

B.C.A. (Bachelor of Computer Applications)

SEMESTER - VI

BCA 6003 OPTIMIZATION THEORY

Operations Research-An Introduction: Definitions of Operations Research, Characteristics of Operations Research Approach.

Linear Programming- Applications and Model Formulation: Introduction, Structure of Linear Programming Model, Advantages of Using Linear Programming, Limitations of Linear Programming, Applications Areas of Linear Programming, General Mathematical Model of Linear Programming Model, Guidelines on Linear Programming Model Formulation, Examples of LP Model Formulation.

Linear Programming- The Graphical Method: Introduction, Important Definitions, Graphical Solution Methods of LP Problem.

Linear Programming- The Simplex Method: Introduction, Standard Form of an LP Problem, Simplex Algorithm (Maximization Case), Simplex Algorithm (Minimization Case).

Duality in Linear Programming: Introduction, Formulation of Dual Linear Programming Problem, Standard Results on Duality, Managerial Significance of Duality, Advantages of Duality.

Integer Linear Programming: Introduction, Types of Integer Programming Problems, Enumeration and Cutting Plane Solution Concept, Gomory's All Integer Cutting Plane Method, Gomory's Mixed- Integer Cutting Plane Method, Branch and Bound Method, Applications of Zero-One Integer Programming.

Transportation Problem: Introduction, Mathematical Model of Transportation Problem, The Transportation Algorithm, Methods for Finding Initial Solution.

Assignment Problem: Introduction, Mathematical Model of Statement Assignment Problem, Solution Methods of Assignment Problem.

Project Management-PERT and CPM: Introduction, Basic Differences between PERT and CPM, Phases of Project Management, PERT/CPM Network Components and Precedence Relationships, Critical Path Analysis.

Queuing Theory: Introduction, Essential Features of a Queuing System, Performance Measures of a Queuing System, Probability Distributions in Queuing Systems, Classification of Queuing Models, Single- Server Queuing Models, Multi-Server Queuing Models.

Text Book:

1. J.K Sharma- Operations Research Theory & Applications, 3rd Edn, Macmillan India Ltd., New Delhi-2007.

Reference Book:

1. H.A. Taha-Operations Research: An Introduction, Pearson Education, New Delhi , 2006.

BCA 6002 DISTRIBUTED COMPUTING

Distributed Computing- An Introduction: Definitions, The History of Distributed Computing, Different Forms of Computing, The Strengths and Weaknesses of Distributed Computing, Basics of Operating Systems, Network Basics, Software Engineering Basics.

Interprocess Communications: An Archetypal IPC Program Interface, Event Synchronization, Timeouts and Threading, Deadlocks and Timeouts, Data Representation, Data Encoding, Text-Based Protocols, Request-Response Protocols, Event Diagram and Sequence Diagram, Connection-Oriented versus Connectionless IPC.

Distributed Computing Paradigms: Paradigms and Abstraction, Paradigms for Distributed Applications, Trade-offs.

The Socket API: Background, The Socket Metaphor in IPC, The Datagram Socket API, The Stream- Mode Socket API, Sockets with Nonblocking I/O Operations, Secure Socket API.

The Client-Server Paradigm: Background, Client-Server Paradigm Issues, Software Engineering for a Network Service, Connection-Oriented and Connectionless Servers, Iterative Server and Concurrent Server, Stateful Servers.

Group Communication: Unicasting versus Multicasting, An Archetypal Multicast API, Connectionless versus Connection-Oriented Multicast, Reliable Multicasting versus Unreliable Multicasting, The Java Basic Multicast API, Reliable Multicast API.

Distributed Objects: Message Passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, Remote Procedure Calls, Remote Method Invocation, The Java RMI Architecture, The API for the Java RMI, A Simple RMI Application, Steps for Building an RMI Application, Testing and Debugging, Comparison of RMI and Socket APIs.

Text Book:

1. M.L.Liu- Distributed Computing: Principles and Applications, 1st Indian Reprint, Pearson Education, 2004.

BCA 6001 DATA COMMUNICATION & NETWORKING

Data Transmission Basic Concepts and Terminology: Data Communication Model, Communication Tasks, Parallel & Serial Transmission, Transmission Models, Transmission Channel, Data Rate, Bandwidth Signal Encoding Schemes, Data Compression, Transmission Impairments, Layering and Design Issues, OSI Model, Services and Standards.

Computer Network: Network Topology, Performance of Network, Network Classification, Advantages & Disadvantages of Network, Transmission Media (guided and unguided), Network Architecture, OSI Reference Model, TCP/IP, SNA and DNA.

Data Line Devices: Modems, DSL, ADSL, Multiplexer and Different Multiplexing Techniques: (FDM, TDM).

Data Link Layer: Need for Data Link Control, Frame Design Consideration, Flow Control & Error Control (Flow control mechanism, Error Detection and Correction techniques) Data Link Layer Protocol, HDLC.

Network Layer: Routing, Congestion control, Internetworking principles, Internet Protocols (IPv4 packet format, Hierarchical addressing sub netting, ARP, PPP), Bridges, Routers.

Physical Layer: Function and interface, physical layer standard, null modem.

Local Area Network: Definition of LAN, LAN topologies, Layered architecture of LAN, MAC, IEEE standard. Ethernet LAN, CSMA, CSMA/ CD, Token passing LAN.

Network Security: Security Requirement, Data encryption strategies, authentication protocols, Firewalls.

Basic Applications: Telnet, FTP, NFS, SMTP, SNMP and HTTP.

Text Book:

1. Prakash C. Gupta -Data Communications & Computer Networks, PHI, New Delhi.

Reference Books:

1. William Stallings- Data & Communications, 6th Edition, Pearson Education.
2. Tanenbaum- Computer Networks, 3rd Edition, PHI, New Delhi .

BCA 6004 ACCOUNTING AND FINANCE MANAGEMENT

Accounting: Basic of Accounting, Accounting Mechanics- Double Entry System, Classification, Rules for Debit and Credit Concepts & Conventions, Indian Accounting Standards.

Journal, Ledger and Trial Balance:

Journal: Meaning of Journal, Advantages, Subdivision.

Ledger: Meaning, subdivision, Mechanics of Posting, balancing of Ledger accounts

Trial Balance: Objectives, Defects of trial balance, Errors disclosed by trial balance, preparation and locating errors.

Cash Book and Subsidiary books of Accounting: Kinds of cashbook, Purchase daybook, Sales daybook, Bills receivable book, Bills payable book.

Finance Accounts: Trading account,, Profit & Loss account, Adjustments, Balance Sheet, Forms of balance Sheet, Assets and their classification, liabilities and their classification, uses and limitations.

Capital & Revenue Expenditure & Receipts: Rules for determining capital expenditure, Deferred Revenue expenditure, Capital & Revenue receipts, Capital & Revenue Profits, Capital & Revenue Loss.

Nature of Financial Management: Scope of financial functions, finance functions and job of finance manager, organization of finance function.

Understanding of Financial statements: Concept of profit and loss account and balance sheet- significance of their preparation.

Statement of Changes of financial position: definition of funds, fund flow statement, cash flow statement.

Text Books:

1. Management Accounting – Manmohan Singh and Goel
2. Financial management- Pandey I. M.

Reference Books:

1. Hanif & Mukherjee-Modern Accountancy, TMH, New Delhi .
2. Maheshwari & Maheshwari- An Introduction to Accountancy, Vikas Publishing House Pvt.Ltd., New Delhi .

ELECTIVES

(BCA 6005)

AGILE SOFTWARE DEVELOPMENT PROCESS

Introduction Unknowable and Incommunicable: The Problem with Parsing Experience, The Impossibility of Communication, Three Levels of Listening.

A Cooperative Game of Invention and Communication: Software and Poetry, Software and Games, A Second Look at the Cooperative Game.

Individuals: Them's Funky People, Overcoming Failure Modes, Working Better in Some Way than Others, Drawing on Success Modes.

Communicating, Cooperative Teams: Convection Currents of Information, Jumping Communication Gaps, Teams as Communities, Team as Ecosystems.

Methodologies: An Ecosystem that Ships Software, Methodology Concepts, Methodologies Design Principles, XP under Glass.

Agile and Self-Adapting: Light but sufficient, Agile, Becoming Self-Adapting

The Crystal Methodologies: Shaping the Crystal Family, Crystal Clear, Crystal Orange, Crystal Orange Web.

Text Book:

Cockburn- Agile Software Development, 1st Indian Reprint, Pearson Education, 2002

DATA MINING & WAREHOUSING

Data Mining:

Introduction: Basic Data Mining Tasks, Data Mining versus Knowledge Discovery in Databases, Data Mining Issues, Data Mining Metrics, Social Implications of Data Mining, Data Mining from a Database Perspective.

Data Mining Techniques: Introduction, A Statistical Perspective on Data Mining, Similarity Measures, Decision Trees.

Classification: Introduction, Statistical- Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms.

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Algorithms, Partitional Algorithms(Minimum Spanning Tree, Squared Error Clustering Algorithm, K-Means Clustering, Nearest neighbor Algorithm).

Association Rules: Introduction, Large Itemsets, Basic Algorithms

Data Warehousing:

The Data Warehousing Environment: The structure of the Data Warehouse, Subject Orientation, Day 1-Day n Phenomenon, Granularity, Exploration and Data Mining, Living Sample Database, Partitioning as a Design Approach, Structuring Data in the Data Warehouse, Auditing and the Data Warehouse, Cost Justification, Data Homogeneity. Heterogeneity, Purging Warehouse Data.

The Data Warehouse and Design: Beginning with Operational Data, Data. Process Models and the Architected Environment, The Data Warehouse and Data Models, The Data Model and the Iterative Development, Normalization/Denormalization, Meta Data.

Granularity in the Data Warehouse: Raw Estimates, Input to the Planning Process, Data in Overflow? What the levels of Granularity will be, Some feedback loop techniques, Levels of Granularity-Banking Environment.

The Data Warehouse and Technology: Managing Large Amounts of Data, Managing Multiple Media, Index/Monitor Data, Interfaces to many technologies, Programmer/Designer Control of Data Placement.

Text Books:

1. M.H. Dunham & S. Sridhar- Data Mining: Introductory and Advanced Topics, Pearson Education, 2006
2. W.H. Inmon- Building The Data Warehouse, 3rd Edn, Wiley Dreamtech India(P) Ltd, 2003

Reference Books:

1. S. Anahory & D. Murray- Data Warehousing, Pearson Education, New Delhi-2000
2. A.Berson & S.J. Smith- Data Warehousing, Data Mining & OLAP, TMH, New Delhi-2006

SYSTEM PROGRAMMING

Introduction: Evolution of System Programming- Assemblers, Loaders, Operating Systems, Macro processors, Compilers & Interpreters.

Assemblers: Elements of Assembly Language programming, A simple assembly scheme, Pass structure of Assemblers, Design of a Two Pass Assemblers, A Single Pass Assembler for IBM PC.

Macros and Macro Processors: Macro definition and call, Macro expansion, Nested macro calls, Advanced Macro facilities, Design of a Macro Processor,

Linkers: Relocation and linking concepts, Design of a linker, Self-Relocating programs, A linker for MS-DOS, Linking for overlays.

Loaders: Compile and Go Loaders, Absolute loaders, Relocating loaders, Direct Linking Loaders.

Software Tools: Software tools for Program Development, Editors, Debug Monitors, Programming Environments, User Interfaces.

Text Book:

1. Dhamdhare D.M.- Systems Programming & Operating Systems, 2nd Edn, TMH, New Delhi 2006.

Reference Books:

1. Donovan J.J.- System Programming, TMH, New Delhi, 1993
2. L.L. Beck- System Software: An Introduction to System Programming, 3rd Edition, Addison Wesley, India

DISTRIBUTED DATABASE SYSTEMS

Introduction: What is Distributed Database System? Promises of DDBSs, Complicating Factors, Problem Areas.

Distributed DBMS Architecture: DBMS Standardization, Architectural Models for Distributed DBMSs, Distributed DBMS Architecture.

Distributed Database Design: Alternative Design Strategies, Distributed Design Issues, Fragmentation, Allocation.

Query Decomposition and Data Localization: Query Decomposition, Localization of Distribution Data.

Optimization of Distributed Queries: Query Optimization, Centralized Query Optimization, Join Ordering in Fragment Queries, Distributed Query Optimization Algorithms.

Distributed Concurrency Control: Serializability Theory, Taxonomy of Concurrency Control Algorithm, Locking-Based Concurrency Control Algorithms, Timestamp-Based Concurrency Control Algorithms, Optimistic Concurrency Control Algorithms, Deadlock Management, “Relaxed” Concurrency Control.

Distributed DBMS Reliability: Reliability Concepts and Measures, Failures and Fault Tolerance in Distributed Systems, Failures in Distributed DBMS, Local Reliability Protocols, Distributed Reliability Protocols.

Text Books:

M. Tamer Ozsu & Patrick- Valduriez- Principles of Distributed Database Systems, 2nd Edition, Pearson Education, New Delhi, 2001

Reference Books:

1. Elmasari & Navathe: Fundamentals of Database Systems, 2nd Edition, Pearson Education, New Delhi, 2005
2. A. Silberschatz, Korth- Database Systems Concepts, McGraw Hill.

DECISION SUPPORT SYSTEM

Introduction to DSS: DSS defined, Ingredients of a DSS, Data and Model Management, DSS knowledge base, User Interfaces, The DSS User, Categories and classes of DSSs.

Decisions and Decision Makers: Decision Makers, Decision Styles, Decision Effectiveness, How can a DSS help?, A topologies of Decisions.

Decision in the Organization: Understanding the Organization, Supporting Organizational Decision Making.

Modeling Decision Process: Defining the problem and its structure, Decision Models, Types of Probability, Techniques for forecasting Probabilities.

Group Decision Support and GroupWare Technologies: Group Decision making, The problem with Groups MDM Support Technologies, Managing MDM Activities.

Expert System and Artificial Intelligence (Intelligent Decision Support Systems): The Concept of Expertise, The Intelligence of Artificial Intelligence, The concepts and structure of Expert Systems, Designing and Building Expert Systems, Evaluating the benefits of ES.

Machines that Can learn: Fuzzy Logic and Linguistic Ambiguity, Artificial Neural Networks, Generic Algorithms and Genetically Evolved Networks, Applications of Machines that Learn.

Designing and Building Decision Support Systems: Strategies for DSS Analysis and Design, The DSS Developer, Tools for DSS Development.

Implementing and Integrating Decision Support Systems: DSS Implementation System Evaluation, The Importance of Integration.

Decision Support in the Twenty-First Century: The future of Decision Support Systems, The future of Expert and Artificial Intelligence Systems.

Text Book:

1. George M. Marks- Decision Support Systems in 21st Century, 2nd Edition, Pearson Education, 2006

Reference Book:

1. Efrain Turban- Decision Support Systems and Intelligence System, 7th Edition, Pearson Education 2006.