

Syllabus for M.C.A. Program Semester - IV

Paper-I(MCA-401): Compiler Design:

Introduction : Analysis of source programme, Different phases of a compiler, Symbol Table.

Lexical Analysis : Different approaches to design a lexical analyzer, regular expression, finite automata (Deterministic & Non-deterministic). RE to NFA and NFA to DFA. Optimization of DFA states. Implementation of lexical analyzer.

Error Handling : errors in different phases of compiler. Introduction to Compiler Construction Tools.

Syntax analysis : context free grammar, Parsing techniques (Top-down, Bottom-up, Operator-precedence, SLR, LALR).

Intermediate code generation : Intermediate language, syntax directed translation, assignment statement, boolean statements and backpatching, array references, procedure calls and record structure.

Code optimization : Principal sources of optimization, Local & Loop optimization, loop invariant computations, induction variable elimination.

Code generation : Design of code generation, a machine model, a simple code generator, register allocation & assignment, code generation from DAG's.

Text/Reference Books :

1. Principles of Compiler Design by Aho, Ullman; Narosa Publishing House, 1989
2. Compilers : Principles, techniques and tools by Aho, Sethi, Ullman; Wesley 1988
3. Compiler Construction : Theory & Practice by Barrat, Eates, Cought, Galgotia 1988
4. Compiler Writing by Trembly, Sorenson ; Mc-Graw Hill Book Co.
5. Compiler Construction for Digital Computer by Gries; John Willey & Sons, New York - 1987

Paper-II (MCA-402) : Management Fundamentals & Information System:

Introduction to Management: Meaning and definitions of management, nature of management- an art or science.

Functional Areas of Management: An Overview: Production and operation management: Production planning, aggregate planning, MRP, production methods- job, batch, flow, continuous production, CAM and FMS, quality control- quality costs, statistical quality control, control charts and their uses. Marketing management: Overview of marketing function, product, price, promotion and distribution strategies, marketing research and its role. Financial management: Working capital management, cost concepts, break even analysis, investment decisions- pay back period, NPV, IPR. Human resource management: Nature and function of HRM, human resource planning- HR information system, performance appraisal system, rewards and incentive schemes.

Information Systems, Organization, Management & Strategy: Emergence of digital film in the existing era of IT, information needs of management at various level of an organization, flow of information in the organization: top down, bottom up and integrated. Information system: Meaning, nature and their role. Approaches to information systems: Technical approach, behavioral approach and socio technical approach. Types of information systems in organization: Decision support system, MIS, expert system, knowledge management system, transaction processing system. Importance of information system in supporting various level of business strategy formulations and decision makings, software and hardware requirements for developing efficient information system.

Information Systems and Managerial Functional Areas: Understanding various processes/ decisions involved in production and operations management and determining their information needs. Developing necessary information systems for production and operations management and their integration with the overall enterprise information systems. Processes and decisions required for effective and efficient sales and marketing management, need for necessary information systems for them and their integration with other information systems in an organization. Appreciating the information requirement of a finance manager for various financial decisions in an organization and how suitable information systems can be designed to meet their requirements, integration of financial information system with that of the enterprise information system. Determining information requirements of a personnel manager and his/ her need for necessary information systems for better decisions. Integrating personnel management related information system with overall information system in an organization.

Current Issues in Information Systems: Role of internet in the development of various information systems in an organization, e-commerce, enterprise resource planning (ERP), role of information systems in supply chain management, information systems and consumer relation management (CRM).

Suggested books:

H. Koontz and H. Weihrich: Essential of Management, Tata McGraw-Hill.

C.B. Gupta: Management Concepts and Practices, S. Chand.

W.S. Jawadekar: Management Information System, Tata McGraw-Hill.

J. A O'Brien: Introduction to Information Systems, Tata McGraw-Hill.

G.R. Jones and J.M. George: Contemporary Management: Tata McGraw-Hill.

K.C. Laudon and J.P. Laudon: Management Information Systems: Organization and Technology, PHI.

Paper-III(MCA-403): Network Management and Information Security:

Network Management: Management Standards and Models, configuration management, configuration database and reports, fault management, identification and isolation, protecting sensitive information, host and user authentication, structure of management information, Standard management information base, SNMPv1 protocol, accounting management, performance management, network usage, matrices and quotas.

Cryptography: Plain text, cipher text, encryption algorithm, decryption algorithm, requirements for cryptography, conventional symmetric encryption algorithms, symmetric vs asymmetric, block and stream ciphers, DES, double and triple DES, cryptographic models, key distribution, link encryption, end-end encryption, steganography.

Public Key Infrastructure and Message Authentication: Public key cryptography principles and algorithms, RSA, Diffie-Hellman key exchange, DSS, elliptic curve. One way hash functions, message digest, MD5, SHA1. Digital signatures, public key infrastructure, digital certificates, certificate authorities.

Network security: Overview of IPv4: OSI model, maximum transfer unit, IP, TCP, UDP, ICMP, ARP, RARP and DNS, ping, traceroute. Network attacks: Buffer overflow, IP scheduling, TCP session hijacking, sequence guessing. Network scanning: ICMP, TCP sweeps, basic port scans. Denial of service attacks: SYN flood, teardrop attacks, land, smurf attacks. Visual and private network topology: tunneling, IPSEC. Traffic protocols: authentication headers, ESP internet key exchange, security association PPTP, L2TP.

Web Security and Application Security: Web servers and browsers: security features, server privileges, active pages, scripting, security configuration setting for browsers, security of active content: JAVA, JAVA script, Active x, plug-ins, cookies. SSL & SET, security mail: PEM and PGP.

Firewalls and Intrusion Detection Systems: Firewall characteristics & design principles, types of firewalls, packet filtering router, application level gateway or proxy, content filters, bastion host. Firewall architectures: dual homed host, screening router, screened host, screened subnet. Firewall logs and intrusion detection system: component of an IDS, placement of IDS components, types of IDS: network based IDS, file integrity checkers, host based IDS, IDS evaluation parameters.

Recommended Books:

William Stallings: Network Security Essentials, Pearson Education Asia.

Gollman Dieter: Computer Security: John Wiley & Sons Ltd.

Paper-IV(MCA-404): Computer Graphics:

Definition : Object Oriented Programming, Paradigms and Metaphors, Active data; Message passing; classes , Installation and Inheritance; Type of Object oriented Systems.

Object-Oriented Programming Tools: Development of programming Language C++, Declarations and constants; expressions and statements; Functions; classes; operator overloading, derived classes, Files and stresses, string Manipulation , buffering.

Concurrent Object Oriented systems.

Applications: Object Oriented Programming in Simulation and A.I.; programming Environments.

Recommended Books:

- . L.Pinson and R.Wiener, An Introduction to O.O.P and Sealltalk- Addison Wesley 1988
- . E.R.Tello, Object Oriented Programming for A.I. -AddisonWesley, 1989
- . P.M.Chirlan, Programming in C++, Merril Pub.Co., 1990
- . Stroustrap, B: The C++ programming Language- Addison Wesley, 1988

Paper -V(MCA-405): Client Server Computing:

Overview : definition, history, myths, transition to client server computing, database architectures, advantages and disadvantages of client server architecture.

Components : client, server, network, role and services of client-server, selection of operating system as client & server, types of client & servers, connectivity, messaging and peer-to-peer communication, role of OSI layer in client server, TCP/IP networks.

Middle-ware : definition, role, 2 tier v/s 3 tiers, network file system, network operating system, API, RPC model & implementation, IPC.

Database Server : memory and process architecture, SQL and PL SQL.

Client/Server Processing: transaction processing, remote processing, distributed processing.

Developing and Managing C/S Applications: development tools, network management, backup and recovery, data integrity & security.

Distributed objects : CORBA, COM, DCOM, OLE, Java-RMI, etc., ODBC & JDBC connectivity.

Data warehousing : operational data & analytical data, architecture.

Reference books:

Client server Computing : Patrick Smith

2. Client server application and architecture : Jeffrey D. Schank

3. Client Server survival guide, 3 rd Edition : Robert Orfali

4. Client server unleashed

Paper- VI(MCA-406) : Practical - I : Graphics Lab:

Practicals based on paper IV

Paper - VII (MCA-407): Practical - II : Client Server Computing Lab:

Practicals based on paper V