

Faculty of Engineering & Technology
Proposed Curriculum structure of Second Year M.C.A 2016-17

Title of the subject: Core Java
Course Code: MCA21

Teaching Scheme:
Lectures: 3 hrs/week
Tutorial: 1 Hr/Week
Credits: 4

Examination Scheme:
Theory Paper: 80 marks [3 hrs]
Class Test: 20 Marks

Course Objectives:

- To enable the students to understand the core principles of the Java Language
- To use visual tools to produce well designed, effective applications and applets

Course Outcome:

At the end of the course student will be able to:

- Analyze basics of Java and also implements object oriented concepts
- Implement well designed applications in AWT, Swing and Applet using event handling

Prerequisites:

Knowledge of Object Oriented Programming (C++)

Unit 1:

[10Hrs.]

Basics of Java: History, Basics of java and version details, Java's importance to the internet, Java's Magic: The Byte Code, Java Buzzwords, Installation of JDK, Basic application CLASSPATH and PATH SETTING, Command Line Argument, Accessing input through keyboard, Basic syntax of Java - Identifiers, Keywords & Data Types, Strings and Characters, Arithmetic Operators and Expressions, Type Conversion in Assignments, Comments, Conditional statements, Looping and branching, Arrays.

Classes in Java: Introduction of a class, Instance variable, class variable, and local variable, static members, Array of objects, Using objects as Parameters, returning objects, Constructors & its type ,This Keyword, Overloading Methods, Overloading Constructors.

Inheritance: Inheritance basic, implicit inheritance, IS-A, HAS-A, USES-A relationship, Object class in depth, super keyword, Super constructor, Method Overriding, final variable, final method, Final class, abstract method, abstract class, Interface, interface with a multiple inheritance

Packages: Packages, User defined package, built in package, Importing Packages and Interfaces.

Unit 2:

[10 Hrs.]

Exception handling: Exception introduction, Types of Exception:(CheckedException, Unchecked Exception, Error), Keywords: try, catch, throw, throws, finally, Inbuilt Exceptions: ArrayIndexOutOfBoundsException, ClassNotFoundException,SQLException, InterruptedException, ArithmeticException, InputMismatchExceptionetc, User defined Exception.

Wrapper classes:Introduction Wrapper classes: Conversion technique (Primitive Conversion, referential conversion) Auto Boxing, Autounboxing, Types of a Wrapper classes: String, StringBuffer, StringBuilder, StringTokenizer.

Collection &Map: Introduction of Collection, Types of a Collection, List (Array List, Stack, Linked List, Vector), Set (HashSet, LinkedHashMap, TreeSet), Queue.

Map: Introduction of Map, Types of Map: Hash Map, LinkedHashMap, TreeMap

Unit 3: [10 Hrs.]

Multithreading: Java Thread Model, The Main thread, Creating a Thread, Creating Multiple Threads, Using Alive() and Join(), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming and Stopping Threads.

JDBC: Basics of Database Connectivity, Introduction to JDBC, JDBC Architecture, Steps to create JDBC Application, insert, update, delete and select operations,

I/O Package: Files & Directories, Introduction of stream, Byte Streams, Character Streams, FileOutputStream, FileInputStream, FileWriter, FileReader, Writer, Reader, FilenameFilter, Serializable, Deserializable.

Unit 4: [10 Hrs.]

Graphics Programming:

Applets: An Overview of Applets, the Life Cycle of an Applet, creating Applets, the Graphics Class, Using

Colors, Displaying Text, Using Applets in a Web Page

Abstract Window Toolkit (AWT): Introducing the AWT: Working with Windows, Graphics, and Text. Using AWT Controls, Layout Managers, and Menus.

Event Handling: The Delegation Event Model, Event handling classes and Interfaces.

Swing: Introduction to swing, swing features, Swing basic containers, Extending GUI Features Using Swing Components: Labels, Buttons, Canvases, Text Fields, Text Areas, Lists, Check Boxes, Radio Buttons, Panels, Windows, Frames, JApplet class, Menus and Menu bars

Text Books:

1. Herbert Schildt: "The Complete Reference Java2", 5th Edition TMH Publications.
2. Cay S Horstmann, Fary Cornell Core Java Vol I: Sun Microsystems Press
3. Deitel&Deitel: "How To Program JAVA", Pearson Education

Reference Books:

1. E Balguruswamy: "Programming with Java- A Primer", TMH
2. Yashavant Kanetkar "Let Us Java" BPB Publications
3. Ramesh Manza "Understanding Programming in Core Java" ChinmayPrakashan,
4. Steven Holzner, JAVA 2 Programming Black Book, Wiley India.
5. core java for beginners by Sharnam and VaishaliShaha

Digital Reference:

1. <http://docs.oracle.com/javase/tutorial/>
2. [javavids –YouTube](#)
3. www.nptelvides.com/java/java_video_lectures_tutorials.php
4. www.spoken-tutorial.org (NMEICT IIT Bombay Java videos)

Title of the subject: Relational Database Management System
Course Code: MCA22

Teaching Scheme:
Lectures: 4 hrs/week
Credits: 4

Examination Scheme:
Theory Paper: 80 marks [3 hrs]
Class Test: 20 Marks

Objectives:

- Learn concepts related to RDBMS, Normalization, Concepts of transaction processing- concurrency control techniques and recovery procedure
- Get acquainted with advanced database system issues related to physical database design.
- Create strong foundation for understanding of latest issues in Database technology.

Unit 1

[10 Hrs]

Relational Models and Normalization:

Overview of RDBMS, Relational Model concepts, Relational Model concepts and Relational database Schemas, Relational Algebra and relational calculus, Update Operation and Dealing with Constraint Violations. Anomalies in databases, Functional dependencies – determinant, partial, full, transitive, Various normal forms and normalization process, 1NF, 2NF, 3NF, BCNF, Lossy and lossless joins, Multi-valued dependency, 4NF, 5NF

Unit 2

[10 Hrs]

Data Storage and Query Processing:

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files – Different types of Indexes- B-Tree - B+Tree – Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join operation. Query Optimization.

Unit 3

[10 Hrs]

Transaction Processing:

Transaction and states, acid properties, Schedules, types of schedules, view and conflict serializability issues, conflict serializability testing mechanism, Deadlocks and resolving deadlocks. Concurrency control: Needs, Use of locks, lock protocols – s, x, binary, 2pl, graph based, Granularity, Concurrency control by timestamps, Concurrency control by validation. Concurrency control by optimistic scheduling, multiversion schemes. Recovery Concepts, Recovery Techniques based on Deferred Update; Recovery Techniques based on Immediate Update; Shadow Paging; The ARIES Recovery Algorithms; Recovery in Multidatabase Systems; Database Backup and Recovery from Catastrophic Failures.

Unit 4

[10 Hrs]

Fundamentals of PL/SQL:

Defining variables and constants, PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, PL/SQL Datatypes: Number Types, Character Types, Boolean Type, Datetime and Interval Types.

Overview of PL/SQL Control Structures: Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IF-THEN- ELSIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP

Cursors: Concept of a cursor, types of cursors: implicit cursors; explicit cursor, Cursor for loops, Cursor variables, parameterized cursors

Function, Procedure and Trigger

Text Books:

1. Elmasri and Navathe: Fundamentals of Data base Systems (5th Ed.).
2. Abraham Silberschatz and Henry Korth, Sudarshan: Database System Concepts, 4th Edition, ISBN: 0-07-120413-X, Tata McGraw-Hill.
3. Database management System, Bipindesai
4. Raghu Ramakrishnan/Johannes Gehrke, "Database Management Systems", Tata Mc Graw Hill.
5. Introduction to database systems C.J.Date
6. Oracle by Ivan N. Bayross
7. Conolly and Begg: Database Systems, 4thEdition, Pearson Education.
8. JoelMurach, "Murach's oracle PL/SQL" Joel Murach's publication Murachs and Assocites
9. Sharnam shah, Vaishali Shah, "Oracle for Professionals"Publication SPD-Shroff Publishers And Distributors 2011
10. RajshekharSundaram, "Oracle 10g Programming: A Premier", Publication Pearson Education 2009

Title of the subject: Advance Computer Networks

Course Code: MCA23

Teaching Scheme:

Lectures: 04 Hrs/Week

Credits : 04

Examination Scheme:

Theory Paper: 80 Marks (3 Hrs)

Objectives:

- To train the students on basic & advance principles of Computer Network.
- To learn the Networking concepts and methodologies.

Outcome:

- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure

Prerequisite: Student must have knowledge of operating systems and basic data communications

Unit I

[10 Hrs]

Network Layer Communication:

IP Addressing & Routing : Internet Protocol, IP packet format, Addressing: Physical Addresses, Logical Addresses, and Port Addresses, IP addresses – Network part and Host Part Network Masks, Network addresses and Broadcast addresses, Address Classes, Loop back address.

Routing: Types of routing protocol, IP routing concepts, Routing Tables, Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), and (IGRP).

IPv6: Introduction, packet format, addressing scheme, security, applications and limitations of IPv6. IPv4 Vs IPv6

Unit 2

[10 Hrs]

Transport layer: Process to process delivery, Elements of transport protocol, User datagram protocol (UDP), Transmission control protocol (TCP), TCP Service, TCP flow control, TCP Congestion control, Stream Control Transmission Protocol (SCTP).

Unit 3

Application layer: Domain Network Services (DNS)

[15 Hrs]

Name space, Domain name space, distribution of name space, DNS in internet, Resolution, DNS message, Types of record register, Dynamic Domain name system (DDNS), DHCP (Dynamic host configuration protocol), DHCP & Scope Resolution, Network Applications (HTTP, Email, etc) Hyper Text Transfer Protocol (HTTP) HTTP communications - HTTP request, Request Headers, Responses, Status Code, Error Status Code, Email- Sending & Receiving, Email Addressing, Message Structure MIME–Multipurpose Internet Mail Extensions, SMTP–Simple Mail Transfer Protocol with examples, Mail Exchangers – Delivering a message, Mail Boxes, POP – Post Office Protocol IMAP – Internet Message Access Protocol FTP – File Transfer Protocol Telnet – Remote Communication Protocol.

Unit 4

[5 Hrs]

Network Security:

Threat: Active attack, Passive Attack, Cryptography: Symmetric and Asymmetric key cryptography, Security services, Digital signature, IPSec, SSL, VPN, Firewall: Packet filter, application gateway, Unicode.

Reference:

- | | |
|---|-------------------------------------|
| 1. Computer Networks | Andrew S. Tanenbaum, Pearson,5th Ed |
| 2. Data Communications and Networking | Behrouz A. Forouzan , TMH,4th Ed. |
| 3. Cryptography and Network Security | AtulKahate , TMH, 2nd Ed. |
| 4. Network Essential Notes | GSW MCSE Study Notes |
| 5. Internetworking Technology Handbook | CISCO System |
| 6. Computer Networks and Internets with Internet Applications | Douglas E. Comer |
| 7. Cryptography and Network Security | William Stalling |

Title of the subject: Principles of Programming Languages

Subject Code- MCA24

Teaching Scheme:

Lectures: 3 hrs/week

Tutorial: 1 Hr/Week

Credits: 4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Course objectives:

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages

Course Outcomes:

Upon Completion of the course, the students will be able to

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object - oriented, concurrency, and event handling programming constructs

Unit 1:

[10 Hrs]

Syntax and Semantics:

Introduction: Evolution of programming languages, Roles and needs of Programming Language, Characteristics of Programming language, Types of Programming Language,

Data, Data Types, and Basic Statements:

Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions , assignment statements , mixed mode assignments, control structures - selection, iterations, branching, guarded Statements

Unit 2

[10 Hrs]

Compiler Construction and Designing Fundamentals:

Describing syntax, Regular Language, Regular Expression, context free grammars, conversions of RE to CFG, RE to NFA, NFA to DFA , Optimizing NFA and DFA, grammars and its types, describing semantics, lexical analysis, parsing and its all types.

Unit 3

[10 Hrs]

Subprograms

Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

Unit 4

[10 Hrs]

Object-Orientation, Concurrency, and Event Handling:

Object - orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling.

Text Books:

1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

References:

1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003

Title of the Subject: Soft Computing
Course Code: MCA 25

Teaching Scheme:
Lectures: 3 hrs/week
Tutorial: 1 Hr/Week
Credits: 4

Examination Scheme:
Theory Paper: 80 marks [3 hrs]
Class Test: 20 Marks

Course objectives:

- To understand fundamental concepts of soft computing.
- To make them understand Artificial Neural Network, Fuzzy Logic, Classical Sets and Fuzzy Sets.
- To understand Genetic Algorithm, Applications of Soft Computing

Unit 1: **[10 Hrs]**

Introduction to Soft Computing: Evolution of Computing, Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

Artificial Neural Network: Introduction, Fundamental Concept, Artificial Neural Network, Biological Neural Network, Comparison between Biological Neuron and Artificial Neuron, Evolution of Neural Networks, Basic Models of Artificial Neural Network

Unit 2 **[10 Hrs]**

Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network, back propagation learning methods, effect of learning rule coefficient; back propagation algorithm, factor affecting back propagation training, Associative Memory Networks, Unsupervised Learning Networks, Special Networks

Unit 3 **[10 Hrs]**

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets, fuzzy reasoning; fuzzy inference systems; fuzzy control; fuzzy clustering;
Membership Functions: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments, Neuro-fuzzy systems: neuro-fuzzy modeling; neuro-fuzzy control.

Unit 4 **[10 Hrs]**

Applications of Soft Computing: Introduction, A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Radar) Image for Flood Area- Image Fusion, Neural Network Classification, Methodology and Results, Optimization of Traveling Salesman Problem using Genetic Algorithm Approach Applications: Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

Text Books:

1. Dr. S. N. Sivanandam and Dr. S. N. Deepa, "Principles of Soft Computing" John Wiley
2. S. Rajsekaran & G.A. VijayalakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.
3. N.P. Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.
4. Siman Haykin, "Neural Networks" Prentice Hall of India
5. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
6. Kumar Satish, "Neural Networks" Tata McGraw Hill

References:

1. D. E. Goldberg: Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley.
2. Z. Michalewicz: Genetic Algorithms + Data Structures = Evolution Programs, Springer-Verlag.
3. N.K. Sinha & M. M. Gupta (Eds): Soft Computing & Intelligent Systems: Theory & Applications, Academic Press.
4. M.T. Hagan, H. B. Demuth, And M. Beale: Neural Network Design, Thompson Learning.
5. C. Lau (Ed): Neural Networks, IEEE Press.

Title of the Subject: Web Engineering

Course Code: MCA 26

Teaching Scheme:

Lectures: 2 Lectures/Week

Credits: 2

Examination Scheme:

Theory Paper: 50 Marks

Course Objectives:

- To understand the concepts, principles, strategies, and methodologies of Web application and development.
- To apply current Web technologies to understand current Webbusiness models, to understand and apply Web development processes.

Unit I: An Introduction to Web Engineering

[3 Hrs]

Motivation, Categories of Web Applications, Characteristics of Web Applications, Product-related Characteristics, Usage related Characteristics, Development-related Characteristic, Evolution of web engineering

Unit II: Technologies for Web Applications

[6Hrs]

Client-side Technologies, ActiveX Controls, Document-specific Technologies, HTML Hypertext Markup Language, DHTML, SMIL Synchronized Multimedia Integration Language, XML-eXtensible Markup Language, XSL-eXtensible Stylesheet Language, Java Script, Server-side Technologies, Servlet, URI Handlers, Web Service, Middleware Technologies

Unit III: Web Application Architectures

[5 Hrs]

Introduction, Fundamentals, What is an Architecture? Developing Architectures Categorizing Architectures, Specifics of Web Application Architectures, Components of a Generic Web Application Architecture, Layered Architectures, 2-Layer Architectures, N- Layer Architectures Data-aspect Architectures, Database-centric Architectures, Architectures for Multimedia Data

Unit IV: Modeling Web Applications

[6 Hrs]

Introduction, Fundamental, Modeling Specifics in Web Engineering, Levels, Aspects, Phases Customization, Modeling Requirements, Hypertext Structure Modeling Concepts, Access Modeling Concepts, Relation to Content Modeling, Presentation Modeling, Customization Modeling, Relation to Content, Hypertext, and Presentation Modeling

TEXT BOOKS

1. GertiKappel, Birgit Proll, "Web Engineering", John Wiley and Sons Ltd, 2006
2. Roger S.Pressman, David Lowe, "Web Engineering", Tata McGraw Hill Publication,2007
3. Guy W. Lecky-Thompson, "Web Programming", Cengage Learning, 2008

REFERENCES

1. Moller, "An Introduction to XML and Web Technologies", Pearson Education NewDelhi, 2009
2. Chris Bates, "Web Programming: Building Internet Applications", Third Edition, WileyIndia Edition, 2007
3. John Paul Mueller, "Web Development with Microsoft Visual Studio 2005", Wiley Dreamtech, 2006.

Title of the subject: Statistical Methods

Course Code: MCA27

Teaching Scheme:

Lectures: 2 hrs/week

Credits : 2

Examination Scheme:

Theory Paper: 50 marks [2 hrs]

Course Objective:

- Develop the ability to handle varied datasets and draw statistical inferences for the same.
- Develop the ability to apply various statistical measures, tools and techniques for analyzing and interpreting data.

Course Outcome:

Student will be able to –

- Demonstrate the basic statistical activities of data collection, presentation and classification.
- Analyze and interpret statistical data through various methods.

Unit 1:

[5 Hrs]

Introduction: Definition of statistics, Importance and scope of statistics, Limitations of statistics, Distrust of statistics, Statistical data collection.

Presentation of statistical data: classification, tabulation, frequency distribution, diagrams and graphs.

Unit 2:

[6 Hrs]

Frequency distributions and Measure of Central Tendency – Frequency distribution, continuous Frequency distribution, Graphic Representation of a Frequency Distribution average or measures of central tendency or measures of Locations.

Requisites for an ideal measure of central tendency – Arithmetic: Mean, Median, mode, geometric Mean and harmonic mean, weighted average, relationship amongst different averages.

Unit 3:

[5 Hrs]

Measures of dispersion, skewness and kurtosis :Meaning and significance of dispersion, Methods of measuring Dispersion – Range, quartile, mean deviation, standard deviation, coefficient of skewness, kurtosis, coefficient of dispersion, coefficient of variation.

Unit 4:

[4 Hrs]

Correlation: definition of correlation, scatter diagram, karlpearson Coefficient of correlation, limits for correlation coefficient

Text Books/Reference Books:

1. Statistical Methods : S.P. Gupta
2. Fundamentals of Statistics : Goon, Gupta, Dasgupta
3. Statistical Methods (An Introductory Text) : J. Medhi
4. Modern Elementary Statistics : J.E. Freund

Digital Reference:

- 1 <http://videlectures.net>

Title of the subject: Lab V Core Java
Course Code: MCA28

Teaching Scheme:
Practical: 2hrs/week
Credit: 1

Examination Scheme:
Practical Exam: 50 marks

Suggested list of Practical

- 1) a) Program on creation of classes & functions.
b) Program using constructor/function overloading
c) Program on passing object as a parameter to function
- 2) a) Program using interface and inheritance covering domain like educational institute/bank etc
b) Program to perform operations on Array & String.
- 3) Program using packages to demonstrate scope of access specifiers.
- 4) a) Program on Exception handling covering (try, catch, throw, throws, finally)
b) Program to create your own exception class.
- 5) Program to demonstrate collection
- 6) a) Program to create multiple threads doing different tasks.
b) Program to demonstrate thread priorities.
- 7) Program to perform database operations (select/insert/update/delete)
- 8) Program using IO streams
- 9) Program to demonstrate Applet & Swing.
- 10) a) Program to perform addition, subtraction, multiplication, division using AWT controls.
b) Program to perform event handling (awt/applet)

Design, develop and implement the above programs using Java language in LINUX/Windows environment.

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva – voce based on the syllabus

Title of the subject: Lab III Relational Database Management System
Course Code: MCA29

Teaching Scheme:
Practical: 2 Hrs/week
Credit: 1

Examination Scheme:
Practical: 50 Marks

Objectives:

- To teach database handling(creation , manipulation)
- To teach queries on the databases(single, multiple)
- To teach PL/SQL programming

Outcomes:

- Students should be able to create and handle databases
- Students should be able to write and execute queries on the databases
- Students should be able to write and execute PL/SQL programming

Suggestive list of Experiments:

1. Create minimum set of six tables using following constraints:
a) Primary key b) Foreign key c) Not Null d) Check e) Unique f) On delete/update cascade g) Default
Use Alter, drop and truncate command on above created table.
 2. Insert minimum ten records in each of the above created tables and comment on the Constraints specified. Use delete, update and select commands on created records.
 3. Execute SQL queries using Aggregate functions on above tables
a) count b) sum c) min d) max e) avg
Use group by and having clause.
 4. SQL Queries based on joins (on above created tables):
a) Natural Join b) Left Outer Join c) Right Outer Join d) Full Outer Join
 5. SQL Queries based on Nested Queries, Views and Indexing:
a. Insert large number of records in the above created schema. Then record the time taken by the Query to insert the data.
b. Find the Query plan for any two queries which have where clause.
c. Now create index on un-indexed attribute.
 6. Assignment based on concurrency control.
 7. Write a PL/SQL program on Variables, Identifiers and Comment.
 8. Write a PL/SQL program on PL/SQL Block Structure (If, IF-THEN-ELSE, Basic Loop, WHILE Loop, FOR Loop)
 9. Write a PL/SQL program on DML Operations Using PL/SQL (Insert, Update, Delete, and Merge) and Cursor.
 10. Write a PL/SQL program on function, Procedure and Trigger.
- Case Study on: Normalization – using any database perform various normal forms

Suggested Database: PostgreSQL

Title of the Subject: Lab-III - ASP.NET

Course Code: MCA30

Teaching Scheme:

Practical: 2 Hrs/ week

Credit: 1

Examination Scheme:

Practical Exam: 50 Marks

Term Work: 50 Marks

Objectives:

To enable the students to design and develop effective dynamic web applications using ASP.NET and supportive Technologies.

Unit 1

Introduction to C#.NET and MVC:

Introduction to .NET framework, Features of .NET, Object Oriented Features, Working with Components / Assemblies, Namespaces, Console applications, Configuring AJAX Control Tool Kit, Introduction to MVC

Unit 2

Introduction to ASP.NET Web Controls and AJAX Controls:

Internet terminology, Web Server, Browser, Server Side Scripting, Webforms in ASP.NET, Page life cycle, IsPostBack property, Text Box, Label, Button, Link Button, Hyperlink Button, Image Button, List Box, Drop DownList, CheckBox, Radio Button, CheckBoxList, RadioButtonList, Panel, UpdatePanel, ModalPopUp, MaskedEdit, Calender

Unit 3

Client Side Validations and Server Side Validation Controls:

Writing JQuery for Client Side Validation, RequiredFieldValidator, RangeValidator, CompareValidator, RegularExpressionValidator, CustomValidator and ValidationSummary

Unit 4

ADO.NET:

Creating Database, Tables, Stored Procedures in SQL Server, Overview of ADO.NET, Advantages of ADO.NET, Connected and disconnected data access, Connection, Command, DataReader, DataAdapter, DataSet, Data Tables, GridView Control, DataList Control and Repeater Control

Unit 5

State Management Techniques, Web Services & Reporting:

Server Side and Client Side State Management techniques-Cookies, QueryString, View State, Hidden, Session and Application Introduction to web services, Creating ASP.NET Web Application using MVC Design pattern, Crystal Reports

Reference Books:

1. ASP.NET: Stephen Walther - Unleashed.
2. ASP. NET: The Complete Reference: TATA Mc GRAW HILL
3. ASP. Net 2.0 Black Book, Dream Tech, Kogent
4. Microsoft SQL Server 2005: The Complete Reference By – Jeffrey Shapiro, Tata McGraw Hills Publication
5. Microsoft SQL Server: Black Book Microsoft SQL Server Black Book (Publisher: The Coriolis Group) Author(s): Patrick Dalton ISBN: 1576101495

Website References:

1. <http://msdn.microsoft.com/en-us/library/>
2. <http://www.tutorialspoint.com/asp.net/>

Term Work:

The term work shall consist of at least 10 experiments based on the syllabus above and a miniproject.

Assessment of term work should be done which will consider the points below and the marks should be awarded accordingly.

- Continuous lab assessment
- Actually performing practical's in the laboratory during the semester
- Mini project developed by the student (Compulsory using MVC Design Pattern)

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record and the mini project. Duration of examination is three hours.

Mini Project (Compulsory):

Guidelines for Mini Project:

1. Allow Only 1 student per mini project
2. Take the topic from student in first 15 days from the start of the semester.
3. Follow Software Development Life Cycle Phase for mini project development.
4. Maintain student-Internal Guide meeting documentations.

Mini Project shall follow the steps below:

1. Define the problem with specifications
2. Define the functionality of the project
3. Design a solution for the project
4. Implement the solution.

(Also keep a record of total number of man hours spent for the mini project.)

5. Present and evaluate the project.

The report of this Mini project is to be submitted in typed form with Spiral Binding. The report should have all the necessary diagrams, charts, printouts and source code.

The suggestive format of the report is as follows:

Title of the Mini Project:

Name & Roll Number of the student:

Name of the guide:

Chapter 1: Introduction

Chapter 2: Requirement specifications

Chapter 3: Design and implementation

(This chapter will include the entire design process with necessary UML diagrams)

Chapter 4: Performance Analysis

(This chapter will include Testing and evaluation process.)

Chapter 5: Conclusions

(This should include conclusion & future scope)

Title of the subject: Computer Network II
Course Code: MCA31

Teaching Scheme:
Practical: 02 Hrs/Week
Credit: 1

Examination Scheme:
Term work: 50 Marks

List of suggested experiments:

- 1) Basic Network commands like : ipconfig, hostname, ping, tracert, netstat
- 2) Windows 2003 server installation and basic configuration
- 3) DHCP server configuration
- 4) DNS & FTP server configuration
- 5) Basic Routing configuration
- 6) Configure RIP2, OSPF
- 7) Configure EIGRP, Access list / NAT technology
- 8) Implementation of Unicast Routing Algorithm
- 9) Implementation of Multicast Routing Algorithm
- 10) Implementation of Broadcast Routing Algorithm

Note:

Design any enterprise network by using Cisco Packet Tracer Simulation (Available on net for free download) or any other standard simulation tools.

Term work:

Term work shall consist of minimum of 10 program / Assignments to be developed base on the above syllabus. The Assessment on the term work shall be done on the following criteria.

- 1) Continue assessment
- 2) Performing the Experiment in the lab
- 3) Oral examination on the syllabus and the term work, mention above

Title of the subject: Advance Java
Course Code: MCA32

Teaching Scheme:
Lectures: 3 hrs/week
Tutorial: 1 Hr/Week
Credits: 4

Examination Scheme:
Theory Paper: 80 marks [3 hrs]
Class Test: 20 Marks

Objectives:

To enable the students to understand the advance principles of Java programming language as well as J2EE Specifications to produce well designed, effective web applications using JSP and supportive technologies.

Unit 1

[10 Hrs]

Introduction to Advance Concepts:

Object Oriented Terminologies, Exception handling, Object Serialization Basics, Serializable Keyword, Remote Method Invocations

Java Database Connectivity and Collections:

JDBC Introduction, Types of drivers, Basic Steps of JDBC, Creating and Executing SQL statement, The Result Set Object, Working with Databases. Collection framework, Collection interfaces and classes

Unit 2

[10 Hrs]

Servlets: Introduction, Life cycle of Servlet, Handling GET and POST requests, Servlet handling from data, Cookies and Session Tracking.

Java Server Pages: Basics and Overview, JSP architecture, JSP tags and JSP expressions, Life cycle of a JSP Model View Controller (MVC), JSP Objects, JSP Beans Tags, Working with Databases.

Unit 3

[10 Hrs]

Struts Framework:

Introduction to Struts, MVC Design Pattern, Struts Architecture, Introduction to the Struts Action and Subclasses, Using Struts HTML Tags, Introduction to Struts Validation Framework, Custom Validators Example, Developing Application with Struts

Unit 4

[10 Hrs]

EJB: Types of Enterprise Java beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Session Bean, Features of Entity Bean, Life-cycle of Entity Bean.

Hibernate: Introduction to Hibernate 3.0, Hibernate Architecture, and Hibernate Applications

Text Books/ Reference Books:

1. Core Java Vol I and Vol II: Sun Microsystems Press
2. The Java Programming Language 3rd Edn. Arnold Ken, D.Holmers, J. Gosling, P. Goteti
3. The Complete Reference Java 7th Edn. Herbert Schildt
4. Advanced Java Programming (OB74) (IBM Learning Services Worldwide Certified Material)
5. J2EE the Complete Reference, First Edition by Jim Keogh, 2002 Tata McGraw Hill
6. Java Servlet Programming, Second Edition by Jason Hunter, William Crawford, O'Reilly

Digital References:

1. www.java.sun.com/docs/books/tutorial
2. <http://www.tutorialspoint.com/jsp/>
3. <http://struts.apache.org/>

Title of the Subject: Data warehouse and Data Mining Techniques.

Course Code: MCA33

Teaching Scheme:

Lectures: 4 hrs/week

Credits: 4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Pre-requisites: Knowledge of RDBMS and OLTP

Objectives:

- To understand the need of Data Warehouses over Databases, and the difference between usage of operational and historical data repositories.
- To be able to differentiate between RDBMS schemas & Data Warehouse Schemas.
- To understand the concept of Analytical Processing (OLAP) and its similarities & differences with respect to Transaction Processing (OLTP).
- To conceptualize the architecture of a Data Warehouse and the need for pre-processing.
- To understand the need for Data Mining and advantages to the business world.
- To get a clear idea of various classes of Data Mining techniques, their need, scenarios (situations) and scope of their applicability.
- To learn the algorithms used for various types of Data Mining problems.

Unit 1

Introduction to Data Warehousing and Components:

[10 Hrs]

Introduction to Decision Support System: DSS Defined, DSS Characteristics, Need for data warehousing, Operational & informational data, Data Warehouse definition and characteristics, Operational Data Stores. Architectural components, Data Preprocessing: Need of Preprocessing Data, Data Cleaning Techniques, Data Integration and Transformation, Data Reduction Techniques, Discretization.

Unit 2

OLAP in the Data Warehouse:

[10 Hrs]

A Multidimensional Data Model, Schemas for Multidimensional Databases: Stars, Snowflakes, Star join and Fact Constellations Measures, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model, Need for OLAP, OLAP tools , Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

Unit 3

Data Mining Algorithms:

[10 Hrs]

Concept Description: Concept Description, Data Generalization and Summarization-Based Characterization, Mining Descriptive Statistical Measures in Large Databases. Mining Association Rules: Association Rule Mining, Market Basket Analysis, Association Rule classification, The Apriori Algorithm, Mining Multilevel Association Rules, Constraint-Based Association Mining, Sequential mining.

Classification and Prediction: Classification and Prediction Data Classification Process, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification.

Unit 4 Classification, Knowledge Discovery:

[10 Hrs]

Classification Based on Association Rule Mining, Other Classification Methods Cluster Analysis: Cluster Analysis, Types of Data in Cluster Analysis, a Categorization of Clustering Methods.

Introduction to **Knowledge Discovery**, innovative techniques for knowledge discovery, application of those techniques to practical tasks in areas such as fraud detection, scientific data analysis, and web mining, Introduction to huge data sets such as Web, telecommunications networks, relational databases, object-oriented databases, and other sources of structured and semi-structured data, Problem of Large Data sets.

Text Books and Reference Books:

1. Paul Punnian, "Data Warehousing Fundamentals", John Wiley Pub
2. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann .
3. Alex Berson, S.J. Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw Hill
4. Margaret Dunham, "Data Mining: Concepts and Techniques", Morgan Kaufmann Pub.
5. Ralph Kimball, "The Data Warehouse Lifecycle toolkit', John Wiley.
6. A B M Shaukat Ali, Saleh A Wasimi, "Data Mining: Methods and Techniques", Cengage Learning Pub.

7. Ian Witten and Eibe Frank, Data Mining, "Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufman, ISBN 1558605525, 1999,

Title of the Subject: Object Oriented Analysis and Design (OOAD)

Course Code: MCA34

Teaching Scheme:

Lectures: 2 Lectures/Week

Total Credits: 2

Examination Scheme:

Theory Paper: 50 Marks

Objectives:

After completing this course students will be able to:

- Analyze requirements and produce an initial design
- Develop the design to the point where it is ready for implementation
- Design components to maximize their reuse
- Learn to use the essential modeling elements in the most recent release of the Unified Modeling Language - UML 2.0

Unit 1

[3 Hrs]

Introduction:

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

Unit 2

[5 Hrs]

Methodology and UML:

Introduction, Survey, Rumbugh, Booch, Jacobson methods, Patterns , Frameworks, Unified approach , Unified modelling language , Static and Dynamic models, UML diagrams, Dynamic modelling, Model organization , Extensibility.

Unit 3

[6 Hrs]

Object Oriented Analysis:

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

Unit 4

[6 Hrs]

Object Oriented Design:

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

Books:

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

Title of the subject: Operation Research

Course Code: MCA35

Teaching Scheme:

Lectures: 4 hrs / week

Credits: 4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Objectives:

To enable the students to understand basics of operation research techniques for optimizing and minimizing various types of problems and choose the best under given circumstances.

Unit 1

[12 Hrs]

Introduction to OR and Linear Programming:

Operation Research – Introduction, Areas of Application. Linear Programming (L.P.): Mathematical Formulation of L.P. problem. Graphical Method and Simplex Method – Concept of slack, surplus & artificial variables. Minimization & Maximization Problems. Special Cases – (i) Alternative optima (ii) Unbounded solutions & (iii) Infeasible solutions to be shown graphically & also by simplex method. Duality in LPP

Unit 2

[8 Hrs]

Transportation Model:

Definition of the transportation model. Balanced / Unbalanced, Minimization / Maximization. Determination of the initial basic feasible solution using (i) North-West Corner Rule (ii) Least Cost Method & (iii) Vogel's Approximation Method for balanced & unbalanced transportation problems. Optimality Test & obtaining of optimal solution using Stepping Stone and MODI method

Unit 3

[8 Hrs]

Assignment and Sequencing Models:

Introduction, Mathematical Formulation of the Problem, Hungarian Method Sequencing problem- Introduction, basic terminology, processing n jobs through two machines and three machines.

Unit 4

[12 Hrs]

Project Scheduling and PERT-CPM:

Introduction to Project Management,. Network Components and Precedence Relationship, Construction of Network – Rules & Precautions Project Management – PERT, Obtaining Critical Path. Time

estimates for activities. Probability of completion of project. Determination of floats (total, free, independent), Basic Difference between PERT and CPM.

Text Books/ Reference Books:

1. Operations Research by Gupta P K, D S. Hira-S.Chand.
2. Operations Research by V.K. Kapoor – Sultan Chand & son
3. Operations Research by S.D.Sharma-KedarnathRamnath& co

Title of the subject: Natural Language Processing

Course Code: MCA36

Teaching Scheme:

Lectures: 4 hrs/week

Credits: 4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Objectives:

- Understand natural language processing and to learn how to apply basic algorithms.
- To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data - corpora.
- To conceive basics of knowledge representation, inference, and relations to the artificial intelligence.

Unit 1

[10 Hrs]

Introduction: Introduction to NLP, Brief History, Applications: Speech to text, story understanding, QA system, Machine Translation, Text summarization, text classification, sentiment analysis, chatterbox, challenges/Open Problems, Natural Language (NL) Characteristics and NL computing techniques, NL tasks: Segmentation, Chunking, tagging, NER, Parsing, Word Sense Disambiguation, NL Generation.

Unit 2

[10 Hrs]

Web 2.0 Applications: Sentiment Analysis, Text Entailment, Cross Lingual Information Retrieval (CLIR).ML basics, algorithms, Naïve Bayes, Bayesian Statistics, HMM, CRF

Unit 3

[10 Hrs]

Word Forms, POS tagging and Chunking: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields, POS tagging techniques, Chunking techniques-CRF.

Unit 4

[10 Hrs]

Structures : Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on NoisyText as in Web documents; dependency parsing; Hybrid of Rule Based and Probabilistic Parsing: MST, MALT parser; Scope Ambiguity and Attachment Ambiguity resolution. Applications of NLP

Text Books:

1. Allen, James, "Natural Language Understanding", Second Edition, Benjamin/Cumming, 1995.
2. Charniack, Eugene, "Statistical Language Learning", MIT Press, 1993.
3. Jurafsky, Dan and Martin, James, "Speech and Language Processing", Second Edition, Prentice Hall, 2008.
4. Manning, Christopher and Heinrich, Schutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
5. Akshar Bharti, Vineet Chaitanya, Rajeev Sangal, "Natural Language Processing: An Paninian perspective"

Title of the Subject: Design and Analysis of Algorithms (DAA)

Course Code: MCA37

Teaching Scheme:

Lectures: 3 Hrs/Week

Tutorial: 1 Hrs/Week

Credits: 4

Examination Scheme:

Theory Paper: 80 Marks (3 Hrs)

Class Test: 20 Marks

Objectives:

- To study different methods to devise an algorithm
- To use computational complexity to analyze algorithms

Unit- 1

[10 Hrs]

Introduction: Introduction and a brief review of Elementary Data Structures, Definition of an Algorithm, Algorithm specification, Performance analysis: -Space and time complexity, Asymptotic Notation, Performance Measurement, hashing.

Unit 2

[10 Hrs]

Divide and Conquer: General method of Divide and Conquer, Binary search, finding the maximum and minimum, merge sort, quick sort, Strassen's Matrix Multiplication.

Unit 3

[10 Hrs]

The Greedy Method: General method, Knapsack Problem, Tree vertex splitting, Job sequencing with deadlines, Minimum cost spanning trees, optimal storage on tape, optimal merge Patterns, Single sources shortest paths. Basic Search and Traversal Techniques - Techniques for graphs-BFS and DFS, connected components and spanning trees - prims and kruskal Algorithms, Biconnected Components and DFS

Unit 4

[10 Hrs]

Dynamic Programming, Backtracking and Branch and Bound Technique: The general method of Dynamic Programming-Matrix chain multiplication, Longest common subsequence, String editing, The general method of backtracking, The 8- queens problem, sum of subsets, Graph coloring, Hamiltonian cycle, Knapsack problem using backtracking, The method of branch and bound, 0/1 knapsack problem, Traveling sales person problem using branch and bound.

Reference

Text Books/Reference Books:

1. E. Horowitz and S. Sahni, "Fundamentals of Computer Algorithms", Galgotia Pub
2. Aho, Hopcroft, Ulman, "The Design and Analysis of Computer Algorithms", Addison Wesley
3. Sachin Dev Goya "Design and Analysis of Algorithm"

Title of the subject: Competency Skills

Subject Code: MCA38

Teaching Scheme:

Lectures: 2 Hrs/Week

Credits: 2

Examination Scheme

Term work: 50 Marks

Objectives:

- To revise various methods to solve logical reasoning type problems.
- Practice problem solving in data interpretation & other areas.

Unit 1

Logical reasoning:

Statements and assumptions, statement and conclusion, Statement and argument and theme detection, making judgments and logical deduction.

Unit 2

Arithmetic aptitude: Problems on : Time and work, time and distance, profit and loss, height and distance, permutations and combination and problems on H. C. F. and L. C. M

Unit 3

Data Interpretation: Table charts, bar charts and pie charts.

Unit4

Verbal ability: Spotting errors, selecting words, ordering of words, completing statements, idioms and phrases, verbal analogy and synonym.

Reference Book:

1. R. S. Agarwal.

Web Links:

1. <https://www.indiabix.com/>
2. <https://www.freeonlinetest.in/>

Title of the subject: Lab I Advance Java Programming (J2EE)

Course Code: MCA39

Teaching Scheme:

Practical: 2 hrs/week

Credits: 1

Examination Scheme:

Practical: 50 Marks

Suggestive List of Experiments

Practical Assignments

No.

1 **JDBC**

Program for simple database connectivity to insert and fetch the data from database

2 **Servlet**

a) Create an HTML file named *insertEmployee.html* and then create a servlet *EmployeeServlet.java* to insert employee information into 'Employee' table.
b) Create an HTML file named *employee.html* and a servlet named *GetServlet1.java*. With the help of *employee.html*, we send the 'ID' of an employee to the *GetServlet1* program. Then, we use it to retrieve his/her information from 'Employee' table and display it on to the browser.

3 **State management:**

a) Create an HTML file *AddCookies.html* which contains four text boxes. When user enters the values in these text boxes and press the submit button, the values will be sent to *AddCookies.java* servlet and get saved in cookies.
b) Create an HTML form *login.html* that accepts the username and password and submits to *login.java* servlet. Verify credentials and on success, set the username in the HTTP Session and show a "Welcome <username>" message. (Use the *requestDispatcher*).

- 4 Program in Servlet to implements database connectivity
5 **JSP**
a) create a form that accepts employee id, employee name and one submit button
b) create a getter setter methods for all the inputs
c) create a jsp page that has 'useBean' action tag and prints the data
6 Program in JSP to implements MVC database connectivity
7 **Struts**
a) create a form that accept username and password
b) if the username and password match then execute "success.jsp" page else execute "error.jsp" page
c) make the necessary changes in struts and web configuration file
8 Program in struts to insert a record into a database
9 Program in struts to select a record from the database
10 Program in Hibernate to insert and select a records

Tools to be used –

Eclipse 3.x, Tomcat 6.x, Ant 1.6.x, Struts 2 or latest version, postgresSQL

Title of the Subject: Lab VII Data Warehousing and Data Mining

Course Code: MCA 40

Teaching Scheme:

Practical: 2 Hrs/Week

Credit: 1

Examination Scheme:

Practical Exam: 50 Marks

Term Work:

The term work shall consist of at least 10 experiments/ assignments based on the syllabus above.

Assessment of term work should be done which will consider the points below and the marks should be awarded accordingly.

* Continuous lab assessment

* Actually performing practical's in the laboratory during the semester

* 10 marks of term work are allocated to case study.

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive List of experiments:

1. Evolution of data management technologies, introduction to data warehousing concepts.
2. Develop an application to implement defining subject areas, design of fact and dimension tables, data marts.

3. Develop an application to implement OLAP, roll-up, drill-down, slice, and dice operations.
4. Develop an application to construct a multidimensional data.
5. Develop an application to implement data generalization and summarization techniques
6. Develop an application to extract association mining rules.
7. Develop an application for classification of data.
8. Develop an application for implementing one of the clustering techniques.
9. Develop an application for implementing Naïve Bayes classifier.
10. Develop an application for Decision tree classifier.

Case Study:

- Map Reduce
 - The Map reduce paradigm
 - Distributed File Systems
 - Hadoop
- Big Data Storage Systems

**Title of the subject: Lab V Design and Analysis of Algorithm
Course Code: MCA 41**

Teaching Scheme:
Practical: 2 hrs/week
Credit: 1

Examination Scheme:
Term work: 50 Marks

Term Work:

The term work shall consist of at least 10 experiments/ assignments based on the syllabus.

Assessment of term work should be done which will consider the points below and the marks should be awarded accordingly.

- * Continuous lab assessment.
- * Practical Performance during the semester.

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive List of experiments:

1. Implement the hashing techniques using linear probing.
2. Implement the hashing technique using quadratic probing.
3. Implement binary search recursive and iterative using divide and conquer (D&C).

4. Implement min-max algorithm using simple and recursive divide and conquer method.
5. Implement quick sort algorithm using divide and conquer method.
6. Implement merging and merge sort algorithm.
7. Implement knapsack using greedy method.
8. Implement job sequencing using greedy approach.
9. Implement string editing.
10. Assignment based on 10 theory questions.

Title of the subject: Lab-IV Mini Project
Course Code: MCA42

Teaching Scheme:
Practical: 2 Hrs/ Week
Credit: 1

Examination Scheme:
Practical: 50 Marks
Term Work: 50 Marks

Introduction and objectives

The Project work constitutes a major component in most professional program. It needs to be carried out with due care, and should be executed with seriousness by the students. The project work is not only a partial fulfillment of the MCA requirements, but also provides a mechanism to demonstrate your skills, abilities and specialization. The project work should compulsorily include the software development.

Objectives

The objectives of the project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

1. Points to remember while preparing the project proposal

Project Proposal Formulation

The project proposal should be prepared in consultation with your guide. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken.

The project work should compulsorily include the software development. The project proposal should contain complete details in the following form:

Performa for Approval of Project Proposal signed and submitted by the student with date.

Synopsis of the project proposal (05-10 pages) covering the following aspects:

1. Title of the Project.
2. Introduction and Objectives of the Project.
3. Project Category (RDBMS/OOPS/Networking/Multimedia/Artificial Intelligence/Expert Systems etc.).

4. Tools/Platform, Hardware and Software Requirement specifications.
5. Problem Definition, Requirement Specifications (Detailed functional Requirements and Technical Specifications), Project Planning and Scheduling (Gantt chart and PERT chart).
6. Scope of the solution.
7. Analysis (Data Models like 0, 1 and 2 level DFDs, Complete ER Diagrams with cardinality, Class Diagrams etc. as per the project requirements).
8. A complete Database and tables detail with Primary and Foreign keys, and proper constraints in the fields (as per project requirements)
9. Number of modules and their description to provide an estimation of the student's effort on the project. Along with process logic of each Module.
10. Implementation methodology
11. List of reports that are likely to be generated.
12. Overall network architecture (if required for your project)
13. Implementation of security mechanisms at various levels
14. Future scope and further enhancement of the project.
15. Bibliography

2. Points to remember while preparing the project report

The **project documentation** may be about 50 to 100 pages (excluding coding). The project documentation details should not be too generic in nature. Appropriate project report documentation should be done, like, **how you have done the analysis, design, coding, use of testing techniques/strategies, etc., in respect of your project.**

To be more specific, whatever the theory in respect of these topics is available in the reference books should be avoided as far as possible.

The project documentation should be in respect of your project only. The project documentation should include the topics given below (whichever is applicable).

- Introduction/Objectives
- Existing System Analysis
- Problem Identification and developing system's Need
- Preliminary Investigation and Feasibility Study
- Project Planning and Project Scheduling (PERT Chart and Gantt Chart both)
- Software requirement specifications (SRS)
- Software Engineering Paradigm applied (Development Model Using, SDLC Types_
- Data models like Data Flow Diagram(for All Levels), Control Flow diagrams, Entity Relationship Model (E-R Diagram), UML Diagrams (Class, Object, Use Case, Sequence, Activity, Component, Deployment) depending upon your project requirements
- Modularization details
- Database design, Procedural Design/Object Oriented Design (Tables with their relationships, Constraints and Normalization Details)
- User Interface Design
- Test Cases (Unit Test Cases and System Test Cases)
- Testing techniques and Testing strategies used
- Testing Plan used and Test reports for Unit Test Cases and System Test Cases
- Reports (sample layouts should be placed)
- Future scope and further enhancement of the Project
- Bibliography

- Appendices (if any)
- Glossary.

The project report should normally be printed with single line spacing on A4 paper (one side only). All the pages, tables and figures must be numbered. Tables and figures should contain titles.

Reference-

1. IEEE, 1987. IEEE Standard for Software User Documentation, IEEE-Std1063- 1987. New York: Institute of Electrical and Electronics Engineers.
2. IGNOU (MCSP-60) MCA Final Year Project Guidelines, 2013
3. IEEE, 2001. Draft Standard for Software User Documentation, IEEEStd1063/D5.1. 2001. New York: Institute of Electrical and Electronics Engineers.
4. syllSommerville, I. 2001. Software Engineering, 6th Edition. Harlow, UK: London: Pearson Education Ltd.

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