filled rectangle and circle. on alternate left click. New figure should not erase the previous one.
5. Write a Window Program to create various brushes and change the background color using timer.
6. Write a Window program to create a window object. Drag the left mouse buttons & display rectangle for which dragged line is a diagonal. Also demonstrate mouse capturing.
7. Write a window program to Move a ball horizontally inside the client area using timer. At each time lapse the ball should move left of the window and when it touches the left boundary of the window it should go to, the right of the window. and so on .
8. Write a window program to display the characters entered by user from the keyboard. [Consider only alphabets and numbers]

**IT-Lab-VI Lab on OS Administration**

1. Use of Unix/Linux – User Commands – Editors - Shell programming
2. C/C++ programming on Unix/Linux – use of make, version control
3. Use of system calls – files – processes – I/O – IPC
4. Experiments using C of mini unix systems (such as Minix) – File system – Processes – Memory Management – Drivers
5. Unix / Linux sources – build, run kernel – small modifications

**Semester- IV****IT-401: Software Engineering****Unit I Introduction:** [L 08 M 12]

What is Software Engineering, The nature of software, Defining software, Legacy Software, Software Process

**Unit II Software Development Life-cycle:** [L 08 M 12]

Requirements analysis, software design, coding, testing, maintenance, etc.

**Unit III Software Requirements Specification:** [L 10 M 12]

Waterfall model, prototyping, interactive enhancement, spiral model, COCOMO model. Role of Management in software development. Role of metrics and measurement.

**Unit IV Software Requirement Specification:** [L 08 M 12]

Problem analysis, requirement specification, validation, metrics, monitoring and control.

**Unit V Design Concepts:** [L 10 M 12]

Design Process, Concepts, Design Models, Architectural Design – Software Architecture, Styles, Alternative architectural, Design, Component level Design - An object oriented view, Traditional view, Process related view, User Interface Design – Analysis and Design

**Unit VI Testing:** [L 06 M 12]

Levels of testing – Functional, Structural, Test Plan, Test case specification, Types of testing – Unit testing, Integration Testing, Function Testing, System testing, Performance testing, Accepting testing.

**Unit VII Quality Management** [L 06 M 12]

What is Quality?, Garvins Quality Dimensions, McCalls Quality Factors, ISO 9126 Quality factors, Targeted Quality Factors, Review Techniques- Formal Technical Reviews.

**Unit VIII Software Configuration Management (SCM) and Project Scheduling** [L 04 M 06]

Software Configuration Items, SCM Repository, SCM process, Scheduling Timeline Charts, Tracking the schedule

**References:**

1. Roger S Pressman ,Software Engineering : A Practitioner's Approach 7<sup>th</sup> Edition, McGraw Hill International Publication.
2. Thomas A Powell, The Complete Reference : Web Design, McGraw Hill International Publication.

**IT-402 Current Computing Trends****Unit I:** [L 36 M 45]

Windows Communication Foundation Overview, Windows Communication Foundation Concepts, Understanding Windows Communication Foundation, Addresses, Understanding and Programming WCF Binding, Understanding and Programming WCF Contracts, Clients, Services, Security

**Unit II:** [L 12 M 24]

Introduction to Workflow and Windows Workflow Foundation, Workflow Overview, Conditional Activities, Flow Activities, Rule Based Workflow, Workflow and web services, Interacting with Work Flow, Deploying Workflow Applications.

**Unit III** [L 12 M 21]

Overview of Windows Presentation Foundation, WPF and .Net Programming, Anatomy of EPFEnabled Application, Building a Rich UI with Microsoft Expression Blend, Custom Controls, Security.

**References:**

1. Scott Klein, Professional WCF Programming .Net Development with Windows Communication Foundation , by Wiley Publishing Inc. ISBN:978-0-470-08984-2.
2. Brian R. Myers., Foundations of WF, An Introduction to Windows Workflow Foundation by Apress publication, ISBN:978-1-59059-718-7
3. Chris Andrade, Shawn Livermore, Mike Meyers, Scott Van Vilet, Professional WPF Programming .Net Development with Windows Presentation Foundation, By Wiley Publishing Inc. ISBN:978-0-470-04180-2

**IT-403 Cloud Computing****Unit I Introduction to Cloud Computing :** [L 12 M 18]

Roots of Cloud Computing, Layers and Types of Clouds, Features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, and Challenges and Opportunities.

**Unit II Virtualization and Resource Provisioning in Clouds** [L 12 M 18]

Introduction and Inspiration, Virtual Machines (VM), VM Provisioning and Manageability, VM Migration Services, VM Provisioning in the Cloud Context, and Future Research Directions

**Unit III Cloud Computing Architecture** [L 12 M 18]

Cloud Benefits and Challenges, Market-Oriented Cloud Architecture, SLA-oriented Resource Allocation, Global Cloud Exchange; Emerging Cloud Platforms, Federation of Clouds

**Unit IV Programming Enterprise Clouds using Aneka** [L 12 M 18]

Introduction, Aneka Architecture, Aneka Deployment, Parallel Programming Models, Thread Programming using Aneka, Task Programming using Aneka, and MapReduce Programming using Aneka, Parallel Algorithms, Parallel Data mining, Parallel Mandelbrot, and Image Processing.

**Unit V: Advanced Topics and Cloud Applications** [L 12 M 18]

Integration of Private and Public Clouds, Cloud Best Practices, GrepTheWeb on Amazon

Cloud, ECG Data Analysis on Cloud using Aneka, Hosting Massively Multiplayer Games on Cloud, and Content Delivery Networks Using Clouds, and Hosting Twitter and Facebook on Cloud.

**References:**

1. RajkumarBuyya, Christian Vecchiola, and ThamaraiSelvi, Mastering Cloud Computing, Tata McGraw Hill, New Delhi, India, 2013.
2. RajkumarBuyya, James Broberg , Andrzej M.Goscinski, Cloud Computing: Principles and Paradigms , ISBN: 978-0-470-88799-8, Wiley India Publication.
3. Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach To ISBN0071626948 / 9780071626941 Tata McGraw Hill Publication.
4. Barrie Sosinsky, Cloud Computing bible, Wiley India Pvt Ltd (2011)

**IT-404 Project**

Project course will commence at the beginning of fourth semester at respective colleges. College should allocate the guides & Lab. Slots to the students in the time table and the final work along with report will be submitted to the college at the end of fourth semester. Project viva will be conducted for final evaluation by the university.

**IT-Lab-VII Lab on Current Computing Trends- II**

1. Create and ASP .NET application using Web server controls apply appropriate validation to it.
2. Create an ASP .NET application using Master Pages and Themes and Skins
3. Create an ASP .NET application to demonstrate binding of GridView, DataList, Repeater, DropDownList, RadioButtonList, CheckBoxList Control using ADO .NET
4. Create an ASP .NET application to demonstrate LINQ to XML, LINQ to Objects, LINQ to SQL
5. Create an ASP .NET application to demonstrate Navigation controls
6. Create an ASP .NET application to demonstrate User and Role management.
7. Create an ASP .NET application to demonstrate User controls
8. Create an ASP .NET application to demonstrate Web parts
9. Create an ASP .NET application to demonstrate various type of Caching (Data Caching, Output Caching, and SQL Server Cache Dependency). NET application using Ajax