

BACHELOR OF COMPUTER APPLICATION (BCA) – FOURTH SEMESTER

Fourth Semester			
S. No.	Name of Subject	Credits	Total Marks
1	Formal Language and Automata Theory	4	100
2	Data Communication	4	100
3	System Analysis & Design	4	100
4	Financial Accounting	4	100
5	Practical	4	100
Total		20	

Subject Name: FORMAL LANGUAGE AND AUTOMATA THEORY

UNIT-I Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and language recognizers.

UNIT-II Finite Automata: NFA with ϵ transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without ϵ transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output-Moore and Melay machines.

UNIT-III Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular Expressions, Pumping lemma of regular sets, closure properties of regular sets (proofs not required)

UNIT-IV Grammar Formalism: Regular grammars - right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms Rightmost and leftmost derivation of strings.

UNIT-V Context Free Grammars: Ambiguity in context free grammars, Minimization of Context Free Grammars, Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of Properties of CFL (proofs omitted).

UNIT - VI Push down automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required), introduction to DCFL and DPDA.

UNIT - VII Turing Machine: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (Proofs not required).

UNIT - VIII Computability Theory: Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of problems, Universal Turing Machine, undecidability of posts Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

Suggested Readings:

1. Hopcroft H.E. & Ullman J.D., „Introduction to Automata Theory Languages and Computation’ - Pearson Education
2. Thomson, ‘Introduction to theory of computation’,-Sipser 2 nd edition
3. Daniel I.A. Cohen, John Wiley, ‘Introduction to languages and the Theory of Computation’.
4. John C Martin, ‘Introduction to languages and the Theory of Computation’ - McGraw Hill.
5. Lewis H.P. & Papadimition ‘Elements of Theory of Computation’ - C.H. Pearson/PHI.
6. Mishra and Chandrashekar, ‘Theory of computer science - Automata, Languages, and Computation’, 2nd edition, PHI

Subject Name: DATA COMMUNICATION

1. Data Communication Concepts
 - a. Networks and open system standards: the OSI reference model
 - b. Network topologies and the physical layer
 - Bus/Tree topology, ring topology, star topology
 - c. The future of data communications
2. Transmission Media and Transmission Technologies
 - a. The electrical interface
 - b. Metallic media
 - c. Optical fiber media
 - d. Wireless media (line-of-sight media)
 - e. Baseband and broadband transmission
 - f. Transmission bandwidth (link capacity)
 - g. Codes
 - h. Analog and digital signals
 - i. Modulation and demodulation, modems and modem standards
 - j. Transmission impairments (distortion and noise limitations on system performance)
3. Data Transmission
 - a. Transmission modes
 - Simplex, half-duplex, full-duplex communications
 - Serial and parallel transmission
 - Synchronous transmission
 - Asynchronous transmission
 - b. Interface standards
 - c. Multiplexing of signals
 - d. Data compression
4. Protocol Concepts - Media Access Control
 - a. Protocol basics

- b. MAC protocols (CSMA/CD and Token passing)
- 5. Data Security and Integrity
 - a. Error detection and correction
 - b. Encryption and decryption
 - c. Viruses, worms, and hacking
- 6. Local Area Networks
 - a. LAN standards (IEEE standards 802 for LANs)
 - b. Interconnecting LANs
 - c. LAN Hardware (server platforms, backup devices, LAN adapters, printers, etc.)
 - d. LAN system software, LAN application software
 - e. LAN selection criteria
- 7. Metropolitan Area Networks (MANs) and Wide Area Networks (WANs)
 - a. Network routing
 - b. Public data networks
 - c. Circuit-switched data network
 - d. Packet-switched data network
 - e. Internet protocol
 - f. ISDN
 - g. Electronic mail
- 8. Network Architecture
 - a. Layered approach
 - b. Hierarchical approach
- 9. Network Interconnections (Internetworking)
 - a. LAN-to-LAN connections and LAN-to-Host connections
 - b. Repeaters, Bridges, Routers, and Gateways
 - c. Interconnection utilities

Subject Name: SYSTEM ANALYSIS & DESIGN

1. **System Definition and Concepts:** General Theory systems, Manual and automated systems, Real- life business Sub - Systems. System environment and boundaries. Real - time and distributed systems. Basic principles of successful systems. Approach to system development: Structure system analysis and design, Prototype, Joint application development.
2. **System Analyst:** Role and need of system analyst. Qualifications and responsibilities. System analysis as a profession.
3. **System Development Cycle:** Introduction to Systems Development Life cycle (SDLS). Various phases of SDLS: Study, Analysis, Design, Development, Implementation, Maintenance.
4. **Systems documentation consideration:** Principles of systems documentation, types of documentation and their importance, enforcing documentation discipline in an organization.

5. **System Planning:** Data and fact gathering techniques: Interviews, group Communication - questionnaires, Presentations and visits. Assessing project feasibility: Technical, Operational, Economic, Cost benefits analysis, Schedule, Legal and contractual, Political. Modern methods for determining system requirement: joint application, Development program, prototyping, Business Process re-engineering. System selection plan and proposal.
6. **Modular and Structured Design:** module specifications. Top-down and bottom-up design. Module coupling and cohesion. Structure charts.
7. **System Design and Modeling :** Process modeling , Logical and Physical design Conceptual Data modeling Entity- relationship analysis, Entity -relationship modeling, ERDs and DFDs, Concepts of normalization. Process description: Structured English, Decision tree, Decision tables. Documentation: Data dictionary, Recording data
8. **Input and Output:** Classification of forms, Input/output forms design. User-interface design, Graphical interfaces. Standards and guideline for GUI design. Designing physical files and databases: Designing field, Designing physical record, Designing Physical files, Designing database. Introduction to CASE tools, Feature, Advantages and Limitations of CASE tools, Awareness about some commercial CASE tools.
9. **System Implementation and Maintenance:** Planning consideration Conversion methods, Procedures and Controls. System acceptance criteria. System evaluation and performance. Testing and Validation. Preparing user manual .Maintenance activities and issues.
10. **Computer System Audit and Security:** Audit of Computer system usage. Types of threats to computer system control measures: Threat and risk analysis, Disaster recovery and contingency planning, viruses.
11. **OO Analysis/ Design:** Introduction to UML OO development life cycle and modeling .Static and dynamic modeling. Comparison of OO and module-oriented approach. Modeling using UML.
12. **Introduction to Management Information System (MIS):** Meaning and role of MIS. System approach to MIS. Types of information systems: Transaction processing system, Management information system Decision support system, Expert system case studies (Illustrative): MIS for accounting and function, MIS for marketing system.

Subject Name: FINANCIAL ACCOUNTING

1. **Meaning and Objective of Accounting:** Meaning & Process, Primary Objectives, Basic Terms.
2. **Theory Base of Accounting:** Basic Assumptions, Basic Principles, Modifying Principles.
3. **Accounting Equation:** Meaning, Process for Development and Accounting Equation.
4. **Journalizing, Posting and Balancing:** Traditional Classification, Accounting Equation Based Classification, Rules of Debit, Credit & Journal Ledger, Posting, Balancing.
5. **Subsidiary Book I-Cash Book:** Meaning & Advantages of Special Journals, Cash Book.
6. **Subsidiary Book II-Cash Books:** Purchases Book, Sales Book journal proper.
7. **Depreciation, Reserves and Provision:** Meaning, Causes, Factors of Depreciation & Accounting, Methods of Allocating & Recording Depreciation, Meaning & Objectives of Provision.
8. **Financial Statement :** Meaning & Usefulness , F.S , Trading Account , Manufacturing Account, profit and Loss Account, Balance Sheet, Final Accounts Classification of Capital and Revenue.
9. **Consignment of Accounts:** Meaning Terms Accounting Entries in the Books Consignor.
10. **Accounting for joint venture:** Meaning Methods of Recording joint and Separate Venture Transactions, Recording in the Books of Books Of One Co-ventureer only, All Co- venturers.

- 11. Accounting for Non-profit Seeking Organizations:** Meaning Distinction Between profit and Non-profit Seeking Organization Receipts& Payment Account Income and Expenditure Account, Meaning and Accounting Treatment of Some Peculiar Items, Preparation of a Receipts& Payment Account.
- 12. Accounts form incomplete records:** Meaning Reasons and Limitation of incomplete records, Preparation of Accounts, Final Accounts Method, Hints for Tracing Missing Information.
- 13. Accounting for Partnership Firms-Fundamentals :** Meaning Essential Elements and Nature of a partnership, Partnership Deed, Maintaining Capital Account of Partners, Treatment of Interest on Capital Calculation of Interest on Capital & Drawings, Calculation of Commission to a Partner, Division of Profit among partners, Goodwill .
- 14. Accounting for Partnership firms-Retirement/Death of Partner:** New profit sharing ration and gaining ration, Treatment of Goodwill, Adjustment for reserves and Accumulated Profit/Losses, Adjustment of Capitals, Disposal of the amount due to the retiring partner.
- 15. Partnership-Dissolution of firm :** Dissolution of Partnership Vs. Dissolution of a firm , Settlement of Accounts (Section 48), Treatment of firm's debts and private debts(Sec.49), Realization Account, Accounting Entries.
- 16. Final Account of a Company:** Meaning, Distinction between a company's and firm's Balance sheets.

Subject Name: PRACTICAL