

IV Semester

MCA 401 - OPTIMIZATION TECHNIQUES

Module I

Linear Programming problem Mathematical formulation, assumptions in linear programming, graphical method of solution, simplex method, Big-M method and Two phase method, Dual simplex method.

Module II

Integer Programming Introduction, Gomory's cutting plane method, Fractional cut method-Mixed integer and branch and bound techniques.

Transportation Problem-General transportation problem, Finding an initial basic feasible solution, Loops in transportation tables, Degeneracy, Optimality method-MODI method.

Assignment Problem- Hungarian Method, Traveling salesman problem.

Module III

Game theory Introduction, two-person zero-sum games, some basic terms, the maxmin-minimax principle, games without saddle points-Mixed Strategies, graphic solution of $2 \times n$ and $m \times 2$ games, dominance property.

Simulation Introduction, Definition of Monte-Carlo Simulation.

Module IV

Dynamic Programming Introduction, The Recursive equation approach, Algorithm, Solution of a L.P.P by Dynamic Programming.

Sequencing Models-Processing n jobs through 2 machines, n jobs through 3 machines, two jobs through m machines.

Networking Analysis CPM&PERT – Network minimization, shortest route problem, maximal-flow problem, Project scheduling, critical path calculations, PERT calculation.

Module V

Queuing Theory Introduction, Queuing system, Elements of Queuing system, Characteristics of Queuing system, Classification of Queuing Models, Poisson Queuing systems-Model I (M/M/1): (∞) :FIFO)-Characteristics of Model I and waiting time characteristics. Characteristics of (M/M/1):(N/FIFO), (M/M/C): (∞) /FIFO), (M/M/C):(N/FIFO)-all without derivation

Text Books

1. Operation Research by Kanti Swarup, P.KGuptha , Man Mohan 11th edition Sultan Chand & Sons Publication.

References

1. Operation Research-An introduction by Hamdy A Taha. Prentice Hall.
2. Introduction To Management Science, Anderson, Thomson Learning, 11Edn.
3. Operation Research Applications and Algorithms, Winston, Thomson Learning, 4Edn.
4. Introduction to Operation Research by Hiller/Lieberman. McGraw Hill.
5. Operation Research by Dr. Kalavathy.S. Vikas Publishing

MCA 402 - OPERATING SYSTEMS

Module I

Evolution of operating systems:-Serial processing, Batch Processing, multiprogramming. Types of operating systems-Batch-multi programming-Time sharing -Real time and distributed operating systems.

File Management:-File structure, File types, File access, File attributes, File operations. Directories-Flat directory systems, hierarchical directory systems. File system implementation-Allocation methods-contiguous allocation, linked allocation, indexed allocation.

Module II

Processor Management:-Job and process concept, Concurrent Processes. Operating system view of processes, process-state transition diagram, PCB (Process control block), Threads, Process scheduling, Operations on Processes, Operating system services.

Process Scheduling:-Types of schedulers, scheduling and performance criteria, scheduling algorithms, multiple processor scheduling

Inter process synchronization and communication-Concurrent Processes-Precedence graph-hierarchy of process, need for inter process synchronization, critical section problem, mutual exclusion-mutual exclusion algorithms, semaphores-definition busy wait implementation, hardware implementation of semaphores-test and set instruction, monitors, inter process communication using messages.

Module III

Memory Management:-Preliminaries-address binding , dynamic linking and loading, Overlays. logical versus physical address space, Swapping, Contiguous allocation Paging-principles of page allocation. structure of page table- hardware support, multi level paging, hierarchical paging, inverted page table, shared pages.

Segmentation-principles of operation, hardware, implementation of segment table, protection and sharing, fragmentation, segmentation with paging.

Virtual Memory-Demand paging –performance. Page replacement-page replacement algorithms. Thrashing, Segmentation and paging implementation of virtual memory, hierarchical address translation tables and MMUS.

Module IV

Deadlocks: -Definition –Deadlock characterization-Resource allocation graph, methods for handling deadlocks, deadlock prevention, deadlock avoidance-safe state-resource allocation graph algorithm-Banker's algorithm, deadlock detection, recovery from deadlock, combined approach to deadlock handling.

Module V

Device Management:-Disk structure, Disk scheduling-FCFS-SSTF-C-Scan-Look, Disk management, Swap space management, Disk reliability, Protection- goals of protection, policies and mechanisms-Access matrix and its implementations , dynamic protection-language base protection. Security-security.

Case Study: -Brief discussion on Unix Operating System

Text Book

Abraham Silberschatz and Peter Baer Galvin, 'Operating System Concepts', (Fifth Edition) Addison Wesley.

Reference

1. Bach M 'The design of the Unix Operating system', Prentice Hall India
2. Understanding Operating systems, Flynn, Thomson Learning, 4Edn.
3. Guide to Operating systems, Palmer, Thomson Learning, 1Edn.
4. Milan Milenkovic 'Operating systems' TATA Mc GrawHill

MCA403 ALGORITHM ANALYSIS AND DESIGN

Module I

Introduction – Algorithms-design strategies-concepts in performance analysis – space complexity, time complexity- asymptotic notation- practical complexities, performance measurement.

Module II

Divide and conquer method – General method, Finding the maximum and minimum, merge sort, Quick sort, Selection sort, Strassen's matrix multiplication.

Module III

Greedy Method and Dynamic programming method – The general method, Knapsack problem, Job sequencing with dead lines, Minimum cost spanning tree- prim's algorithm and kruskal's algorithm, optimal storage on tapes. Dynamic programming- General method, multistage graphs, All pairs shortest paths, The traveling salesperson problem.

Module IV

Backtracking and branch and bound techniques – The general method, The 8 queens problem, Sum of subsets. Branch and Bound- least cost search, control abstraction for LC search.

Module V

Lower bound theory and NP Hard problem – Comparison trees- searching, sorting and selection. Concepts of NP hard and NP-complete problems, non deterministic algorithms, Classes of NP hard and NP complete. COOK'S theorem.

Text Book:

Fundamentals of computer algorithms- Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajeshkharan (Galgotia)

References:

1. Fundamentals of algorithms – Gilles Brassard, Paul Bratley (PHI)
2. Introduction to the design and analysis of algorithms – Anany Levitin (Pearson)
3. Computer algorithms – Introduction to design and analysis – Sara Baase, Allen Van Gelder (Pearson)

MCA 404 – JAVA & WEB PROGRAMMING

Module-I

Introduction to Java: Overview of java, why java is important to the internet, Java's magic: The Byte code, The java buzzwords, Lexical issues. **Data types, variables and arrays:** Different data types, literals, variables, type conversion and casting, automatic type promotions in expression, arrays **Operators:** arithmetic operators, bitwise operators,

relational operators, Boolean logical operators, assignment operators, the ? Operator, operator precedence. **Control statement:** Selection statement, iteration statement, jump statement

Module- II

Introducing classes: class fundamentals, constructors, garbage collections, overloaded methods and constructors, Object parameter, recursion, understanding final and static keywords, nested and inner class, command line arguments **Inheritance:** Basics, super, multilevel hierarchy, method overriding, dynamic method dispatch, abstract classes **Packages and interfaces:** packages, access protection, importing package, interface

Module- III

Exception Handling: Exception handling fundamentals, multiple catch clauses, nested try statements, built-in exceptions, creating our own exception. **Multithreaded programming:** Java thread model, creating thread, creating multiple threads, thread priorities, synchronization, interthread communication **I/O Basics:** reading and writing console base input and output, rereading and writing files, String Handling, java.lang package.

Module-IV

Event Handling: the delegation Event model, Adapter class, Working with AWT controls layout managers and menus, applet programming

Module-V

Java database programming: Different JDBC drivers, ODBC and JDBC – JDBC Overview JDBC implementation – Connection class – Statements – Other JDBC classes **HTML, JavaScript:** Introduction, Eventhandlers, javascript in forms and frames. **Java Servlets:** Java Servlets and CGI programming, Benefits, Lifecycle of a Servlet, simple java servlet, reading data from a client, Reading Http Request Header, sending data to a client and writing the HTTP Response Header, working with Cookies, tracking sessions, Security Issues. **JSP:** JSP basics, tags, Request string, Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods, Cookies, Session Object, Sharing Data Between JSP pages, Error handling in JSP

Text book

1. JAVA The Complete Reference- Patrick Naughton and Herbert Schidt.- fifth Edition Tata McGraw Hill.
2. The Complete reference J2SE - Jim Keogh – Tata McGraw Hills

References:

1. Programming and Problem Solving With Java, Slack, Thomson Learning, 1Edn.
2. Java Programming Advanced Topics, Wigglesworth, Thomson Learning, 3Edn.
3. Java Programming, John P. Flynt , Thomson Learning, 2Edn.
4. Ken Arnold and James Gosling, The Java Programming language, Addison Wesley, 2nd Edition, 1998
5. Patrick Naughton and Herbert Schidt.- The Complete Reference, JAVA fifth Edition Tata McGraw Hill.
6. Maydene Fisher, Jon Ellis, Jonathan Bruce; JDBC API Tutorial and Reference, Third Edition, Publisher: Addison-Wesley Professional,2003
7. Java Servlets IInd edition Karl Moss Tata McGraw Hills
8. Professional JSP – Wrox
- 9 Thinking java – Bruce Eckel – Pearson Education **Association**
10. JavaScript: A Beginner's Guide, Second Edition **By John Pollock**, McGraw-Hill Professional – Publisher

MCA 405(A) - VISUAL PROGRAMMING (ELECTIVE-I)

Module 1

Parts of Visual C++ program - application object – main window object, view object document object. Event oriented window programming , device context. Elements of GUI & Visual design, Designing and Creating a Visual C++ Program, Project work spaces, Debug and Release Targets, Cleaning up, various features of the Visual C++ IDE.

Module 2

Basics of MFC & MFC-based executables. Event Handling : Reading keystrokes, handling mouse , creating menus, tool bars, buttons, status bar prompts, dialog box, check box, radio buttons, list boxes, combo boxes, sliders, serialization , file handling, multiple documents.

Module 3

Understanding Message maps and message loops, Events and Event handling, Mouse events, Keyboard events, Dynamic data Exchange and verification, creating Menus, Modeless dialog boxes. Device contexts, working with images, bitmaps and icons, creating bitmap buttons, creating and using Pens, Brushes, and Fonts.

Module 4

Document - View Architecture basics, the document class and view class, creating SDI applications, Multitasking, creating MDI Applications, Working with menu in documents, Toolbar and status bar.

Module 5

Basics of Windows Architecture, SDK & SDK Executables, Window creation, Toolkits, Application development using SDK

TEXT BOOK

1. Yeshwant Kanetkar , Visual C++ Programming , BPB

REFERENCES

1. Jeff Prosise, Programming Windows with MFC, Microsoft Press, 2000
2. Charles Petzold, “Programming Windows”, 5th Edition, Microsoft Press, 1999.
- 3 Holzner Steven, “Visual C++ 6 in record time”, BPB publications
- 4 Mickey Williams , David Bennett, Visual C++ 6 Unleashed (Hardcover) , SAMS
- 5 Yeshwant Kanetkar, Visual C++ Projects.
- 6 David Kruglinski, George Shepherd & Scot Wingo, Programming Visual C++, Microsoft Press
Indian Reprint, 2000
- 7 Chuck Sphar, Learn Visual C++ Now, Microsoft Press/Phi, 1999
- 8 Ivor Horton, Programming Visual C++ Standard Edition, Wrox Press, 1999
- 9 Herbert Schildt, MFC Programming for the GROUND UP, Second Edition, Tata McgrawHill, 2000
- 10 Richard.C.Leinecker and Tom Archer, Visual C++ Programming Bible, Wiley Dream Tech, 2005

MCA 405(B) - CLIENT SERVER COMPUTING

(Elective I)

Module I

Overview of Client Server computing, Evolution of Client Server systems, c/s Vs. Heterogenous computing, advantages and disadvantages, Fat Servers, Fat clients, 2-Tier and 3-Tier architecture, Types of servers and clients

Module II

Components of Client/ Server Applications

Client, - Role of Client, Client Services, Request for service – Remote Services, utility services, Database Services DDE, OLE, CORBA. Server- Role of Server, Server Functionality in Detail, Network Operating System, Available Platforms, Server Operating System

Connectivity: Open System Interconnect, Communication Interface Technology, Interprocess Communication, Wide Area Network Technologies, Network Management.

Module III

Client Server Systems Development –

Software- Factors driving demand for Application software development, Need to improve Productivity, platform migration, re-engineering of existing system, common Interface Across Platforms, Development methodology, project management, Architecture , productivity measures, CASE, OOP. Hardware, Service and Support.

Module IV

Understanding Middleware, Database Connectivity Challenge, Basic View of Middleware, Highlevel Middleware communication type, Types of Middleware. Object oriented Development with client Server

Module V

Future Trends and applications:- OLTP, OLAP, TP monitors, DTP, Groupware , Distributed objects and components , Intranet, Hardware and Software trends – peer to peer technologies, Mobile computing.

Text book:

1. Smith, Patrick. N, and Steven LGuengerich. Client/Server Computing. SAMS
2. Jenkins, Neil. Client/Server Unleashed. Bk&CD-Rom ed. SAMS

Reference:

1. Orfali, Robert, Dan Harkey , and Jeri Edwards. Essential client/server survival guide. Wiley

MCA 405(C) NEURAL NETWORKS AND FUZZY LOGIC

(Elective –I)

Module I

Introduction: Principles, artificial neuron, activation functions, single layer and multilayer networks, training artificial neural networks, Perception, Representation, Linear separability, Learning Training Algorithms.

Module II

Back Propagation: Training algorithm, applications, network configurations Network paralysis, local minima, temporal instability.

Counter Propagation Networks: Kebeon layer, Training the cohenen layer, pre initializing the wright vectors, statistical properties, Training the Grosbery layer, full counter propagation network - Application.

Module III

Statistical method: Boltgmann's Training cauche training, Artificial specific heat methods, applications to general non-linear optimization problems.

Hopfield nets:- Relcurrent networks, stability, Application, Thermo dynamic systems, statistical Hopfield networks, Bidirecional associative memories, continous BAM , Adaptive resource theory, Architecture classification, Implementation.

Module IV

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control. Fuzzification, inferencing and defuzzification. Fuzzy knowledge and rule bases. Fuzzy modeling and control schemes for nonlinear systems.

Module V

Self-organizing fuzzy logic control. Fuzzy logic control for nonlinear time-delay system. Implementation of fuzzy logic controller using Matlab fuzzy-logic toolbox. Stability analysis of fuzzy control systems

Text Book

1. Neural Computing Theroy & Practice –Philip D Wasserman
2. Fuzzy Logic Intelligence, Control and Information - John Yen and Reza Langari.

Reference:-

1. Neural Networks- Simon Hayking
2. Adaptive Pattern Recognition & Neural Networks –Pay Y. II
3. An Introduction to neural Computing –Chapman & Hall
4. Fuzzy Logic: Dispatches from the Information Revolution- Matthew Friedman

MCA 405(D) -BUSINESS DATA PROCESSING AND COBOL PROGRAMMING (Elective-I)

Module-I

INTRODUCTION

Business Data Processing, Types of COBOL, Mainframe COBOL, Transaction Files, Master Files, File Processing, Coding Format for cobol Program, Structure of a Cobol Program, Charecter set, Cobol words, Data names and identifiers, Literal, Figurative Constants, Continuation of lines and notations. IDENTIFICATION , ENVIRONMENT DIVISION AND DATADIVISION :General formats, Configuration section, Input-output section, Level Structure, Data description entries, Picture clause, Value clause, File section, Working - Storage Section, Editing charecters of different data and examples, special-names paragraph, Classes and categories of data.

Module-II

PROCEDURE DEVISION, VERBS AND CLAUSES

Structure of procedure devision, Data movement verb and other options of move statements, Arithmetic verbs, Sequence control verbs, Input & Output verbs, conditional verb : simple IF, Categories of COBOL statements. Usage Clause, Synchronized clause, Justified clause, Redefines clause and Renames clause, qualification of data names, sign clause, Elementary and Group moves, corresponding option : Move Corresponding, Add Corresponding & Subtract Corresponding, Routed option, On size error option, compute verb.

Module-III

COMPUTATION AND DECISION MAKING

In teractive processing using screen sections, Intrinsic Functions, Conditions: Relational, class, Condition-name, compound, sign, IF statements, Alter statements, Perform statements, Exit statements.

Module-IV

ARRAY PROCESSING AND TABLE HANDLING

Occurs clause, subscripting, Assingning values to table elements, Multidimensional tables, Perform & table handling, Indexed tables & Indexing. Set verb, search verb, Occurs depending clause, Index data item.

Module-V

SEQUENTIAL, INDEXED & RELATIVE FILE PROCESSING, REPORT WRITER AND SUBROUTINES

File characteristics, file control entires, file description. Statemetns for sequential files, Sequential file with variable length records, I/O control paragraph, Simple sort verb, file updation, variation of updation, Simple merge verb, input and output procedure in sort statements, Merge verb with output procedure. File control paragraph, for relative files, Procedure devision statements for relative files, Indexed sequential files, General format of a report, File section, Report clause, Outline of a report section, Report section - report description entry, report group, procedure devision statements, Sample program, Structure of COBOL subroutine, Callinh of a Subroutine, State of subroutine and cancel statement, Advantages and Disadvantages of cobol subroutines.

Text books

1. M.K Roy and d Ghosh Dastigar, COBOL Programming, including MS COBOL and COBOL 85, Tata McGraw Hill 1997
2. Nancy Stern and Robert a Stern, Structered COBOL Programming, 8th Edition, john Wiley 1997
3. Structured Cobol Programming , Shelly Cashman , Thomson a Learning 2Edn.

MCA 405(E) ENTREPRENEURSHIP (Elective I)

Module-I

Entrepreneurship and free Enterprise

An Entrepreneurship perspective, Defining Entrepreneurship, Business Innovation and Entrepreneurship , Perspective on Small , Environment risk and Failure, Corporate Entrepreneurship – Intrapreneurship . A model for New ventures: feasibility Planning

Module-II

Product and service concepts for new ventures

A macro view, product and Technology, Identifying Opportunities, The product Development process . Product Protection: patents , Trademarks, and copyrights. Services: The Human side of Enterprise, Information Technology Enabled service Ventures , case studies

Module-III

Marketing and new venture development

The Marketing Concept, Marketing research for new ventures, market intelligence, Competitive Analysis, Marketing: functions and Strategies , International Markets: New venture opportunities

Module-IV

Organizing and financing the new venture

The Entrepreneurial Team and Business formation , Human Resources Needs and skills marketing , legal forms of Business in Perspective, Sole Proprietorship, Partnership, Corporations, Business Acquisitions and Franchising , financial resources for new ventures. Asset management, Equity Financing Venture Capital, debt Financing, Government programs for new ventures in India .

Module-V

Marketing Growth and Transition

The Organization Life cycle , changing Entrepreneurial Roles, Strategic Management, Implications for entrepreneurial Careers , case studies

Test Book:

Entrepreneurship – New venture Creation : By David H.Holt, Prentice Hall of India Pvt Ltd.

Reference Books :

1. Dynamics of Entrepreneurial Development and Management- vasant desai, millennium Edition , Himalaya Publishing house
2. Entrepreneurship , Kuratko, Thomson Learning 6Edn.
3. Entrepreneurship Ideas and Action, Greene, Thomson Learning 1Edn.
4. Entrepreneurship – Madhurima lal, Shikha sahai, First Edition, Excel Books
5. Entrepreneurship Management – Dr. Aruna Kabgud, Vikas Publishing House

MCA 405(F)- ENTERPRISE RESOURCE PLANNING (Elective-I)

Module I

ERP overview- Basics of ERP-pros and cons of ERP. Comprehensive Enterprise Application –CRM- webbased CRM – ERP and Supply Chain Management., Core ERP benefits, Business Process Value Chains, ERP Optimization, ERP Strategic Planning, Parallel Capabilities, Action Plans

Module-II

ERP Selection- Selection Process - Initial Vendor Screening- Best Practices for Selection- Selection Phases-Cost of ERP - RFI Approach - Vendor Analysis -ERP Life Cycle Management

Module-III

Executing ERP- ERP Project Management -factors for success of ERP- ERP Change Management- ERP Implementation Methodology, ERP Infrastructure Considerations

Module-IV

ERP upgrades- Reasons to ERP Application Upgrades , ERP Upgrade Impact Analysis – ERP Transition Model – Post ERP Implementation - Continuous Business improvements - ERP Risk Management - Major ERP Security Concerns- ERP/IT Framework –COBIT , ITIL, ISO 17799, Case Studies

Text books:

1. Enterprise Resource Planning in Practice- Jagan Nathan Vaman, TATA McGraw Hill Publishing
2. Concepts in Enterprise Resource Planning – Joseph A. Brady, Ellen F. Monk, Bret J. Wagner, Thomson Course Technology
3. Enterprise Resource Planning Concepts and Practice –Vinod Kumar , N K Venkitakrishnan, Prentice Hall of India Pvt Ltd.
4. Enterprise Resource Planning-Alexis Leon, TATA McGraw Hill Publishing

MCA 405(G) OBJECT ORIENTED MODELING AND DESIGN (Elective I)

Module 1

Concepts :- Objects, Attributes and Methods, Encapsulation and Information Hiding Messages, Class Hierarchy, Inheritance, Polymorphism, Genericity.
Object Oriented System Development, Methodology.

Module 2

Unified Modeling Language:- Introduction, UML diagrams, Class diagrams, Use-Case Diagrams, UML Dynamic Modeling.

Module 3

Analysis:- Object Oriented Analysis Process, Object Analysis: Classification, Identifying Relationships, Attributes & Methods.

Module 4

Design:- The Object Oriented Design process & design Axioms, Designing classes, Access layer: Object Storage & Object Interoperability, View Layer: Designing Interface.

Module 5

Implementation:- S/W Implementation, Component diagrams, Deployment diagrams, S/W Testing and Maintenance.

Text Book :-

Object-Oriented Modeling and Design., Rumbaugh, Blaha, Lorensen., Pearson Education

References:-

- 1.Object Oriented System Analysis and Design, Satzinger, Thomson Learning 1Edn.
- 2.Object Oriented System Development using the Unified Modeling Language., Bahrami A., McGraw-Hill

3. Page-Johns, Meilir., Fundamentals of Object oriented Design in UML, Pearson Education Asia, 2000.
4. Object Oriented System Analysis and Design using UML., Bennet, McRobb and Farmer., McGraw-Hill
5. The Unified Modeling Language *Reference Manual.*, Rumbaugh, Jacobson and Booch., Pearson Education Asia.

MCA 406 - DBMS LAB

1. Table Design- Using foreign key and Normalization
2. Practice SQL Data Definition Language (DDL) commands
 - a) Table creation and alteration (include integrity constraints such as primary key, referential integrity constraints, check, unique and null constraints both column and table level)
 - b) Other database objects such as view, index, cluster, sequence, synonym etc.
3. Practice SQL Data Manipulation Language (DML) commands
 - a) Row insertion, deletion and updating
 - b) Retrieval of data
 - i) Simple select query
 - ii) Select with where options (include all relational and logical operators)
 - iii) Functions: Numeric, Data, Character, Conversion and Group functions with having clause.
 - iv) Set operators
 - v) Sorting data
 - vi) Sub query (returning single row, multiple rows, more than one column, correlated sub query)
 - vii) Joining tables (single join, self join, outer join)
4. Practice Transaction Control Language (TCL) commands (Grant, revoke, commit and save point options)
5. Usage of triggers, functions and procedures
6. Development of sample applications using Oracle as Back End Sample applications may include
 - i). Payroll Information
 - ii). Student Information System
 - iii). Bank Transaction
 - iv). Library Information System etc.

MCA 407 Java and Web Programming Lab

1. Programs to illustrating classes, objects, methods, constructors, destructors etc.
2. Programs to implement overloading, polymorphism, inheritance
3. Programs demonstrating the usage of packages
4. Program using files, streams, exception handling
5. Programs using threads, synchronization and string handling

6. Programs using AWT package
7. Programs to create simple applets
8. Programs using JDBC
9. Programs demonstrating networking
10. Web page design using HTML
11. Programming exercises on JavaScript, form validation etc.
12. Programs using Servlets and JSP