**THIRUVALLUVAR UNIVERSITY**

**VELLORE**

**M.Sc. INFORMATION TECHNOLOGY**

**(CBCS PATTERN)**

**SYLLABUS**

(With effect from 2020 - 2021)

**The Course of Study and the Scheme of Examination**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Sl.******No.*** | ***Study Components*** | ***ins. hrs / week*** | ***Credit*** | ***Title of the Paper*** | ***Maximum Marks*** |
| ***Course Title*** | ***CIA*** | ***Uni. Exam*** | ***Total*** |
| **SEMESTER I** |  |
|  | Core | Paper 1 | 5 | 3 | Operating System  | 25 | 75 | 100 |
|  | Core | Paper 2 | 5 | 3 | Object Oriented Analysis & Design | 25 | 75 | 100 |
|  | Core | Paper 3 | 5 | 3 | DBMS | 25 | 75 | 100 |
|  | Practical | Paper 1 | 3 | - | Object Oriented Programming Lab | - | - | - |
|  | Practical | Paper 2 | 3 | - | RDBMS-Lab  | - | - | - |
|  | Practical | Paper 3 | 3 | - | Visual Programming-Lab | - | - | - |
| Internal Elective for same major students  |
|  | CoreElective | Paper-1 | 3 | 3 | **(to choose one out of 3)**A. Computer ArchitectureB. Discrete MathematicsC. Principles of Communication System | 25 | 75 | 100 |
| External Elective for other major students (Inter/multi disciplinary papers) |
|  | Open Elective | Paper-1 | 3 | 3 | Digital data handling | 25 | 75 | 100 |
|  |  |  | **30** | **15** |  | **125** | **375** | **500** |
|  |
| **SEMESTER II** |  | ***CIA*** | ***Uni. Exam*** | ***Total*** |
|  | Core | Paper 4 | 4 | 3 | Visual Programming | 25 | 75 | 100 |
|  | Core | Paper 5 | 4 | 3 | Computer Networks | 25 | 75 | 100 |
|  | Core | Paper 6 | 4 | 3 | Software Engineering | 25 | 75 | 100 |
|  | Practical | Paper 1 | 3 | 4 | Object Oriented Programming Lab | 25 | 75 | 100 |
|  | Practical | Paper 2 | 3 | 4 | RDBMS- Lab | 25 | 75 | 100 |
|  | Practical | Paper 3 | 3 | 4 | Visual Programming -Lab | 25 | 75 | 100 |
| **Internal Elective for same major students**  |
|  | CoreElective | Paper-2 | 4 | 3 | **(to choose one out of 3)**A. Introduction to Computation with PYTHONB. E-CommerceC. Microprocessor & Micro Controller |  25  | 75 | 100 |
| **External Elective for other major students (Inter/multi disciplinary papers)** |
|  | Open Elective | Paper-2 | 3 | 3 | HTML Programming | 25 | 75 | 100 | 25 | 75 | 100 |
|  | \*Field Study |  | - | 2 |  | 100 | - | 100 |
|  | Compulsory Paper |  | 2 | 2 | Human Rights | 25 | 75 | 100 |
|  |  |  | **30** | **31** |  | **325** | **675** | **1000** |
| **SEMESTER III** |  | ***CIA*** | ***Uni. Exam*** | ***Total*** |
|  | Core | Paper-7 | 4 | 3 | Internet Programming  | 25 | 75 | 100 |
|  | Core | Paper-8 | 4 | 3 | Mobile Computing | 25 | 75 | 100 |
|  | Core | Paper-9 | 4 | 3 | Computer Graphics and Multimedia | 25 | 75 | 100 |
|  | Practical | Paper 4 | 4 | - | Network -Lab | - | - | - |
|  | Practical | Paper 5Paper 6 | 4 | - | Internet Programming Lab | - | - | - |
| Practical | 4 | - | Graphics and Multimedia Lab | - | - | - |
| **Internal Elective for same major students**  |
|  | Core Elective | Paper-3 | 3 | 3 | **(to choose one out of 3)**A. JSP and EJBB. Big Data AnalyticsC. Image Processing | 25 | 75 | 100 |
| **External Elective for other major students (Inter/multi disciplinary papers)** |
|  | Open Elective | Paper-3 | 3 | 3 | Data Analysis using SPSS. | 25 | 75 | 100 |
|  | \*\* Mooc Courses |  | - | - |  | - | - | 100 |
|  |  |  | **30** | **15** |  | **100** | **300** | **600** |
| **SEMESTER IV** |  | ***CIA*** | ***Uni. Exam*** | ***Total*** |
|  | Core | Paper-10 | 4 | 3 | Data Mining and Warehousing | 25 | 75 | 100 |
|  | Core | Paper-11 | 4 | 3 | Network Security | 25 | 75 | 100 |
|  | Practical | Paper 4 | 4 | 4 | Network LAB | 25 | 75 | 100 |
|  | Practical | Paper 5  | 4 | 4 | Internet Programming Lab | 25 | 75 | 100 |
|  | Practical | Paper 6 | 4 | 4 | Graphics and Multimedia Lab | 25 | 75 | 100 |
|  | Core  | Project | 4 | 5 | Project Work/ Dissertation and viva voce (Compulsory) | 100 (75 Project+25 Viva) | 100 |
| **Internal Elective for same major students**  |
|  | CoreElective | Paper-4 | 3 | 3 | **(to choose one out of 3)**A. Open Source SoftwareB. Machine Learning TechniquesC. Component Technology | 25 | 75 | 100 |
| **External Elective for other major students (Inter/multi disciplinary papers)** |
|  | Open Elective | Paper-4 | 3 | 3 | Data conversion and XML | 25 | 75 | 100 |  | 75 | 100 |
|  |  |  | **30** | **29** |  | **225** | **675** | **800** |
|  |  |  | **120** | **120** |  |  |  | **2900** |
|  |

**\* Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registred by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

(i). Head of the respective department

(ii). Mentor

(iii). One faculty from other department

\*\***Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

**SEMESTER III**

**PAPER - 7**

**INTERNET PROGRAMMING**

**Objectives:**

Upon completion of the course the student will be able to:

Write client-side JavaScript programs for executing in a Web browser.

Do basic HTML design using colors, images, tables, frames, and GUI components such as text boxes, buttons, menus, checkboxes, and radio buttons and develop interactive Web applications that integrate HTML with JavaScript using event handlers.

Explain control structures, functions, and arrays, and illustrate how they are used to create JavaScript programs. Also discuss object-oriented programming and the Document Object Model, built-in and custom objects.

Create JavaScript applications that use cookies to track and save Web preferences.

**UNIT-I**

Introduction: Introduction to the Internet and World Wide Web - World Wide Web Consortium (W3C) - History of the Internet History of the World Wide Web - History of SGML -XML Introduction to HyperText Markup Language - Editing HTML - Common Elements - Headers - Linking - Images - Unordered Lists - Nested and Ordered Lists - HTML Tables-Basic HTML Forms

**UNIT-II**

Dynamic HTML: Dynamic HTML Object Model and Collections, Event Model, Filters and Transitions, Data Binding with Tabular Data Control, Dynamic HTML-Structured Graphics ActiveX Controls, Dynamic HTML-Path, Sequencer and Sprite ActiveX Controls.

**UNIT-III**

JavaScript: JavaScript, Introduction to Scripting, Control Statements, Functions, Arrays, Objects.

**UNIT-IV**

XML: Creating Markup with XML -Parsers and Well-formed XML Documents -Parsing an XML Document with msxml - Document Type Definition (DTD) - Document Type Declaration - Element Type Declarations - Attribute Declarations - Document Object Model - DOM Implementations - DOM Components - path - XSL: Extensible Stylesheet Language Transformations (XSLT)

**UNIT-V**

PERL, CGI AND PHP: Perl - String Processing and Regular Expressions - Form Processing and Business Logic - Server-Side Includes - Verifying a Username and Password - Using DBI to Connect to a Database - PHP - Form Processing and Business Logic - Connecting to a Database - Dynamic Content in PHP

**Text Books:**

Deitel & Deitel, Internet & World Wide Web How to Program, 3rd Edition, Pearson Education India, 2004.

Deitel & Deitel, XML How to Program, Pearson Education, 2001.

**References Books:**

God bole - Web Technologies, TCP/IP to Internet Application Architectures, 1st Edition - 2005, TMH, New Delhi.

Negrino and Smith, Javascript for the World Wide Web, 5th Edition, Peachpit Press 2003.

Deitel & Deitel, Perl How to Program, Pearson Education, 2001.

Benoit Marchal, XML by Example, 2nd Edition, Que/Sams 2002.

**PAPER - 8**

**MOBILE COMPUTING**

**Objectives:**

The objective is to provide the concepts of mobile computing including access control, digital mobile phone system, wireless LAN and the necessary protocols.

**UNIT-I**

INTRODUCTION: Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions – Multiplexing – Spread Spectrum and Cellular Systems – Medium Access Control – Comparisons.

**UNIT-II**

TELECOMMUNICATION SYSTEMS: Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT-2000 – Satellite Systems.

**UNIT-III**

WIRELESS LAN: IEEE 802.11 – Hiper LAN – Bluetooth – MAC layer – Security and Link Management.

**UNIT-IV**

MOBILE IP : Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.

**UNIT-V**

WIRELESS APPLICATION PROTOCOL: Wireless Application Protocol (WAP) – Architecture – XML – WML Script – Applications.

**Text Book:**

Jochen Schiller, “Mobile Communications”, Pearson Education, Delhi, 2000.

**References Books:**

Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Danil Mouney, Jari Alvinen, David Bevis, Jim Chan and Stetan Hild, “The Wireless Application Protocol : Writing Applications for the Mobile Internet”, Pearson Education Asia, 2001.

**PAPER - 9**

**COMPUTER GRAPHICS AND MULTIMEDIA**

**Objectives:**

The objective is to provide complete understanding of the theoretical aspects of computer graphics and multimedia. To provide the details of algorithms which facilitate implementation of both 2D and 3D graphics. To provide a basic understanding of the fundamental issues and problems in the representation and manipulation of multimedia content such as images, audio and video.

**UNIT-I**

Introduction and Hardware: Representative uses of computer graphics - vector display and raster display architectures - display processor - interactive input devices - output primitives - software portability and graphics standards - conceptual framework for interactive graphics.

**UNIT-II**

2D graphics: Basic raster graphic algorithms for 2D primitives - scan converting lines - circles - ellipses - filling rectangle - character generation - 2D transformations - 2D clipping - windowing transformation.

**UNIT-III**

3D graphics: 3D representation methods - 3D transformations - viewing and projections - parallel and perspective projections - hidden line elimination - hidden surface elimination.

**UNIT-IV**

Introduction: Elements of multimedia systems - Multimedia Hardware - Storage for Multimedia - Input, Output and Communication devices.

**UNIT-V**

Multimedia Building Blocks: Text - Images - Animation – Audio – Video – Animation – Image editing tools - Painting and drawing tools - Sound editing programs - Video formats - Presentation tools - Authoring tools.

**Text Books:**

 Foley, Van Dam, Reiner, Aughes, “Computer graphics Principles and Practice”, Addision Wesley, 1997.

 Hearn and Baker, “Computer graphics”, PHI, Ltd., 1995.

Tay Vaughan, Multimedia - Making it Works, 2nd Edition, McGraw Hill, 1997.

Judith Jeffcoate, Multimedia In Practice - Technology and Applications, Prentice Hall of India, 1995.

**References Books:**

Plastock, ” Computer Graphics ”, 2nd Edition , 2006, TMH, New Delhi.

William M.Neuman, Robert Sproull, “Principles of interactive computer graphics”, Second edition, McGraw Hill, 1989

Steven Harrington, “Computer graphics - A Programming Approach”, McGraw Hill, 1987.

Parekh,” Principles of Multimedia”, 2006, TMH, New Delhi.

Tay Vaughan, ”Multimedia making it work ”, 7th Edition , 2007, TMH, New Delhi.

**CORE PRACTICAL - 4**

**NETWORK LAB**

**Objectives:**

To familiarize the concepts learned in Computer Network. Programs for various Network functions can be written using Java.

**Network Programming**

Retrieving data with URLs

Implementation of Socket Programming

Using TCP/IP

Using UDP

Implementation of FTP

Implementation of ECHO/PING/TALK

Implementation of Remote command Execution

Implementation of ARP

Implementation of RARP

Implementation of RMI / RPC

Implementation of Shortest Path Routing Algorithm

Implementation of Sliding Window Protocol

**CORE PRACTICAL - 5**

**INTERNET PROGRAMMING LAB**

**Objectives:**

To implement the concept learned in internet programming and make familiarize with the creation of web based applications.

Creating a web page with cascading style sheets and Embedded style sheets.

Create a web page with the following.

Order form using HTML form elements

Validate the details in client side by using Java script

Design a web page to perform screen saver animations using Java script

Design a web page to display the text file contents using data binding concepts in DHTML.

Design a HTML Editor using Java applet.

Design a web page for library Management using Java applet and JDBC.

Write a Java RMI program to copy a text file from server to client.

Design a web page to conduct On-line Quiz using Java server pages.

Write a servlet program to do the following.

Set the URL of another server.

Display the header details during request of a page.

Display response header as well as contents during response from the server.

Design a web page to demonstrate session tracking Management using Java servlet.

**CORE PRACTICAL - 6**

**Graphics and Multimedia Lab**

**Objectives:**

To make the students to understand practically various concepts learned in Computer graphics and Multimedia.

Program for Line drawing using Bresenham, DDA Line Drawing Algorithms.

Program for Circle Drawing using Bresenham Circle Drawing Algorithms.

Program for Clipping Algorithm using Line Clipping

Program for 2D Transformations like Translations and Scaling and Rotations.

Program for 3D Transformations like Translations and Scaling and Rotations.

Performing various editing operations on an Image

Creating different Animations.

**CORE ELECTIVE
PAPER - 3**

**(to choose one out of 3)**

1. **JSP AND EJB**

**Objectives:**

To provide complete skills on Internet programming paradigm and also programming knowledge about J2EE such as JSP and EJB.

**UNIT-I**

Introduction: J2EE-JSP Basics-Elements – Directives –Scripting Elements – Web Application Server Architecture – Important Servlet API features –Introduction to JSP and Java Beans – JDBC

JSP session – persistent connections – cookies and Java sessions – HTTPS and SSL

**UNIT-II**

Error Handling and Debugging: JSP Error Handling – types – JSP specific Exception classes - handling different types of errors – Debugging techniques.

Database connectivity – RDBMS - Driver types – coding with JSP and JDBC

**UNIT-III**

Tag extensions and libraries –simple tags – implementation of Body tag interface – Dynamic GUI – creation of web sites – co-branded model –web portal

**UNIT-IV**

Introduction – transaction process – Benefits and models of transaction – 2 tier architecture – 3 tier architecture – server side component architecture- distributed transaction processing – The Java 2 Platform Enterprise Edition – Enterprise Bean – type of bean – Logical architecture – EJB - design and implementation of a bean.

**UNIT-V**

Session beans – Enterprise Bean class – Life cycle – Stateful Session Bean Example – Stateless Session Bean Example –session context – EJB Security

Entity Beans – Persistence concept - Definition and features of Entity Beans – Developing and using Entity Beans- Entity context – Life cycle of Entity Beans – container – managed persistence Bean – Debugging problems

**Text Books:**

Karl Avedal, Danny Ayers et. Al.,”Professional JSP “,Wrox Press, May 2000

Simon Brown,Robert Burdick,Danko Coker , Professional JSP “,Wrox Press, May 2001

Richard Monson Haefel, ”Enterprise Java Beans “,O’Reilly,Shroff Publishers and Distributers Pvt. Ltd.,January 2001

**References Books:**

Wrox Author Team,”Professional EJB “,Wrox Press, July 2001

**CORE ELECTIVE
PAPER - 3**

**B. BIG DATA ANALYTICS**

**UNIT – I**

UNDERSTANDING BIG DATA: What is big data – why big data, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System , Grid Computing, Volunteer Computing, convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.

**UNIT- II**

NOSQL DATA MANAGEMENT: Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schema less databases – materialized views – distribution models – sharding – version – Map reduce – partitioning and combining – composing map-reduce calculations.

**UNIT -III**

BASICS OF HADOOP: Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures.

**UNIT –IV**

 MAPREDUCE APPLICATIONS: MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats

**UNIT- V**

 HADOOP RELATED TOOLS: Hbase – data model and implementations – Hbase clients – Hbase examples –praxis. Cassandra – Cassandra data model – cassandra examples – cassandra clients –Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

**BOOKS RECOMMENDED**

 1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.

1. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
2. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
3. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley,
2012.
4. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011*.*
5. Alan Gates, "Programming Pig", O'Reilley, 2011.

**CORE ELECTIVE
PAPER - 3**

**C. IMAGE PROCESSING**

**Objectives:**

To familiarize the concepts of Image Processing and its Applications

**UNIT-I**

Introduction : Image perception – light, luminance, brightness and contrast – Monochrome vision models – Image fidelity criteria – color representation. Digital image sampling and quantization –Basic relationship between pixels

**UNIT-II**

Image enhancement : point operations – contrast stretching, clipping and thresholding – Histogram modeling – Spatial operations – averaging and low pass filtering, smoothing filter, sharpening filter and median filtering - Image Enhancement in frequency domain – smoothing and sharpening filters – Homomorphic filter

**UNIT-III**

Image restoration : Image observation models – Inverse and wiener filtering – Least square filters – Image analysis – Edge detection – Boundary extraction – Boundary representation – Region representation – Image segmentation – Classification techniques – Image understandings.

**UNIT-IV**

Image data compression : Redundancies – Image compression models – Error free compression – Lossy compression - Entropy coding, Run length, Bit plane – Predictive techniques – Delta modulation - DCPM

**UNIT-V**

Morphological Image Processing : Introduction – Dilation – Erosion – Opening –Closing – Morphological Algorithm operations on binary and Gray scale images

Image Representation and Description : Representation Schemes – Boundary Descriptors – Regional Descriptors

**Text Books:**

Gonsalez and Woods, “Digital Image Processing”, second Edition, Pearson Education,2002.

Anil K.Jain, “Fundamentals of digital image processing”, Prentice Hall information and System Science series, 1989.

**References Books:**

Pratt W.K. ,“Digital Image Processing”, 2nd Edition, John Wiley & Sons, 1991.

Rosenfied A. & Kak, A.C., “Digital Picture Processing”, Vol. I & II, Academic press, 1982.

Nick Efford – Digital Image Processing: A Practical introduction using Java – Addison Wesley / Benjamin Cummings, 2000.

**OPEN ELECTIVE**

**PAPER - 3**

 **DATA ANALYSIS USING SPSS**

**UNIT – I**

Introduction statistics**,** Descriptive vs Inferential Data Analysis, Measuring Variables, validity, reliability, explicability, Types of Variables (nominal, ordinal, interval), Common Terms-dataset, population sample, parameter, statistic, Misuses of Data examples, Univariate Descriptive Statistics, Sample Size , Range , Frequency Distributions, Histograms, Other Charts, Measures of Central Tendency and Dispersion , Means, medians, modes ,Variance, standard deviation.

**UNIT – II**

Introduction to SPSS for Windows, SPSS versions, Starting an SPSS Session , critical issues - SPSS: general description, functions, menus, commands, SPSS file management, Types of Data, Structuring your data for use in SPSS, Creating a New Dataset , Using an Existing Dataset, Manipulating and Merging Datasets ,Importing and Exporting Data , Printing Datasets , Data manipulation - Data Transformation - Syntax files and scripts - Output management

**UNIT- III**

Descriptive Statistics in SPSS- More on different types of data -mean, standard deviation, variance, range, frequencies, Manipulating Data in SPSS, Recoding and Transforming Variables ,Graphs and Charts , Scatter plots , Histograms ,Box Plots and Other Charts , Cross-tabulations ,Printing and Saving Output

**UNIT – IV**

Probabilities and Sampling, Binomial and Normal Random Variables, Z-scores ,Using the Normal Table, Other distributions ,Methods of Sampling ,Systematic Sampling, Random Sampling ,Sampling Error.

**UNIT – V**

Statistical tests - Means - The Chi-Square Test - Cross-tabulation- T-test - Analysis of Variance - one-way ANOVA, Repeated measures ANOVA - Non parametric tests - Normality tests- Correlation and regression - Linear correlation and regression - Cronbach's Alpha - Multiple regression (linear)- Multivariate analysis - Factor analysis - Cluster analysis.

**TEXT BOOKS:**

1. Field A., Discovering Statistics Using SPSS, Fourth Edition, SAGE, 2013
2. SPSS: Stats Practically Short and Simple, first edition, Sidney Tyrrell,2009
3. Sabine Landau And Brian S. Everitt., A Handbook of Statistical Analyses using SPSS, Chapman & Hall/CRC Press LLC, 2004.

**REFERENCE BOOKS:**

1. Statistical Data Analysis (Oxford Science Publications) by Glen Cowan
2. Applied Statistical Analysis By IBM ICE Publication

**SEMESTER IV**

**PAPER - 10**

**DATA WAREHOUSING AND DATA MINING**

**UNIT – I**

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

**UNIT -II**

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

**UNIT – III**

**O**verview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

**UNIT– IV**

 Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisions, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases

**UNIT – V**

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K- nearest neighbor classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis

**REFERENCE BOOKS:**

1. M.H.Dunham,”Data Mining:Introductory and Advanced Topics” Pearson Education,2013

2. Jiawei Han, Micheline Kamber, ”Data Mining Concepts & Techniques” Elsevier,2013.

3. Sam Anahory, Dennis Murray, “Data Warehousing in the Real World:A Practical Guide for Building Decision Support Systems, 1/e“, Pearson Education. 2009.

4. Mallach,”Data Warehousing System”, McGraw –Hill, 2008.

**PAPER - 11**

**NETWORK SECURITY**

**Objectives:**

The goal of the course is to provide students with a foundation allowing them to identify, analyze, and perhaps solve network-related security problems in computer systems. The course covers fundamentals of number theory, authentication, and encryption technologies, as well as the practical problems that have to be solved in order to make those technologies workable in a networked environment, in particular in the wide-area Internet environment.

**UNIT-I**

Introduction: Attacks - Services - Mechanisms - Conventional Encryption - Classical and Modern Techniques - Encryption Algorithms - Confidentiality.

**UNIT-II**

Public Key Encryption: RSA - Elliptic Curve Cryptography - Number Theory Concepts.

**UNIT-III**

Message Authentication: Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

**UNIT-IV**

Network Security Practice: Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

**UNIT-V**

System Security: Intruders - Viruses - Worms - Firewalls Design Principles - Trusted Systems.

**Text Books:**

William Stallings, Cryptography and Network Security: Principles & Practice, Prentice Hall, 3rd Edition, 2002.

**References Books:**

Kahate - Crytography and Networks Security - 1st Edition 2005, TMH, New Delhi.

Bruce, Schneier, Applied Cryptography, 2nd Edition, Wiley & Sons, 1996.

Man Young Rhee, Internet Security, Wiley, 2003.

Pfleeger and Pfleeger, Security in Computing, Pearson Education, 3rd Edition, 2003.

**CORE ELECTIVE**

**PAPER - 4**

**(to choose one out of 3)**

**A. OPEN SOURCE SOFTWARE**

**UNIT I : INTRODUCTION**

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux. .

**UNIT II :OPEN SOURCE DATABASE**

MySQL: Introduction – Setting up account – Starting, terminating and writing your ownSQL programs – Record selection Technology – Working with strings – Date and Time– Sorting Query Results – Generating Summary – Working with metadata – Usingsequences – MySQL and Web.

**UNIT III OPEN SOURCE PROGRAMMING LANGUAGES**

PHP: Introduction – Programming in web environment – variables – constants – data;types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates.

**UNIT IV PYTHON**

Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.

**UNIT V PERL**

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files –Data Manipulation.

**TEXT BOOKS**

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003

2. Steve Suchring, “MySQL Bible”, John Wiley, 2002

**REFERENCE BOOKS:**

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002

2. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001

3. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

4. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

5. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.

**CORE ELECTIVE**

**PAPER - 4**

1. **MACHINE LEARNING TECHNIQUES**

**UNIT I: INTRODUCTION, CONCEPT LEARNING AND DECISION TREES**

Learning Problems – Designing Learning systems, Perspectives and Issues – Concept Learning Version Spaces and Candidate Elimination Algorithm – Inductive bias – Decision Tree learning– Representation – Algorithm – Heuristic Space Search.

**UNIT II :NETWORKS AND GENETIC ALGORITHMS**

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and
Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis
Space Search – Genetic Programming – Models of Evolution and Learning.

**UNIT III: BAYESIAN AND COMPUTATIONAL LEARNING**

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description
Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier
– Bayesian Belief Network – EM Algorithm – Probably Learning – Sample Complexity for
Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

**UNIT IV:INSTANT BASED LEARNING AND LEARNING SET OF RULES**

K- Nearest Neighbor Learning – Locally Weighted Regression – Radial Basis Functions –
Case-Based Reasoning – Sequential Covering Algorithms – Learning Rule Sets – Learning
First Order Rules – Learning Sets of First Order Rules – Induction as Inverted Deduction –
Inverting Resolution

**UNIT V: ANALYTICAL LEARNING AND REINFORCED LEARNING**

Perfect Domain Theories – Explanation Based Learning – Inductive-Analytical Approaches FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference
Learning.

**TEXT BOOK**

1.Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (INDIAN EDITION), 2013

**REFERENCE BOOKS**

1.Ethem Alpaydin, “Introduction to Machine Learning”, 2nd Ed., PHI Learning Pvt. Ltd., 2013.

2.T. Hastie, R. Tibshirani, J. H. Friedman, “The Elements of Statistical Learning”, Springer;
1st edition, 2001.

**CORE ELECTIVE**

**PAPER - 4**

1. **COMPONENT TECHNOLOGY**

**Objectives:**

Aim of this course is to provide the concepts of distributed objects and computing methodologies and CORBA

**UNIT-I**

INTRODUCTION : Objects – distributed objects – Historical perspective on Distributed objects and computing methodologies.

**UNIT-II**

CORBA : Architecture – Interface Definition Language – Static and dynamic method invocation- Interface Repository – Basic Object adapter – Services.

**UNIT-III**

DEVELOPMENT OF A CORBA APPLICATION : Client applet – Server – IDL contract – Database interface.

**UNIT-IV**

DCOM : Model and services – Objects and Object hierarchies – Location transparency – Configuration information – interface definition language (MIDL) – Applications.

**UNIT-V**

CURRENT ISSUES : Internet Inter Orb Protocol – CORBA – DCOM interoperability issues – CORBA facilities – CORBA domains – CORBA migration process – Other distributed object paradigms.

**Text Books:**

Mowbray, T.J. and Ruh, W.A., “Inside CORBA”, Addition Wesley, 1997.

**References Books:**

Orfali, R. and Harkey, D. “Client / Server Programming with Java and CORBA”, 2nd Edition, John Wiley and Sons, 1999.

Henning, M. and Vnonki, S. “Advanced CORBA Programming with C++”, Addison Wesley, 1999.

Slama, Garbis and Russel, “Enterprise CORBA”, Addison Wesley, 1999.

Redmond, F.E., “DCOM: Microsoft Distributed Component Object Model”, IDG Books Worldwide Inc., 1997.

Sessions, R., “COM and DCOM”, John Wiley and Sons, 1998.

Thai, T.I. “Learning DCOM”, O’Reilly, 1999.

**OPEN ELECTIVE**

**PAPER - 4**

**DATA CONVERSION AND XML**

**UNIT I: DATA CONVERSION**

Conversion of Text to PDF and Conversion of PDF to Word, Data Conversion from Word to HTML format, Data Conversion from Text to HTML, math keying, pre-editing workflow

**UNIT II : XML**

Introduction to XML - Origins and description of the XML, Differences between XML and HTML, Differences between XML and SGML, Uses of XML, XML Document structure, DTDs, Schemas, validation, character sets and encoding, Namespaces, comments, Processing instruction, CDTA sections, XML Tools

**UNIT III : DOCUMENT**

Document Type Definitions- Document type declaration, Notations, Entities, XML content models, Element structure, attribute structure, Building document structure.

**UNIT IV: CSS**

Cascading Style Sheets in browsers and components, The display: block property Fonts, Text Alignment, Borders, Backgrounds, XSL Transformation, Xpath- nodes, syntax, axes and operators

**UNIT V: SCHEMA**

 Basic schema concepts, advanced schema concepts, schema for structures, schema for Data types. DOM-Levels of DOM, XML Tree structure, DOM core, Using DOM interfaces, DOM views, DOM style interfaces, DOM traversal and ranges

**BOOKS RECOMMENDED**

1. Ed.Tittel, “Schaum’s Outline of Theory and Problems of XML”, Tata McGraw-Hill Edition, 2004.
2. Frank. P. Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.
3. Aaron Skonnard, Martin Gudgin, “Essential XML Quick Reference”, Addison-Wesley, 2003

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