



**Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon**

School of Computer Sciences

**Master of Science in Information Technology
[M. Sc.(Information Technology)]
Syllabus
*[under Academic Flexibility]***

Faculty of Science and Technology

With effect from July - 2019-20

Programme Objectives (POs):

1. To provide advanced and in-depth knowledge of Information Technology and its applications.
2. To prepare Post Graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.
3. To develop programming attitude to serve as software developer in IT industry.
4. To enable students, pursue a professional career in Information and Communication Technology in related industry, business and research.
5. To impart professional knowledge and practical skills to the students.

Program Specific Outcomes (PSOs):

After successful completion of M.Sc.(Information Technology), the student will achieve the following PSOs.

- PSO-1: Detailed Knowledge of contemporary issues in Information Technology.
- PSO-2: Strong skills in learning new programming environments.
- PSO-3: Ability to analyse, design, model, develop, test and manage complex software and information management systems.
- PSO-4: Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems.
- PSO-5: Analysing the impact of IT solutions in the societal and human context.
- PSO-6: Analyze and recommend the appropriate IT infrastructure required for the implementation of a project.
- PSO-7: Understand the concepts and applications in the field of Information Technology like Web designing and development, Mobile application development, and Network and communication technologies.

Master of Science in Information Technology

Degree Name	:	Master of Science in Information Technology [M. Sc. (Information Technology)] [Under Academic Flexibility]
Faculty	:	Science and Technology
Duration	:	02 years, Full Time course
Medium of Instruction	:	English
Pattern	:	Semester Pattern (04 semesters)
Examination Pattern	:	60% (External Assessment) + 40% (Internal Assessment)
Passing Standard	:	Separate Passing for internal as well as external assessment.
Evaluation Mode	:	CGPA
Lecture	:	Clock hour (60 minutes)

Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon
School of Computer Sciences
Syllabus under CBCS for M.Sc. (Information Technology)
Syllabus Structure (w.e.f. 2019-20)

Semester-I

Course Code	Course Type	Title of the Course	Contact Hours/Week			Distribution of Marks for Examination						Credits
						Internal		External		Total		
			Th(L)	Pr	Total	Th	Pr	Th	Pr	Th	Pr	
IT-101	Core	Data Structures and Algorithms	04	-	04	40	-	60	-	100	-	04
IT-102	Core	Computer Graphics and Digital Image Processing	04	-	04	40	-	60	-	100	-	04
IT-103	Core	Web Designing	04	-	04	40	-	60	-	100	-	04
IT-104	Core	Operating Systems	04	-	04	40	-	60	-	100	-	04
IT-105	Skill Based	Object oriented Programming using JAVA	04	-	04	40	-	60	-	100	-	04
IT LAB-I	Core	LAB on Computer Graphics and Digital Image Processing and JAVA Programming	-	04	04	-	40	-	60	-	100	04
IT LAB-II	Core	LAB on Data Structures and Algorithms and Web Designing	-	04	04	-	40	-	60	-	100	04
AC-101	Audit Course	Practicing Cleanliness	-	02	02	-	100	-	-	-	100	02

Semester-II

Course Code	Course Type	Title of the Course	Contact Hours/Week			Distribution of Marks for Examination						Credits
						Internal		External		Total		
			Th(L)	Pr	Total	Th	Pr	Th	Pr	Th	Pr	
IT-201	Core	Computer Networks	04	-	04	40	-	60	-	100	-	04
IT-202	Core	Linux Administration and Programming	04	-	04	40	-	60	-	100	-	04
IT-203	Core	Database Management System(DBMS)	04	-	04	40	-	60	-	100	-	04
IT-204	Core	Theoretical Computer Science	04	-	04	40	-	60	-	100	-	04
IT-205	Skill Based	Programming with Windows Technologies	04	-	04	40	-	60	-	100	-	04
IT LAB-III	Core	LAB on Linux Administration & Programming	-	04	04	-	40	-	60	-	100	04
IT LAB-IV	Core	LAB on Database Management System(DBMS) and Windows Programming Technologies	-	04	04	-	40	-	60	-	100	04
AC- 201 (A)/(B)/(C)/ (D)	Elective Audit Course	Choose one out of four AC-201(A)/(B)/(C)/(D) (Personality and Cultural Development Related)	-	02	02	-	100	-	-	-	100	02

List of Elective Audit courses to be offered in Semester-II:

- AC-201(A) : Soft Skills
- AC-201(B) : Practicing Sports Activities
- AC-201(C) : Practicing Yoga
- AC-201(D) : Introduction to Indian Music

Semester-III

Course Code	Course Type	Title of the Course	Contact Hours/Week			Distribution of Marks for Examination						Credits
						Internal		External		Total		
			Th(L)	Pr	Total	Th	Pr	Th	Pr	Th	Pr	
IT-301	Core	Mobile Application Development	04	-	04	40	-	60	-	100	-	04
IT-302	Core	Ruby and Rails	04	-	04	40	-	60	-	100	-	04
IT-303	Core	Software Engineering	04	-	04	40	-	60	-	100	-	04
IT-304	Core	Web Application Technology	04	-	04	40	-	60	-	100	-	04
IT-305 (A)/(B)/(C)	Elective	Choose One from IT-305(A), IT-305(B) or IT-305(C)	04	-	04	40	-	60	-	100	-	04
IT LAB-V	Core	LAB on Mobile Application Development and Data Warehousing and Data Mining (DWDM)	-	04	04	-	40	-	60	-	100	04
IT LAB-VI	Core	LAB on Ruby on Rails and Web Application Technology	-	04	04	-	40	-	60	-	100	04
AC-301(A)/(B)/(C)/(D)	Elective Audit Course	Choose one out of four (AC-301 (A)/(B)/(C)/(D) (Technology + value added course)	-	02	02	-	100	-	-	-	100	02

List of Elective Courses to be offered in Semester-III:

IT-305(A): Data Warehousing and Data Mining (DWDM) IT-305(B): Optimization Algorithms IT-305(C): Artificial Intelligence

List of Elective Audit courses to be offered in Semester-III:

AC-301 (A) : Computer Skills AC-301 (B) : Cyber Security
 AC-301 (C) : PHP and MySQL (Spoken Tutorial Course) AC-301 (D) : Drupal (Spoken Tutorial Course)

Note: Syllabus for Spoken Tutorial Courses AC-301 (C)/(D) is available at <https://spoken-tutorial.org> developed at IIT Bombay for MHRD, Government of India.

Semester-IV

Course Code	Course Type	Title of the Course	Contact Hours/Week	Distribution of Marks for Examination						Credits
				Internal		External	Total			
				Th	Pr	Project Evaluation	Th	Pr		
IT-401	Project	Full time Industrial Training	Students contact to teachers through E-mail, AView Software and other ICT technologies throughout the Semester	-	-	Project Evaluation in the form of Demonstration, Project Report Writing, Confidential Report from the Industry, Viva Voce etc.	-	300	12	

Semester- I

Course Code: IT-101

Data Structures and Algorithms

Clock Hours: 60

Total Marks: 100

Course Objectives:

Students will try to learn:

1. Understand and remember algorithmic notations and its analysis procedure.
2. Introduce the concept of linear and non-linear data structures through ADT.
3. To design and implement various data structure algorithms and its applications.
4. To introduce various techniques for representation of the data in the real world.

Unit-I

[8] Max Marks:6

Introduction to Data Structures and Algorithms: Algorithmic Notation: Format Conventions, Statement and Control Structures. Time and Space Analysis: Data types and Abstract data types, Types of Data structures; Primitive, Non primitive, Linear and Nonlinear Data structures.

Unit-II

[8] Max Marks:15

Array: Storage representation, operations and applications (Polynomial addition and subtraction)
Stack: operations and applications (infix, postfix and prefix expression handling), **Queue:** operations and applications, Circular Queues: operations and applications, Concept of Double ended Queue and Priority Queue, Linked representation of stack and queue.

Unit-III

[10] Max Marks:12

Linked Lists: Operations and Applications of Linear linked list (Polynomial addition and subtraction), Circular linked list and Doubly linked list.

Unit-IV

[11] Max Marks:21

Trees: Binary Trees, Binary Tree: Representations, Operations (insert/delete), Traversal (inorder, preorder, postorder, level order), Threaded Binary Tree, Search Trees: AVL Tree, single and double rotations, B-Trees: insertion and deletion, Introduction to B+ and B* Trees.

Unit-V

[11] Max Marks:18

Graphs and Their Applications: Representation (Matrix/Adjacency) and Traversal (Depth First Search/Breadth First Search), Spanning Trees, Minimal Spanning Tree (Prim's and Kruskal's algorithm), Shortest Paths and All Pair Shortest Path, Dijkstra's, Floyd-Warshall Algorithms.

Unit-VI

[12] Max Marks:18

Hash Table: Hash Function, Collision and its Resolution, Separate Chaining, Open Addressing (linear probing, quadratic probing, double hashing), Rehashing, Extendible Hashing **Searching:** Linear Search and Binary Search (array/binary tree). **Sorting:** General Background, Sorting Techniques: Bubble Sort, Insertion Sort, Selection Sort, Quicksort, Mergesort, Heapsort and Radix Sort.

References:

1. Tremblay, J. & Sorenson, P.G., (2001), An Introduction to Data Structures with Application, Mcgraw Hill India, ISBN: 978-0074624715, 0074624717
2. Langsam, Y., Augenstein, M.J. & Tenenbaum A.M., (2015), Data Structures using C and C++, 2nd Edition, Pearson Education ISBN: 978-9332549319, 9332549311
3. Balagurusamy, E., (2013), Data Structures using C, 1st Edition, Mcgraw Hill Education, ISBN: 978-1259029547, 1259029549
4. Weiss, M.A., (2002), Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson India, ISBN: 978-8177583588, 8177583581

5. Horowitz, E., Sartaj S. & Mehta, D. (2008), Fundamentals of Data Structures in C++, Universities Press ISBN: 978-8173716065, 8173716064 *
6. Lafore, R., (2003), Data Structures & Algorithms in Java, 2nd Edition, Pearson India, ISBN: 978-8131718124, 8131718123
7. Kruse, R., Tondo, C.L., Leung B., & Mogalla S, (2006), Data Structures and Program Design in C, Pearson India, ISBN: 978-8177584233.

Course Outcomes:

Students will able to:

1. Select appropriate data structures as applied to specified problem definition.
2. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
3. Students will be able to implement Linear and Non-Linear data structures.
4. Implement appropriate sorting/searching technique for given problem.
5. Design advance data structure using Non-Linear data structure.
6. Determine and analyze the complexity of given algorithms.

Course Code: IT-102

**Computer Graphics and Digital
Image Processing**

Clock Hours: 60

Total Marks: 100

Course Objectives:

1. To equip students with the fundamental knowledge and basic technical competence in the field of Computer Graphics and Digital Image Processing.
2. To provide an understanding of how to scan convert the basic geometrical primitives, basic principles of 2 and 3- dimensional computer graphics.
3. To be able to discuss the application of computer graphics concepts in the development of information visualization, and business applications.
4. Give an in-depth knowledge about the basic theory and algorithms related to Digital Image Processing.
5. Provide awareness about the current technologies and issues specific to Digital Image Enhancement, Restoration, Segmentation, Color Image Processing, and Morphological Image Processing.

Unit-I

[08] Max Marks:12

Introduction to Computer Graphics and Output Primitives: Overview of Computer Graphics, Its Applications and Software, Representation in Graphics, Vector Graphic Display, Raster Graphics Display, I/O Devices, Representing Image, Straight Line, Line Drawing Algorithm, DDA, Bresenham's Line Algorithm, Circle-generating algorithm, Ellipse-generating Algorithm, Polygon Filling Algorithm.

Unit-II

[06] Max Marks:12

Two-Dimensional Transformation: Matrix and transformation, 2D Basic transformation, Homogeneous coordinates, Translation, Scaling and Rotation of straight line or polygon, Combined Transformation, Rotation about an arbitrary point/line, Reflection and Shearing Transformation, Viewing Transformation, Clipping, Cohen-Sutherland line clipping.

Unit-III

[06] Max Marks:12

Three-Dimensional Transformation: Introduction, Matrix representation of 3D Transformation, 3D Translation, Scaling, Rotation, Composition of 3D Transformation, Projection, Orthographic, Isometric, Oblique Projection, Perspective Projection, One-Two-Three point perspective Projection.

Unit-IV

[08] Max Marks:12

Introduction to Digital Image Processing & Applications: Digital Image Processing, Applications of Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sensing and Acquisition. Image Sampling and Quantization. Some Basic Relationships Between Pixels.

Unit-V

[10] Max Marks:15

Image Enhancement: 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.

Unit-VI

[10] Max Marks:15

Image Restoration and Color Image Processing: 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, Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening.

Unit -VII

[06] Max Marks:12

MATLAB Image processing toolbox: Introduction to MATLAB, Matrix Operations, Introduction to Image Processing Tool Box, Image Read & Write, Filters (spatial and frequency domain), Image Restoration and Reconstruction, Morphological Operations, Edge Detection and linking, Segmentation.

References:

1. Amarendra N Sinha, Arun D. Udai, (2008). Computer Graphics, TMH publication ISBN- 13 : 978-0-07-063437-4.
2. D. Hearn and M. Pauline Baker, Computer Graphics (C Version), Pearson Education, 2nd Edition ISBN-13: 978-0135309247
3. D. F. Rogers and J. A. Adams, Mathematical Elements for Computer Graphics, 2nd Edition, McGraw-Hill International Edition, ISBN-13:978-0-07-0486775
4. R.C.Gonzalez & R.E.Woods, Digital Image Processing, Pearson Education, 3rd edition, ISBN. 13:978-0131687288
5. S. Jayaraman Digital Image Processing TMH (McGraw Hill) publication, ISBN-13:978-0-07-0144798
6. Gonzalez, Woods & Steven, Digital Image Processing using MATLAB, Pearson Education, ISBN-13:978-0130085191

Course Outcomes:

1. Developed scientific and strategic approach to solve complex problems Computer in the domain of Computer Graphics and Digital Image Processing.
2. Demonstrated various algorithms for scan conversion and filling of basic primitives objects and their comparative analysis and applied 2-D and 3-D geometric transformations, viewing and clipping on graphical objects.
3. Built the mathematical foundations for digital image representation, image acquisition, image transformation, image enhancement and restoration.
4. Developed a theoretical foundation of fundamental concepts of digital image processing.
5. Exposed students to MATLAB Image Processing Toolbox.

Course Code: **IT-103**

Web Designing

Clock Hours: **60**
Total Marks: **100**

Course Objectives:

The student should be able to

1. understand the basics of web development.
2. learn the concepts of HTML 5.0.
3. understand the importance style sheet and able to apply the internal and external style sheet to format the web pages.
4. learn the concepts of XML related technologies.
5. learn the concepts of modelling information.

Unit-I

[05] Max Marks:10

Introduction to Web Development: Components of Web application, Static vs. dynamic web pages, A survey of browsers, servers and scripting languages, URL, Introduction to HTML, HTML5, XHTML and CSS, Semantic markup, Web Page Designing Principles, Page layout, Website organization

Unit-II

[10] Max Marks:15

HTML 5.0: Structure of HTML5 Document, Elements, tags and attributes, DOCTYPE declaration, HEAD section, Coding text elements, Headings and paragraphs, Inline elements for formatting and emphasizing text, div and span elements, Events, WEB Form2.0, SVG, Canvas, Audio & Video, Geolocation, Drag & Drop, Web Workers.

Unit-III

[10] Max Marks:20

CSS to format elements of a web page: CSS applications, Selectors: Basic Rule, Grouping, class and ID selectors, attribute selectors, document structure, Specificity, Inheritance, cascade, Values and Units, Fonts, Colors Working with text, text alignment, spacing(letter/word), Text decoration, Text Shadows, CSS box model, Spacing, borders and backgrounds, Page layout using CSS, Floating elements, Multicolumn layout, Ways to include CSS in a web page.

Unit-IV

[15] Max Marks:20

HTML and CSS skills: Working with links and lists, Working with images, Working with tables, Working with forms, Adding audio, video to web pages, JavaScript for image rollovers, image swaps, slide shows, tabbed data and data validation

Unit-V

[10] Max Marks:20

Core Concepts of XML: Parts of an XML document, Document Prolog, The XML declaration, The document type declaration, Elements, Attributes, Namespaces, Entities, Comments, CDATA Section, Processing instructions, XSL, Displaying XML with CSS, JAVA Script, XSLT

Unit-VI

[10] Max Marks:15

Modelling Information: Simple Data storage, Dictionaries, Records, XML and Databases, Narrative Documents, Flows and sections, Blocks and inlines, Complex structures, Metadata, Linked Objects

References:

1. Anne Boehm, Murach's HTML, XHTML and CSS, Shroff Publishers and Distributers Pvt. Ltd., ISBN 13: 978-93-5023-095-4
2. Learning XML, Erik T. Ray, O'Reilly, Shroff Publishers and Distributers Pvt. Ltd., ISBN 13: 978-81-8404-896-4
3. Eric A. Meyer, CSS: The Definitive Guide, Visual Presentation for the Web, 3rd Edition, O'Reilly Media, November 2006, ISBN:978-0-596-52733-4| ISBN 10:0-596-52733-0(Print),

ISBN 978-0-596-15940-5, 10:0-596-15940-4(Ebook)

4. Benoit Marchal, XML by Example, 2nd Edition, Microsoft Press 2001, ISBN-10: 0-7897-2504-5, ISBN-13: 978-0-7897-2504-2.

Auxiliary Resources :

<https://www.tutorialspoint.com/html5/>

Course Outcomes:

Upon completion of this course, the student will:

1. design and implement web pages.
2. design web forms and apply client side validation.
3. demonstrate various CSS features.
4. display XML file using CSS, XSL, DSO.
5. create a drawing application with Canvas using HTML5.
6. display the location's coordinates of Longitude and latitude on Google Map.
7. create a web page for shopping cart using Drag and Drop Events.

Course Code: **IT-104**

Operating Systems

Clock Hours: **60**

Total Marks: **100**

Course Objectives:

To provide a clear description of the concepts that underlie operating systems.

Unit-I

[04] Max Marks:08

Introduction: review of computer organization, introduction to popular operating systems like UNIX, Windows, etc., OS structure, system calls, functions of OS, evolution of OSs.

Unit-II

[03] Max Marks:06

Computer organization interface: using interrupt handler to pass control between a running program and OS.

Unit-III

[08] Max Marks:12

Concept of a process: states, operations with examples from UNIX (fork, exec), Process scheduling, interprocess communication (shared memory and message passing), UNIX signals.

Unit-IV

[04] Max Marks:06

Threads: multithreaded model, scheduler activations, examples of threaded programs.

Unit-V

[06] Max Marks:10

Scheduling: multi-programming and time sharing, scheduling algorithms, multiprocessor scheduling, thread scheduling (examples using POSIX threads).

Unit-VI

[08] Max Marks:12

Process synchronization: critical sections, classical two process and n-process solutions, hardware primitives for synchronization, semaphores, monitors, classical problems in synchronization (producer-consumer, readers-writer, dining philosophers, etc.).

Unit-VII

[06] Max Marks:10

Deadlocks: modelling, characterization, prevention and avoidance, detection and recovery.

Unit-VIII

[07] Max Marks:12

Memory management: with and without swapping, paging and segmentation, demand paging, virtual memory, page replacement algorithms, working set model, implementations from operating systems such as UNIX. Current Hardware support for paging: e.g., Pentium/ MIPS processor etc.

Unit-IX [07] Max Marks:12

Secondary storage and Input/Output: device controllers and device drivers, disks, scheduling algorithms, file systems, directory structure, device controllers and device drivers, disks, disk space management, disk scheduling, NFS, RAID, other devices. operations on them, UNIX FS, UFS protection and security, NFS

Unit-X [04] Max Marks:06

Protection and security: Illustrations of security model of UNIX and other OSs. Examples of attacks.

Unit-XI [03] Max Marks:06

Epilogue: Pointers to advanced topics (distributed OS, multimedia OS, embedded OS, real-time OS, OS for multiprocessor machines).

All above topics shall be illustrated using UNIX as case-studies.

References:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne (2009), Operating System Concepts, 8th Ed., John Wiley ISBN 0-471-69466-5.
2. William Stallings (2014), Operating Systems: Internals and Design Principles. Pearson, 8th Ed. ISBN-13: 978-0-13-230998-1
3. AS Tanenbaum (2009), Modern Operating Systems, 3rd Ed., Pearson. ISBN: 0135013011
4. AS Tanenbaum, AS Woodhull (2006), Operating Systems Design and Implementation, 3rd Ed., Prentice Hall ISBN-10: 0131429388
5. M. J. Bach (1986), Design of the Unix Operating System, Prentice Hall of India ISBN0. -13-201757-1 025

Course Outcomes:

Get familiar with the fundamental concepts and algorithms used in existing operating systems.

Course Code: IT-105

**Object Oriented Programming
using JAVA**

Clock Hours: 60

Total Marks: 100

Course Objectives:

The student should be able to

- understand the fundamental concepts of object oriented programming and Java technology.
- understand how to create Java applications that uses encapsulations, inheritance, and inner classes.
- understand the importance and use of exceptions, lambda expressions, and generic programming.
- understand how to create GUI applications and event driven applications.
- manipulates databases through java application and applet.
- understand the importance and use of threads, JAR files.

Unit-I [08] Max Marks:12

An Introduction to Java: Java as a Programming Platform, The Java “White Paper” Buzzwords, Java Applets and the Internet, Common Misconceptions about Java, The Java Programming Environment, Installation, A Simple Java Program, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays.

Unit-II [08] Max Marks:12

Objects and Classes: Introduction to Object-Oriented Programming, Using Predefined Classes, Defining Your Own Classes, Static Fields and Methods, Method Parameters, Object Construction, Packages, The Class Path, Documentation Comments.

Unit-III [10] Max Marks:16
Inheritance, Interfaces, Lambda Expressions, and Inner Classes: Classes, Super classes, and Subclasses, Object: The Cosmic Superclass, Generic Array Lists, Object Wrappers and Autoboxing, Methods with a Variable Number of Parameters, Enumeration, Classes, Reflection, Interfaces, Examples of Interfaces, Lambda Expressions, Inner Classes, Proxies.

Unit-IV [10] Max Marks:16
Exceptions and Generic Programming: Dealing with Errors, Catching Exceptions, Assertions and Logging, Why Generic Programming? Simple Generic Class, Generic Methods, Bounds for Type Variables, Inheritance Rules for Generic Types, Wildcard Types, Reflection and Generics.

Unit-V [12] Max Marks:24
Graphics Programming, Event Handling and Swing Components: Introducing Swing, Creating a Frame, Positioning a Frame, Displaying Information in a Component , Working with 2D Shapes, Using Color, Using Special Fonts for Text, Displaying Images, Basics of Event Handling, Actions, Mouse Events, The AWT Event Hierarchy, Swing and the Model-View-Controller Design Pattern, Introduction to Layout Management, Text Input, Choice Components, Menus, Sophisticated Layout Management, Dialog Boxes.

Unit-VI [12] Max Marks:20
Deployment and Concurrency and Database Programming: JAR Files, Storage of Application Preferences, Service Loaders, Applets, Java Web Start, Threads, Interrupting Threads, Thread States, Thread Properties, Synchronization, Blocking Queues, Thread-Safe Collections, Callables and Futures, Executors, Synchronizers, Threads and Swing, The Design of JDBC, The Structured Query Language, JDBC Configuration, Working with JDBC Statements, Query Execution, Scrollable and Updatable Result Sets, Row Sets, Metadata

References:

1. Cay S. Horstmann Core Java Volume I—Fundamentals (December 2015), Tenth Edition, Prentice Hall, ISBN: 9780134177335
2. Cay S. Horstmann Core Java, Volume II—Advanced Features (December 2016), Tenth Edition, Prentice Hall, ISBN: 9780134177878
3. Herbert Schildt, Java: The Complete Reference, Ninth Edition, McGraw Hill Education, ISBN 978-0-07-180855-2

Course Outcomes:

Upon completion of this course, students would be able to:

- understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
- identify classes, objects, members of a class and the relationships among them needed for a specific problem.
- create Java application programs using sound OOP practices and proper program structuring.
- develop programs using Java standard class library for manipulating databases, handling threads, GUI applications, and event driven applications.
- create the applications that demonstrates exception handling and generic programming in Java.

Course Code: IT LAB-I LAB on Computer Graphics and Digital Image Processing and JAVA Programming Total Marks: 100

Course Objectives:

The student should be able to

- draw line, ellipse, circle, polygon using various algorithms.
- apply 2-D and 3-D transformations on various objects.
- get acquainted with digital image processing.
- apply different image enhancement techniques, interpolation techniques, filtering techniques on the given image.
- write java applications that demonstrate string operations, package creation, inheritance, inner classes.
- write java applications that uses various swing components and handle several events.
- write java applications that demonstrates, generic programming, JDBC and multithreading.

Computer Graphics and Digital Image Processing

1. Line drawing algorithm (DDA and Bresenham's Line Algorithm)
2. Circle drawing algorithm
3. Ellipse drawing algorithm
4. Polygon filling algorithm
5. Windowing and clipping algorithm (Point, line and polygon clipping)
6. Composite 2-D transformation, (rotation, scaling & reflection)
7. 3-D geometric transformation (rotation, scaling & reflection)
8. Introduction to Image Processing Toolbox
9. Read an 8 bit image and then apply different image enhancement techniques:
 - (a) Brightness improvement
 - (b) Brightness reduction
 - (c) Thresholding
 - (d) Negative of an image
 - (e) Log transformation
 - (f) Power Law transformation.
10. Implement different interpolation techniques using MATLAB/ SciLab
11. Read an image, plot its histogram then do histogram equalization. Comment about the result.
12.
 - (a) Implement Gray level slicing (intensity level slicing) in to read cameraman image.
 - (b) Read an 8 bit image and to see the effect of each bit on the image.
 - (c) Read an image and to extract 8 different planes i.e. 'bit plane slicing.'
13. Implement various Smoothing spatial filter.
14. Read an image and apply
 - (a) Gaussian 3x3 mask for blurring
 - (b) High pass filter mask with different masks
 - (c) Laplacian operator with centre value positive and negative
- (d) High boost filtering.
15. Write a program to implement various low pass filters and high pass filter in frequency domain.
16. Write a program for erosion and dilation, opening & closing using inbuilt and without inbuilt function.
17. Implement and study the effect of Different Mask (Sobel, Prewitt and Roberts)
18. Implement various noise models and their Histogram
19. Implement inverse filter and wiener filter over image and comment on them

JAVA Programming Assignments:

1. Write a program that demonstrate program structure of java.
2. Write a program that demonstrate string operations.
3. Write a program that demonstrate package creation and use in program.
4. Write a program that demonstrate inner class.

5. Write a program that demonstrate inheritance.
6. Write a program that demonstrate 2D shapes on frames.
7. Write a program that demonstrate text and fonts.
8. Write a program that demonstrate event handling for various types of events.
9. Write a program to illustrate use of various swing components.
10. Write a program that demonstrate use of dialog box.
11. Write a program to create own dialog box.
12. Write a program to create toolbar, menu & popup menu.
13. Write a program to implement file handlings.
14. Write a program that demonstrate Applet programming.
15. Write a program to implement generic programming.
16. Write a program that demonstrate JDBC on applet/application.
17. Write a program that demonstrate multithreading.

Course Outcomes:

Upon completion of the subject, students will be able to:

- create graphics applications in C++ that draws line, ellipse, circle, polygon using various algorithms.
- create graphics applications in C++ that draws an object like line and apply 2-D and 3-D transformations on it.
- create graphics applications in C++ that draws an object like polygon and clip it using various polygon clipping algorithm.
- create a matlab application that apply different image enhancement techniques, interpolation techniques, filtering techniques on the given image.
- create java applications that demonstrate string operations, package creation, inheritance, and inner classes.
- create java applications that uses various swing components and handle several events.
- write java programs that demonstrate generic programming, JDBC and multithreading.

Course Code: IT LAB-II LAB on Data Structures and Algorithms Total Marks: 100
and Web Designing

Course Objectives:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues .
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To understand design concept of web pages using different features.
6. To introduce the concept of XML and HTML5 for the construction of web pages using various technologies supported by it.

Data Structures Assignments:

1. **Implementation of programs based on the following**
 - Arrays
 - Multidimensional Arrays, Matrices
 - Stacks, Polish Notation
 - Queues
 - Deques

- Linear Linked List, Circular Linked List, Doubly Linked List
 - Polynomial Addition/Subtraction
- 2. Implementation of programs based on Trees**
- Binary Search Tree
 - In-order, Pre-order and Post-order Traversals
 - Heap Tree
 - Balanced Binary Tree (AVL)
 - B-Trees
- 3. Implementation of programs based on Graphs**
- Depth First Traversal
 - Breadth First Traversal
 - Obtaining Shortest Path (Dijkstra and Floyd-Warshall)
 - Minimum spanning tree (Kruskal and Prim)
- 4. Implementation of programs for Hash Table, Searching and Sorting techniques**
- Hash Table
 - Linear and Binary Search (using array)
 - Bubble sort
 - Selection sort
 - Insertion sort
 - Radix sort
 - Quick sort
 - Merge sort
 - Heap sort

Web Designing Assignments: Demonstrate following Assignments with appropriate HTML tags and CSS

1. Design a web page for clickable table of contents (TOC) of your first semester syllabus. Every click should display detailed content.
2. Design a web page for online books catalog.
3. Design a first page of online newspaper.
4. Design a web page for lecture schedule of current semester.
5. Demonstrate various CSS features
6. Design a web page that displays student feedback form for a scheduled course.
7. Design a web page that allows mp3 downloads.
8. Design a web page for nursery for plant selection using XML.
9. Design a web page for restaurant/ice cream parlor using XML.
10. Create a dictionary database using XML.
11. Design a narrative document using XML.
12. Display XML file using CSS
13. Display XML file of your choice using XSL
14. Display XML file using DSO data binding
15. Demonstrate Event Handling.
16. Draw Circle, Rectangle, Line, Ellipse and Polygon using SVG.
17. Create a Drawing Application with Canvas using HTML5.
18. Display Audio & Video playlist on browser using HTML5.
19. Display your location's coordinates of Longitude and latitude on Google Map.
20. Create a web page for shopping cart using Drag and Drop Events.
21. Design a web page which demonstrate Web Workers feature.

Course Outcomes:

Students will be able to:

1. Select appropriate data structures as applied to specified problem definition.
2. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
3. Students will be able to implement Linear and Non-Linear data structures.
4. Implement appropriate sorting/searching technique for given problem.
5. Implement the web pages using various web designing features.
6. Implement the web pages using XML and HTML5.

Semester- II

Course Code: **IT-201**

Computer Networks

ClockHours:60

Total Marks:100

Course Objectives:

1. This module introduces students to local, metropolitan, and wide area computer network and focusses on building a firm foundation for understanding Data Communications and Computer Networks.
2. It is based around the OSI Reference Model, that deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the model.
3. Also, student learn how data transmission take place between nodes and what are the difficulties encounter during transmission.
4. Introduction to the Internet protocol suite and its development.
5. Students are also introduced to the areas of Cryptography and Network Security.
6. To expose students to emerging technologies and their potential importance.
7. This module provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in this area.

Unit-I

[10] Max Marks:20

Overview of Computer Network, OSI and TCP/IP Reference Models, Guided and Unguided Transmission Media, Analog and Digital Communication, Encoding and Modulation, Nyquist Theorem, Shannon's capacity, Switching techniques- TDM, FDM.

Unit-II

[15] Max Marks:25

Framing, Error detection and Error correction- Vertical Redundancy Check (VRC) Longitudinal Redundancy Check (LRC), Hamming Distance, Hamming Code, Cyclic Redundancy Check(CRC), Stop and Wait Protocol, Sliding Window Protocol, Go-Back-n ARQ, Selective-Reject ARQ, HDLC.

Unit-III

[10] Max Marks:15

Channel Allocation, ALOHA Systems, CSMA Protocols, Collision Free Protocols, Local Area Networks, Bridges, ATM.

Unit-IV

[15] Max Marks:25

Routing- Flooding, Shortest Path Routing, Distance Vector Routing, Link State Routing, Congestion Control-Leaky Bucket and Token Bucket algorithms, IP Protocol, IP Addressing, ARP, RARP, OSPF, BGP, TCP, UDP, DHCP.

Unit-V

[10] Max Marks:15

Cryptography and Network Security- Introduction to the Concept of Security, Cryptographic Techniques, Computer-based Symmetric and Asymmetric Key Cryptographic Algorithms, Public Key Infrastructure (PKI), Internet Security Protocols, Network Security.

References:

1. Andrew S. Tanenbaum ,(2009). Computer Networks 4th Edition , Pearson Prentice Hall.ISBN- 978-81-7758-165-2
2. Behrouz A. Forouzan, (2012).Data Communications and Networking. 5th Edition. Mc Graw – Hill, ISBN-10: 0073376221
3. William Stallng, (2013) Cryptography and Network Security 6 edition Pearson Education India, ISBN-10: 9332518777
4. Behrouz A Forouzan and Fender Mukhopahyay, (2010) Cryptography and Network Security, 2nd edition, McGraw Hill Education, ISBN-10: 007070208X

5. Atul Kahate, (2009), Cryptography and Network Security, 2nd Edition, McGraw Hill Education, ISBN-10: 0070151458
6. Auxiliary Resources:
 - a. <http://nptel.ac.in/courses/106105081/1>
 - b. <http://www.nptelvideos.in/2012/11/computer-networks.html>
 - c. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system-engineering-spring-2009/video-lectures/lecture-9/>

Course Outcomes:

1. Have a good understanding of the OSI Reference Model and have an upright knowledge of Layers 1-3.
2. To be familiar with contemporary issues in networking technologies
3. Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;
4. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols;
5. Have good exposure to cryptography and network security and in future may think of implementing such techniques.

Course Code: IT-202

Linux Administration and Programming

Clock Hours: 60

Total Marks: 100

Course Objectives:

- To know basics of Linux operating system and understanding concept of login process and general purpose commands.
- To understand file management, permission and disk related commands.
- To understand Linux shell script and system administration tasks.
- To know basics of networking, internet servers and installation, configuration, administration of internet servers.

Unit-I

[8]

Max Marks:12

Introduction to Linux: Basic idea on Proprietary, Open Source, Free Software etc., Introduction of Various Linux Distribution (Red Hat Enterprise Linux, Cent OS, Fedora Projects, Debian Linux, Ubuntu, etc.); Basic Architecture of Unix/Linux system, Kernel, Shell. Linux File System, Boot block, Super block, Inode table, Data blocks, How Linux access files, storage files, Linux standard directories, LILO, GRUB Boot Loader; Installation of Linux system- Using Live CD, Virtual Machine, Direct Installation; Partitioning the Hard drive for Linux, init and run levels.

Unit-II

[8]

Max Marks:15

Linux Basics: Login process, Creating Users Account and Group, Getting Help. Services and Process, Files and File System (File Types and Permissions, Links, Size and Space, Date and Time) Working with Files: Reading Files, Searching for files, Copying, Moving, Renaming, Deleting, Linking, and Editing Files; Other Commands: ls, rm, rmdir, pwd, more, less, grep, sort, cat, head, tail, wc, tee, ps, top, tar, unzip, nice, kill, netstat, Disk related commands, checking disk free spaces.

Unit-III

[12]

Max Marks:18

Linux Shell Script: Shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, creating Shell programs for performing various tasks.

Unit-IV [12] Max Marks:21

System Administration: Common administrative tasks, identifying administrative files – configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, becoming super user using su; Getting system information with uname, host name, disk partitions & sizes, users, kernel. Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages in Linux. Configure X-windows starting & using X desktop. KDE & Gnome graphical interfaces, changing X windows settings.

Unit-V [10] Max Marks:18

Introduction to Networking and Internet Servers: TCP/IP Networking: Network Classes and Subnetting, Gateways and Routers, Basic introduction to DHCP (Dynamic Host Configuration Protocol), Samba Server, Domain Name System, Mail Servers (SMTP, POP3 and IMAP), FTP Server, Apache Web Server, SSI, CGI.

Unit-VI [10] Max Marks:06

Installation, Configuration and Administration of Internet Servers: Installation and configuration of a simple LAN, Installation and configuration of: Proxy server(Squid), DNS server(BIND), Mail server, Web server(Apache), File server(Samba), DHCP server, Installation and configuration of a SSH server and client, Installation and configuration of FTP server and client.

References:

1. Collings T., & Wall, K. (2005), Red Hat Linux Networking and System Administration, 3rd Edition, Wiley Publishing, ISBN: 978-0-7645-9949-1
2. Das, S., (2006), Unix Concepts and Applications, 4th Edition, McGraw Hill Education, ISBN: 978-0070635463, 0070635463
3. Wale Soyinka, (2012), Linux Administration: A Beginner's Guide, 6th Edition, McGraw Hill Education, ISBN: 978-1259061189, 1259061183
4. Richard Petersen, (2007), Linux: Complete Reference, 6th Edition, Tata McGraw-Hill, ISBN: 978-0070222946, 0070222940
5. Richard Petersen, (2017), Red Hat Enterprise Linux 7: Desktops and Administration, Surfing Turtle Press, ISBN: 978-1936280629, 1936280620
6. Matthew, N. & Stones R., (2011), 4th Edition, Beginning Linux, Wrox, ISBN: 9780470147627

Course Outcomes:

- Understand and demonstrate basic knowledge in Linux operating system.
- Apply and change the ownership and file permissions using Linux commands.
- Implement shell scripts and apply basic of administrative task.
- To understand the networking, internet servers and installation, configuration, administration of internet servers.

Course Code: **IT-203** **Database Management System(DBMS)**

Clock Hours: **60**

Total Marks: **100**

Course Objectives:

- Understand the basic concepts of database management systems.
- Learn and practice data modelling using the entity-relationship and developing database designs.
- Understand the use of Structured Query Language (SQL) and learn SQL syntax.
- Apply normalization techniques to normalize the database
- Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.
- Understand the functional dependencies and design of the database.
- Understand the concept of Transaction and Query processing
- Describe and discuss selected advanced database topics such as distributed database and XML and Web data

Unit-I

[05] Max Marks:08

Introduction: Database system application and purpose, Characteristics of DBMS, Database Users, 1-tier, 2-tier and 3-tier architecture of DBMS along with its advantages, Levels of Database Architecture, Data Models, Data-schemas and instances, Data Independence, Role and responsibilities of DBA.

Unit-II

[10] Max Marks:10

Database Design and E-R Model: Overviews of Database Design, ER Modeling concepts, ER Diagrams, Reduction to Relational Schemas, Extended ER Features, Alternative notations for Modelling, Cardinality constraints, Atomic Domains and 1NF, Decomposition using Functional Dependencies (BCNF, 3NF and 4NF).

Unit-III

[12] Max Marks:20

Relational Databases: Structure of Relational Databases, Database Schemas, Keys, Schema diagrams, Relational Query Languages, Relational Operation. Overview of SQL, SQL Data Definition, Basic Structure of SQL Queries, Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of Databases. Join Expressions, Views, Transactions, Integrity Constraints, SQL data types and Schemas, Authorization, Accessing SQL from Programming Languages, Overview of Dynamic SQL and SQL CLI. Functions and Procedures, Triggers. The relational Algebra fundamental and extended Operations. Tuple and Domain Relational Calculus.

Unit-IV

[10] Max Marks:22

Transaction Management and Query Processing: Transaction Concept, Model, Storage Structure, Atomicity and Durability, Isolation, Levels of Isolation, Overview of Query Processing, Measuring Query Cost, Selection Operation, Sorting, Join Operation, Other Operations and Evaluation of Expression. Overview of Query Optimization, Transformation of Relational Expression, Choice of Evaluation Plan.

Unit-V

[10] Max Marks:15

Concurrency Control and Recovery System: Lock based Protocol, Timestamp based Protocol, Validation based Protocol, Deadlock Handling, Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithms, Buffer Management, Early lock release and logical undo operations, Remote Backup Systems. Case study: ARIES

Unit-VI

[13] Max Marks:25

Advanced Topics in Databases: Type your unit content here.(comma separated) Introduction to Object Databases: Shortcomings of Relational Data Model, The Conceptual Object Data Model, Objects in SQL:1999 and SQL:2003. Introduction to XML and Web Data: Semi-structured Data, Overview of XML, XML Data Definitions, XML Schema, XML Data Manipulation: XQuery, XPath Query Languages: XPath and SQL/XML. Distributed Databases: Overview, Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control, Cloud based Databases.

References:

- 1] Michael Kifer, Arthur Bernstein, P.M, Lewis and P.K. Panigrahi (2011), “Database Systems: An Application Oriented Approach”, Second Edition, Pearson Education, 2011, ISBN: 9788131703748.
- 2] C. J .Date, A. Kannan and S. Swamynathan (2006), “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006, ISBN:978-81-7758-556-8
- 3] A. Silberschatz, H.F.Korth, and S.Sudarshan (2011), “Database System Concepts”, TMH Publications, Sixth Edition,2011, ISBN:978-007-132522-6.

Course Outcomes:

The learner will be able:

- Describe data models and schemas in DBMS
- Understand the features of database management systems and Relational database.
- Use SQL- the standard language of relational databases.
- Design ER-models to represent simple database application scenarios
- To understand the functional dependencies and design of the database.
- Understand the use of Transaction and Query processing in execution of transaction
- Apply the relational model, specify integrity constraints, and explain how to create a relational database using an ER diagram.
- Analyse and apply two formal query languages, relational calculus and algebra, associated with the relational model.
- Specify how Structured Query Language (SQL) builds upon relational calculus and algebra and effectively apply SQL to create, query and manipulate relational databases.
- Describe how data can be partitioned and distributed across networked nodes of a DBMS, and suggest how queries and segmented data can be optimized and managed in a distributed environment.

Course Code: IT 204 Theoretical Computer Science

**Clock Hours: 60
Total Marks: 100**

Course Objectives:

To Understand and learn

1. Fundamentals of Regular and Context Free Grammars and Languages
2. The relation between Regular Language and Finite Automata and machines.
3. How to design Automata’s and machines.
4. The relation between Contexts free Languages, Push down Automata and simplification of Contexts Free Grammars.
5. To learn how to design Push down Automata and Turing Machines.

Unit-I

[12] Max Marks:20

Finite Automata: 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 [04] Max Marks:12
Formal Languages: Formal languages, Chomsky classification of languages, languages, their relation and automaton.

Unit-III [14] Max Marks:23
Regular Expressions: 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 [10] Max Marks:15
Context Free Languages: 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 [08] Max Marks:15
Push Down Automata: Pushdown Automaton (PDA), informal description, basic definitions, acceptance by a PDA, PDA and CFLs.

Unit-VI [08] Max Marks:15
Turing Machine: Turing Machine, Model, computable languages and function, representation of TMs, Language Acceptability by TMs, Design of TM, Halting Problem of TMs.

References:

1. Smita Rajpal. Theory of Automata and Formal Languages: GALGOTIA Publications ISBN 1234027054.
2. J.E.Hopcraft, R. Motwani and J.D.Ullman. Introduction to Automata Theory languages & Computation: Pearson Education Asia ISBN 978-0321455369.
3. K.L.P.Mishra, N. Chandrashekharan. Theory of Computer Science: PHI ISBN 8120329686.
4. Martin John C. Introduction to Language & Theory of computation: TMH ISBN 9780070660489.
5. M.Sipser (1997). Introduction to the Theory of Computation; Singapore: Brooks/Cole, Thomson Learning ISBN 978-1133187790.
6. <http://nptel.ac.in/>

Course Outcomes:

1. Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.
2. Design different types of Finite Automata for regular grammars.
3. Understand, design, analyze, interpret and simplify Context Free languages and Grammars.
4. Design different types of Push down Automata for Context Free languages and able to convert from Context Free Grammars to Push down Automata and vice versa.
5. Understand basic turing machine and Design different types of Turing Machines.
6. Compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power.

Course Code: IT- 205

**Programming with Windows
Technologies**

**Clock Hours: 60
Total Marks: 100**

Course Objectives:

- To understand the concepts of windows Programming.
- Learn what WCF is, and how it unites existing distribution mechanisms
- Gain an understanding of what ABC (Address, Binding, Contract) means for WCF services

- Learn how to implement WCF services and clients
- Gain an understanding of the philosophy and architecture of WPF.
- Create Windows applications using the classes provided by WPF.
- Understand the principles of XAML and create applications using a combination of code and XAML.
- Use the layout features of WPF to create flexible and attractive user interfaces.
- Implement event and command-driven applications with windows, menus, dialogs, toolbars and other common user interface features.

UNIT-I **[18]** Max Marks:**35**

Windows Programming: Windows environment – a simple windows program – windows and messages – creating the window – displaying the window – message loop – the window procedure – message processing – text output – painting and repainting – Mouse-Keyboard-introduction to GDI – device context – basic drawing – child window controls.

UNIT-II **[22]** Max Marks:**35**

Windows Communication Foundation [WCF]: 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-III **[20]** Max Marks:**30**

Windows Presentation Foundation [WPF]: Overview of Windows Presentation Foundation, WPF and .Net Programming, Anatomy of EPF-Enabled Application, Building a Rich UI with Microsoft Expression Blend, Custom Controls, Security.

References:

1. Charles Petzold(2007, Windows Programming, Microsoft Press, 2007
2. Johnson M. Hart(2010) , Windows System Programming, 4th Edition, Addison-Wesley, 2010, 0-321-65774-8
3. Scott Klein, Professional WCF Programming .Net Development with Windows Communication Foundation, Wiley Publishing Inc. ISBN: 978-0-470-08984-2.
4. Chris Andrade, Shawn Livermore, Mike Meyers, Scott Van Vilet, Professional WPF Programming .Net Development with Windows Presentation Foundation, Wiley Publishing Inc. ISBN:978-0-470-04180-2

Course Outcomes:

On completion of this course the students will be able to:

- explain the concepts of windows programming.
- hands on experience using Visual Studio to create service-oriented applications using Windows Communication Foundation (WCF) and C#.
- use the WCF Routing Service for load balancing, content-based routing, and protocol bridging.
- create Windows applications using the classes provided by WPF
- use the layout features of WPF to create flexible and attractive user interfaces

Course Objectives:

- To understand the Installation of Linux system.
- To understand and make effective use of Linux utilities and shell scripting language to solve problems.
- To understand in C some standard Linux utilities like mv,cp,ls etc.
- To know basics of system administration tasks, installation, configuration and administration of internet servers.

1. Demonstration on Installation of Linux system

Direct Installation; Partitioning the Hard drive for Linux, Using Live CD, Virtual Machine, init and run levels

2. Linux Commands and Shell Programming

Creating Users Accounts and Groups, Starting and Stopping Services, Files and File System (File Types and Permissions, Links, Size and Space, Date and Time), Working with Files: Reading Files, Searching for files, Copying, Moving, Renaming, Deleting, Linking, and Editing Files, Other Commands: ls, rm, rmdir, pwd, more ,less. grep, sort, cat, head, tail, wc, tee, ps, top, tar, unzip, nice, kill, netstat, Disk related commands, checking disk free spaces
read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Shell programs for performing various tasks (List to be given by the course instructor)

3. System Administration

Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, becoming super user using su; Getting system information Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages in Linux. X-Windows administration

4. Installation, Configuration and Administration of Internet Servers

- Simple LAN
- Proxy server(Squid), DNS server(BIND)
- Mail server
- Web server(Apache)
- File server(Samba)
- DHCP server
- SSH server and client
- FTP server and client

Course Outcomes:

- To implement the Installation of Linux system.
- Understand the basic commands of Linux operating system and can write shell scripts.
- To create file systems, directories and operate them and to implement in C some standard Linux utilities like mv,cp,ls etc.
- To implement system administration tasks, installation, configuration and administration of internet servers.

Course Code: IT LAB-IV

**LAB on Database Management System
(DBMS) and Windows Programming**

Total Marks: 100

Course Objectives:

1. Give practical experience and training to handle database management system software.
2. To introduce basic Windows Programming and to understand the WCF and WPF Programming.

DBMS Assignments:

1. Creating database tables and using data types.
 - Create table
 - Modify table
 - Drop table
2. Practical Based on Data Manipulation.
 - Adding data with Insert
 - Modify data with Update
 - Deleting records with Delete
3. Practical Based on Implementing the Constraints.
 - NULL and NOT NULL
 - Primary Key Constraint
 - Foreign Key Constraint
 - Unique Constraint
 - Check Constraint
 - Default Constraint
4. Practical for Retrieving Data Using following clauses.
 - Simple select clause
 - Accessing specific data with Where
 - Ordered By
 - Distinct
 - Group By
5. Practical Based on Aggregate Functions.
 - AVG
 - COUNT
 - MAX
 - MIN
 - SUM
 - CUBE
6. Practical Based on implementing all String functions.
7. Practical Based on implementing Date and Time Functions.
8. Practical Based on implementing use of UNION, INTERSECTION, SET DIFFERENCE.
9. Implement Nested Queries & all types of JOIN operation.
10. Practical Based on performing different operations on a view.
11. Practical Based on implementing use of Procedures.
12. Practical Based on implementing use of Triggers
13. Practical Based on implementing Cursor.
14. Demonstrate Database connectivity with front end tools like – VB, VC++,D2K.
15. Practical based on creating Data Reports.
16. Design entity relationship models for a business problem and develop a normalized database structure

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. If user clicks inside any figure a mistake box is display.
5. Write a Window Program to create various brushes and change the background color to brushes on left mouse click.
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.

WCF and WPF Programming

1. Create a simple WCF application with appropriate client and host it in various environments IIS, Windows Service, Windows Application.
2. Create a simple WCF application for arithmetic operations. Use Service Contract, NetTcpBinding and TCP address
3. Create a simple WCF application of string Concatenation. Use Service Contract, NetTcpBinding and TCP address
4. Create an appropriate application using Windows Presentation Foundation.

Course Outcomes:

Ability to practically work of Database Management System Software to perform basic SQL operations, triggers, procedures, views along with development of forms and reports with database connectivity.

Successful students will able to write the window program and create the WCF and WPF applications.

Semester- III

Course Code: **IT-301** **Mobile Application Development**

Clock Hours: **60**
Total Marks: **100**

Course Objectives:

- To introduce Android platform and its architecture.
- To learn activity creation and Android UI designing.
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To work with SQLite Database and content providers.
- To integrate multimedia, camera and Location based services in Android Application.

Unit- I

[10] Max Marks:10

Mobile Application Development: 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. Comparison of Android with other Mobile OS. Comparative study of all versions of Android.

[Note: The unit is to be thought with respect to current scenario of Mobile Development hence above contents may change]

Unit-II

[12] Max Marks:15

Hello, Android and Installations: Background, What is android and what isn't, Open Mobile Development Platform, 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, Android Development Tools as per current version, Installations, Emulator.

Unit-III

[16] Max Marks:20

Creating Applications, activities and User Interfaces: 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 and fragments, Using Adapters, Creating New Views.

Unit-IV

[12] Max Marks:20

Intents, Broadcast Receivers, and the Internet: Introducing Intents, Creating Intent Filters and Broadcast Receivers, Using Internet Resources. Introducing Dialogs and Action Bars, Creating and Using Menus.

Unit-V

[06] Max Marks:15

Working in the Background: Introducing Services, Using Background Worker Threads, Using Toast, Introducing Notifications, Using Alarms.

Unit-VI

[12] Max Marks:15

Data Storage, Retrieval, and Sharing: FILES, SAVING STATE, AND PREFERENCES: Saving Application Data, Creating and Saving Shared Preferences, Retrieving Shared Preferences, Introducing the Preference Framework and the Preference Activity, Persisting the Application Instance State, Including Static Files as Resources, Working with the File System.

DATABASES AND CONTENT PROVIDERS: Introducing Android Databases, SQLite Databases, Content Providers, Introducing SQLite, Content Values and Cursors, Working with SQLite Databases, Creating Content Providers.

References:

1. Reto Meier. Professional Android Application Development, Wrox Publications ISBN: 978-0-470-34471-2.
2. Rick Rogers, John Lombardo, Zigurd Mednieks, G. Blake Meike. Android Application Development: Programming with the Google SDK. O'Reilly ISBN 10: 0596521472 / ISBN 13: 9780596521479.

Auxiliary Resources:

d. <https://developer.android.com/index.html>

Course Outcomes:

Students will able to:

- Describe Android platform, Architecture and features.
- Design User Interface and develop activity for Android App.
- Use Intent, Broadcast receivers and Internet services in Android App.
- Design and implement Database Application and Content providers.
- Use multimedia, camera and Location based services in Android App.
- Discuss various security issues in Android platform

Course Code: **IT-302**

Ruby on Rails

Clock Hours: **60**

Total Marks: **100**

Course Objectives:

Develop programming skills and logical ability with the use of Ruby Programming language platform.

Understanding web application development using Rails framework.

Unit-I

[08] Max Marks:12

Ruby Installation and Basics: Ruby/Rails Installation, Introduction to Ruby, Ruby naming convention, Interactive Ruby (IRB) & “ri” (Ruby Interactive) command-line tools, Ruby object, Ruby types: String, Hash, Symbol, Ruby class, Inheritance, Ways of creating Ruby object, Ruby methods, Methods Basics, Methods Advanced: Arguments, Visibility, Method with a! (bang), Modules, Control structures, Exception handling, Ruby operators, Regular expression

Unit-II

[10] Max Marks:15

Ruby core: Basics of block, How does a block look like? Block passing and execution, Proc, & (Ampersand), lambda, Closure, What is and Why Meta-programming?, Ruby language characteristics (that make it a great metaprogramming language), Object#respond_to?, Object#send, Dynamic typing (and Duck typing), missing_method, define_method

Unit-III

[04] Max Marks:06

Ruby I/O: File I/O, File inquiries, Directories, Navigation through Directories

Unit-IV

[10] Max Marks:15

Ruby Advanced: Ruby OOPs concepts, Database Access, Web Application without framework, Sending email, Ruby - XML, XSLT and XPath

Unit-V

[10] Max Marks:15

Ruby Advanced: Ruby TK (GUI for Ruby), Ruby – Multithreading Built in Functions, Variables, Constants, Ruby associated tools, Ruby - XML, XSLT and XPath

Unit-VI

[18] Max Marks:27

Rails Basics: What is and Why Ruby on Rails? Building HelloWorld Rails application step by step, App directory structure (MVC), Environment, Rake, Gems, Generators, Migration, Console,

Bundle, scaffolding, ORM (ActiveRecord), Action controller basics, Action Views, Helpers, Authentication.

References:

1. Yukihiro Matsumoto (2008), The Ruby Programming Language, Shroff; First edition, 2008, ISBN-10: 8184044925, ISBN-13: 978-8184044928
2. Michael Fitzgerald, Learning Ruby, Published by O'Reilly Media, Inc., May 2007, ISBN-10: 8184043341, ISBN-13: 978-8184043341
3. Rails AntiPatterns, Wesley Professional Ruby Series, 1st edition, 2010, ISBN-10: 0321604814, ISBN-13: 978-0321604811
4. Adam Gamble, Cloves Carneiro, Jr. Rida Al Barazi (2007), Beginning Rails4, Apress, 3rd edition, 2013 ISBN-13 (pbk): 978-1-4302-6034-9| ISBN-13 (electronic): 978-1-4302-6035-6

Course Outcome:

Familiar with Ruby Programming language by understanding lexical and syntactic structure of Ruby programs, Datatypes and Objects, Expressions and Operators, Statements and Control Structures, Methods, procs, lambdas, and closures, Classes and modules, Reflection and Metaprogramming.

Familiar with web application development using Rails framework.

Course Code: IT-303

Software Engineering

**Clock Hours: 60
Total Marks: 100**

Course Objectives:

- The nature of software development and software life cycle process models.
- Explain methods of capturing, specifying, visualizing and analyzing software requirements.
- Understand concepts and principles of software design and user-centric approach and principles of effective user interfaces.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.
- Understand need of project management and project management life cycle.
- Understand project scheduling concept and risk management associated to various type of projects.

Unit-I

[10] Max Marks:10

Introduction and Process Models: Nature of Software, Software Engineering the process, Software Myths. Process Models: Generic process model, Prescriptive process models, Specialized process models, Unified process, Personal and Team process model, Process Technology, Product and Process. Agility, cost of change, Agile process, Extreme Programming, Agile Process models: Adaptive Software development, Scrum, Dynamic system development model, Crystal, Feature Driven development, Lean Software development, Agile modelling, Agile Unified process. Tool set for Agile process.

Unit-II

[10] Max Marks:15

Requirement Analysis and Modelling: Requirement Engineering, Establishing Groundwork, Eliciting Requirements Developing Use cases, Building Requirement model, Negotiating and Validating requirements. Requirement analysis, Scenario based modelling, UML models that supplements use case, Data modelling concepts, class based modelling. Requirement Modelling strategy, Flow oriented modelling, Creating Behavior model, Pattern for Requirement modelling.

Unit-III

[08] Max Marks:15

Quality Assurance and Change Management: Elements of SQA, SQA Tasks, Goal and Metrics,

Formal approaches to SQA, Software Reliability, ISO 9000 Quality standards, SQA Plan. Software Configuration Management, SCM Repository, SCM process.

Unit-IV [11] Max Marks:20

Design Concept: Design process, Design Concept: Abstraction, Architecture, Pattern, Separation of concept, Modularity, Information hiding, Functional independence, Refinement, Aspects, Refactoring. Design Model: Data design element, Architectural design element, Interface design element, Component level design element, Deployment level design element.

Unit-V [11] Max Marks:20

Architectural and Component Level Design: Software Architectures, Architectural Genres, Architectural styles, Architectural design, Accessing alternatives Architectural design, Architectural mapping using dataflow. Introduction to component, Designing class based component, Conducting component level design, Designing traditional component, component based development.

Unit-VI [10] Max Marks:20

Software Testing: Strategic approach to software testing, Test strategies for conventional software, Validation Testing, System testing, Software testing fundamentals, Internal and external view of testing, White box testing, Basic path testing, Control structure testing, Black box testing, model based testing, Testing for specialized Environment, Architectures and applications.

References:

1. R.S.Pressman, "Software Engineering: A Practitioner's Approach", McGraw-Hill International Edition, Seventh Edition, ISBN:978-007-126782-3.
2. Pankaj Jalote, "Software Engineering: A Precise Approach", Wiley India Pvt. Limited ISBN: 978-81-265-2311-5.
3. K. K. Aggarwal and Yogesh Singh, "Software Engineering", Third Edition, New Age International Publishers, ISBN:978-81-224-2360-0.

Course Outcomes:

- Understand and demonstrate basic knowledge in software engineering
- Define various software application domains and remember different process model used in software development.
- Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
- Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
- Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.
- Justify role of SDLC in Software Project Development
- Generate project schedule and can construct, design and develop network diagram for different type of Projects.

Course Code: **IT-304**

Web Application Technology

Clock Hours: **60**

Total Marks: **100**

Course Objectives:

- To learn .Net Framework
- Creating ASP.Net web applications using standard .net controls.
- Develop database applications using ADO.Net

- Use Web Services and develop simple and complex applications using .Net framework
- Develop a data driven web application.
- Connecting to data sources and managing them.
- Maintain session and controls related information for user used in multi-user web applications
- Understand the fundamentals of developing modular application by using object oriented methodologies

Unit-I [10] Max Marks:15

Desktop Computing vs. Internet Computing, Internet computing infrastructure, Client side scripting vs. Server Side Scripting technologies, Web Server basics and configuration: IIS, Apache etc., Web site hosting basics, Web Publishing, HTML, introduction to .NET framework, Features of .NET framework:CTS,CLS,CLR,.NET technologies, languages'C#.NET,VB.NET, basics of ASP.NET page framework, Visual studio .NET IDE, Page Life Cycle,PostBack, Viewstate, Page directives, ASP.Net page execution cycle, HTTP Pipeline, HTTP Application, HTTP Request, HTTP Response classes, HTTP Modules and HTTP Handlers, State Management, Role of *Global.asax*, Application configuration using *web.config* file

Unit-II [15] Max Marks:25

ASP.NET Control hierarchy, HTML Server Controls, Web Server Controls, User and Server controls, Validation Controls, List bound controls: dropdown lists, list boxes, Repeater, DataList, Data Grid, DataGridView, FormsView controls, Data binding to List Bound Controls, Templating and Styling of ASP.NET server controls

Unit-III [20] Max Marks:25

Web Page Designing principles, CSS anatomy, Anatomy of Master Pages, nesting master pages, Site map file, Web site Navigation controls, properties:TreeView, Sitemap Path, Menu, Other Navigation methods: Response.Redirect(), Server.Transfer(), Personalization through Profiles, Themes/Skins, Web Site security basics: authentication modes:Windows,Forms,passport, authorization, roles/Membership, access rules, login controls,Web services: working, anatomy, hosting

Unit-IV [15] Max Marks:25

Database technology: ADO.NET, Anatomy/architecture of ADO.NET, working with Connection, Command, Data Adaptor, DataReader, DataSet, DataTable objects, Editing data in Data Tables, concurrency control. Introduction to MVC, Data Reports

References:

1. Richard Anderson, Brian Francis, Alex Homer, Rob Howard, David Sussman, Karli Watson(2002), Professional ASP.NET 1.0, Special Edition, Wrox Press Ltd., 2002, ISBN 1-861007-0-3-5.
2. Chris Hart, John Kauffman, Dave Sussman, and Chris Ullman(2006), Beginning ASP.NET 2.0, Wiley Publishing, Inc., 2006, ISBN-13: 978-0-7645-8850-1, ISBN-10: 0-7645-8850-8.
3. Beginning ASP.NET 4: in C# and VB, Imar Spaanjaars, Wiley Publishing, Inc 2010., ISBN: 978-0-470-50221-1
4. Bill Evjen, Scott Hanselman, Devin Rader (2008), Professional ASP .NET 3.5 in C# and

VB, Wiley Publishing Inc.,2008 ISBN:978-0-470-18757-9.

5. Dino Esposito (2008), Programming Microsoft ASP.NET 3.5, Second Edition, Microsoft Press, 2008, ISBN-10: 0735625271, ISBN-13: 978-0735625273

Auxiliary Resources:

a. Website URLs

1. <https://www.asp.net/>
2. <http://asp.net-tutorials.com/>

b. Video Links

1. <https://www.asp.net/web-forms/videos>
2. https://www.youtube.com/playlist?list=PL6n9fhu94yhXQS_pli-HLIftB9Y7Vnxlo&feature=view_all

Course Outcomes:

The student will be able apply technical knowledge and perform specific technical skills, including:

- Successful students will able to design web applications using ASP.NET
- Successful students will be able to use ASP.NET controls in web applications.
- Successful students will be able to debug and deploy ASP.NET web applications
- Successful students will be able to create database driven ASP.NET web applications and web services.

Course Code: IT-305 (A)

**Data Warehousing and Data Mining
(DWDM)**

Clock Hours: 60

Total Marks: 100

Course Objectives:

1. To comprehend evolution of decision making, operational vs decision support system and the concept of data warehouse.
2. To understand transactional and analytical processing
3. Significance of analytical processing and importance of data pre-processing.
4. Learn various data pre-processing techniques, methods.
5. Understand and apply various techniques/algorithms to obtain meaningful patterns from data (Association mining, classification and clustering)

Unit-I

[08] Max Marks:12

Introduction to Data Warehousing: Evolution of decision system, Failure of past decision support system, Operational v/s decision support systems, Data warehousing lifecycle, Architecture, Building blocks, Components of DW, Data Marts and Metadata

Unit-II

[08] Max Marks:12

Data Pre-processing: need for pre-processing of the data, Descriptive data summarization, Data cleaning, Data Integration and transformation, Data reduction, Data discretization and concept hierarchy generation.

Unit-III

[10] Max Marks:15

OLAP Analytical Processing: OLAP in Data warehouse, Demand for online analytical processing, need for multidimensional analysis, limitations of other analysis methods, OLAP

definitions and rules, OLAP characteristics, major features and functions, OLAP models-ROLAP, MOLAP, HOLAP, Differentiation, Data cubes and operations on cubes.

Unit-IV [06] Max Marks:09

Data Mining: Introduction-Data Mining functionalities, Classification of Data Mining Systems, basic Data Mining task, Data Mining Issues

Unit-V [08] Max Marks:12

Association Rule Mining: Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

Unit-VI [10] Max Marks:15

Classification and Prediction :Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

Unit-VII [10] Max Marks:15

Cluster Analysis :Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis

References:

1. Jiawei Han and MichelineKamber “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008.
2. M. H. Dunham. Data Mining: Introductory and Advanced Topics. Pearson Education. 2001.
3. H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.
4. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001
5. Tan Steinbach, Vipin Kumar, Introduction to Data mining, Pearson Education
6. Jarke Vassiliou, Fundamentals of Data Warehouses, IInd Edition, Springer
7. Anahory Murray, Data Warehousing in Real World, Pearson Education
8. Paulraj Ponniah , Data Warehousing.

Course Outcomes:

After this course students shall be able to –

1. Explain organization of data warehousing and data marts.
2. Differentiate between OLTAP and OLAP
3. Apply data pre-processing techniques
4. Write basic algorithms for extracting patterns from data (association mining, classification and clustering)
5. Solve problems related with various aspects of data mining.

Course Code:IT-305 (B)

Optimization Algorithms

Clock Hours:60

Total Marks: 90

Course Objectives:

1. To introduce with the branch of OR and its role in decision making.
2. To list out various types of applications of operations research (OR).
3. To explain Linear Programming Problem (LPP) and practice with techniques to solve various types of LPP (transportation problem, assignment problems, special cases of duality, Integer programming problems)
4. Describe the significance, concept of game theory and algorithms to solve game theory problems.
5. Introduce critical path analysis using network problems.

Unit-I

[05]

Max Marks:08

Overview of operations Research: Introduction, Applications, Role of OR in Decision Making, Feasible and optimal Solutions

Unit-II

[15]

Max Marks:20

Linear Programming: Special Types: Transportation Problem as LPP, Initial Basic Feasible Solution, North West corner Rule, Lowest Cost Method, Vogel's Approximation Method, MoDi method for optimization, Degeneracy.

Assignment problem, Hungarian Method, Special cases of assignment problem

Unit-III

[18]

Max Marks:24

Linear Programming Problems: Introduction, Formulation of Mathematical model of LPP, Standard form of linear programming problems, Solving LPP using Graphical method, Infeasible LPP, Unbounded LPP, Basic feasible solutions, Simplex method for solving LPP, augmentation using Slack and artificial variables, Big M and two phase method, Degeneracy, alternative optima, Interpretation of final Simplex table, Duality: concept, applications and example.

Unit-IV

[06]

Max Marks:08

Integer Programming: Introduction, How it differs from LPP, Pure and mixed integer programming problems, Binary IPP, Techniques to solve IPP.

Unit-V

[08]

Max Marks:15

Network Models: Definitions, Applications, Representation of a problem in network form, Critical Path Analysis, Resource planning, Giantt Chart.

Unit-VI

[08]

Max Marks:15

Game Theory : Concept, Two party zero sum game, Pay off matrix, Pure and mixed strategy games, Rule of Dominance, Subgame method, Brown's Algorithm

References:

1. Hamdy Taha (2010). Operations Research: An Introduction. Pearson Education. ISBN: 978-0132555937
2. L C Jhamb. Quantitative Techniques For Managerial Decisions Vol I, Vol II. Everest Publishing House, ISBN: 8186314628
3. PanneerSelvan R (2006). Operations Research. Prentice Hall of India. ISBN: 978-8120329287

Course Outcome:

After completion of this course students shall be able to-
write about OR and decision making.

1. Differentiate between feasible and optimal solution
2. Apply solving techniques to all types of LPP.
3. Apply solving techniques to network problems and game theory problems as well.

Course Code: **IT-305(C)**

Artificial Intelligence

Clock Hours: 60

Total Marks: 100

Course Objectives:

The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software or tools programming environments.

The student should be made to:

- 1) Gain a historical perspective of AI and its foundations.
- 2) Study the concepts of Artificial Intelligence.
- 3) Investigate applications of AI techniques in intelligent agents
- 4) Learn the methods of solving problems using Artificial Intelligence.
- 5) Learn various peculiar search strategies for AI

Unit-I [08] Max Marks:10

Introduction: Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents.

Unit-II [06] Max Marks:10

State Space Search: Depth First Search, Breadth First Search, DFID.

Unit-III [08] Max Marks:12

Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search.

Unit-IV [08] Max Marks:15

Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization.

Unit-V [08] Max Marks:12

Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net.

Unit-VI [06] Max Marks:12

Game Playing: Minimax Algorithm, AlphaBeta Algorithm, SSS*.

Unit-VII [08] Max Marks:14

Planning and Constraint Satisfaction: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graphplan, Constraint Propagation.

Unit-VIII [08] Max Marks:15

Logic and Inferences: Propositional Logic, First Order Logic, Soundness and Completeness, Forward and Backward chaining.

References:

1. Deepak Khemani (2013). A First Course in Artificial Intelligence, McGraw Hill Education (India).
2. Elaine Rich and Kevin Knight (1991). Artificial Intelligence, Tata McGraw Hill.
3. Stuart Russell and Peter Norvig (2009). Artificial Intelligence: A Modern Approach, 3rd

Edition, Prentice Hall.

Course Outcome:

At the end of the course, the student should be able to:

- 1) Identify problems that are amenable to solution by AI methods.
- 2) Identify appropriate AI methods to solve a given problem.
- 3) Design smart system using different informed search / uninformed search or heuristic approaches.
- 4) Apply the suitable algorithms to solve AI problems

Course Code: IT LAB-V LAB on Mobile Application Development Total Marks: 100
and Data Warehousing and Data Mining(DWDM)

Course Objectives:

- To gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment.
 - To learn designing of User Interface and Layouts for Android App.
 - To learn how to use intents to broadcast data within and between Applications.
 - To use Content providers and Handle Databases using SQLite.
 - To introduce Android APIs for Camera and Location Based Service.
 - To discuss various security issues with Android Platform.
 - To create awareness of how enterprise can organize and analyze large amounts of data by creating a Data Warehouse.
1. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the red color with white background with change in fonts & styles of text
 2. Create List with string taken from resource folder (res>>value folder). On changing list value change image.
 3. Create android UI such that, one screen have radio button of the types of cars. On selecting any car name, next screen should show car details like: name, company name, images if available, show different colors in which it is available.
 4. Create android application that will display toast (Message) on android life cycle stages.
 5. Create the application that will change color of screen , based on selected option from the menu.
 6. Create android application with login module. (Check username & password) on successful login, go to next screen. And on falling login, alert user using Toast
 7. Create android application that will display toast (Message) on specific interval time.
 8. Create the android application that calls 3 native applications using intents.
 9. Create the android application that will read phonebook contact using content providers and display in list on selecting specific contact makes a call to selected contact.
 10. Create android application to take a picture using native application.
 11. Create the android application that will send SMS using your android application
 12. Create android background application that will open activity on specific time.
 13. Create the android application that will demonstrate shared preferences.
 14. Create the android application that will call maps using android application.
 15. Create android application to make Insert, Update, Delete and retrieve operation on

employee database.

DWDM Assignments:

WEKA : Data processing in WEKA

Classification algorithms: decision tree classification, naive Bayesian classification, a brief introduction to other classifiers

Clustering algorithms: methods to cluster continuous data, methods to cluster categorical data

Association Mining: Apriori algorithm

Course Outcomes:

- Experiment on Integrated Development Environment for Android Application Development.
- Design and Implement User Interfaces and Layouts of Android App.
- Use Intents for activity and broadcasting data in Android App.
- Design and Implement Database Application and Content Providers.
- Experiment with Camera and Location Based service. Develop Android App with Security features.
- Organize strategic data in an enterprise and build a data Warehouse.

**Course Code: IT LAB-VI LAB on Ruby on Rails and Web
Application Technology**

Total Marks: 100

Course Objectives:

- Develop and flourish programming and logical skill by practicing assignments.
- Set up a programming environment for ASP.net programs.
- Configure an asp.net application.
- Creating ASP.Net applications using standard .net controls.
- Develop a data driven web application.
- Connecting to data sources and managing them.
- Maintain session and controls related information for user used in multi-user web applications
- Understand the fundamentals of developing modular application by using object oriented methodologies

Ruby and Rails Assignments:

1. Demonstrate a Ruby Basic program which manipulate Hash, Array, Strings. Any five methods of each container. Also use !(bang) operator.
2. Write Ruby program which accepts user input and process it then print the result. Like radius.rb is a file which accept input as float and returns a calculated Area of circle
tom@laptop:~/courses/ruby/asst\$ ruby radius.rb
Enter the radius: 2 Area is: 12.5663708
3. Write a ruby program which prompts for and reads one line of input. It then echos the line, then prints it repeatedly, each time removing every second character. It continues until no more characters can be removed. Treat all characters alike; no special treatment for spaces or punctuation. Like this:

```
tom@laptop:~/courses/ruby/asst$ ruby reduce.rb
Please enter a line> Sandy.
Sandy.
Sny
Sy
S
```

```
tom@laptop:~/courses/ruby/asst$ ruby reduce.rb
Please enter a line> On Tuesday, Frank in the motor pool buys lunch.
On Tuesday, Frank in the motor pool buys lunch.
O usa,Faki h oo olby uc.
OuaFk oob c
Oak o
Okoo
Oo
O
tom@laptop:~/courses/ruby/asst$ ruby reduce.rb
Please enter a line> Those so aglow point at hues afferent
Those so aglow point at hues afferent
Toes go on the feet
Te oo h et
T ohe
Toe
Te
T
```

4. Demonstrate Inheritance in Ruby by building a superclass called Bird from which our Duck, Goose, and Owl classes will derive their functionality. (http://www.gotealeaf.com/books/oo_ruby/read/inheritance)
5. Demonstrate a Ruby programs which uses loops like, each, times, do loop, etc. With having use of operators & exceptions which cause to break loop like devide by zero, etc.
6. Write a Ruby script which demonstrate use of blocks, lambda & proc.
7. Write a Ruby program which show duck typing, uses respond_to? Method.
8. Write a Ruby program which access private methods/attributes outside of class.
9. Write a Ruby program which define dynamic methods and method will return something also use missing_method. It should return some result to console if some method is missing.
10. Create a Basic Ruby on Rails web application which print "Hello World on web browser"
11. Create a Ruby on Rails web application which shows having Post Section. In which user can Insert, Edit, Delete Post, using scaffolding.
12. Create a Ruby on Rails web application with Post Model uses variuos type of server validation.
13. Create a Ruby on Rails web application which shows having Post Section. In which user can Insert, Edit, Delete Post, using scaffolding, using mysql database.
14. Create a Ruby on Rails web application using mysql database without scaffold. which shows having Post Section. In which user can Insert, Edit, Delete Post. Post have multiple comments, comments can also Insert, Edit, Delete with nestes routes.like "/posts/2/comments"
15. Create a Ruby on Rails web application using mysql database. Post is always belongs to user and user has many posts. Without login user can't Insert, Delete or Edit Post, can only show post using devise gem.
16. Create a Ruby Application having 3 to 4 .rb files interconnected with each other. Which demonstrate all above concept with Human readable console output.
17. Design a Ruby On Rails Web Application which deals with User, Registration Form, Validations, CSS, JavaScripts, Ajax, Associations, etc

Web Application Development Technology Practical Assignments

1. Demonstrate followings in IIS:
 - a. Creation of Virtual Directory, Home directory, Home page, hosting of website
2. Demonstrate Page Life Cycle of ASP.NET. Use important page events for your

demonstration.

3. Write VB.Net/C# console applications to demonstrate: OO concepts: polymorphism, encapsulation, inheritance, interface inheritance, abstract classes/methods, overloading, overriding, collection classes, properties
4. Demonstrate concept of postback and viewstate using web form server controls of ASP.NET
5. Demonstrate various Web form server controls using sample data entry screen form for registering for a service on website. Also use validation controls to validate input data.
6. Demonstrate DropDown List box, CheckButtonList, RadioButtonList controls.
7. Demonstrate Databinding using Hashtable, ArrayList, DataTable data sources.
8. Demonstrate Repeater control with the help of various templates.
9. Demonstrate paging, sorting, filtering of data in asp:DataGrid/DataGridView.
10. Demonstrate editing process in DataGrid and DataList controls. Make use of necessary templates for proper visual appearance.
11. Demonstrate State Management features of ASP.NET using sample shopping cart application.
12. Create sample website for demonstrating use of Profiles/Themes using skin files.
13. Demonstrate Master Pages and website navigation controls(sitemap path, treeview, menu) using SiteMap file.
14. Demonstrate Properties of website navigation controls.
15. Demonstrate Authorization/Authentication using Login controls and Roles/Membership/AccessRules
16. Demonstrate creation of simple/complex DataReader/DataSet Objects.
17. Demonstrate editing in DataTable objects.
18. Demonstrate Web Service hosting, access in ASP.NET

Course Outcomes:

The student will be able apply technical knowledge and perform specific technical skills, including:

- Ability to logically build program using syntactic structure and APIs of Ruby Programming Language.
- Ability to design simple web applications using Rails framework.
- Successful students will be able to design web applications using ASP.NET
- Successful students will be able to use ASP.NET controls in web applications.
- Successful students will be able to debug and deploy ASP.NET web applications
- Successful students will be able to create database driven ASP.NET web applications and web services.

Semester- IV

Course Code: IT-401

Full Time Industrial Training

Total Marks: 300

Course Objectives:

- To provide comprehensive learning platform to students where they can enhance their employ ability skills and become job ready along with real corporate exposure.
- To enhance students' knowledge in one particular technology.
- To Increase self-confidence of students and helps in finding their own proficiency.
- To cultivate student's leadership ability and responsibility to perform or execute the given task.
- To provide learners hands on practice within a real job situation.

Twelve credits shall be awarded to the Industrial Training/Project course, which will commence in the IVth Semester and the final work and report will be completed at the end of IVth Semester of M.Sc.(IT) course. The student is expected to work on software development project. The project work should have coding part. Student will have to submit the bound project report in university prescribed format at the end of the semester. Student will have to appear for Project Viva-voce and the marks and the credits will be allotted at the end of IVth semester of M.Sc.(IT) course.

Course Outcomes:

- Capability to acquire and apply fundamental principles of Computers and information technology.
- Become master in one's specialized technology.
- Become updated with all the latest changes in technological world.
- Ability to communicate efficiently.
- Knack to be a multi-skilled IT professional with good technical knowledge, management, leadership and entrepreneurship skills.
- Ability to identify, formulate and model problems and find engineering solution based on a systems approach.
- Capability and enthusiasm for self-improvement through continuous professional development and life-long learning