



**Master of Computer Application Programme
Department of Computer Application
JIS College of Engineering**

COMPUTER ORGANIZATION & ARCHITECTURE MCA101

CONTACTS: 3L + 1 T; CREDITS: 4

Group –A

Digital Logic:

Data and number representation- binary-complement representation, BCD-ASCII, conversion of numbers from one Number system to the other, $(r-1)$'s & r 's complement representation, binary arithmetic, Floating point representation.

Fundamentals of Boolean Algebra, Logic gates (AND, OR, NOT, XOR, NAND, NOR, XNOR), De Morgan's theorem, MINTERM, MAXTERM, truth table, Boolean expression, simplification, Boolean Algebra, K-map up-to 4 variable.

Combination circuits: adders, subtractor, BCD adder, multiplexer, de-multiplexer, encoder, decoder

Sequential circuits: Flip-Flop (SR, JK, D, T, Master-slave), Application of flip-flop-- Asynchronous counter up-to 4 bit, decade counter, mod-n-counter, Synchronous counter—ring counter, Johnson's counter, Register.

Group B

Computer Organization:

Memory organization: Types of memory RAM, ROM, EPROM, DRAM, SRAM, Associative memory, main memory, virtual memory, secondary memory

I/O: I/O interface, polling, interrupts, DMA, mode of data transfer,

CPU : CPU organization, instruction format, addressing mode, RISC, CISC, Von- Neumann- Architecture

Pipeline & vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline, .Computer arithmetic: addition, subtraction, multiplication & division. Booth's multiplication. Dual core, C2D, I3, I5.

Books:

- 1.Computer System Architecture, Morris Mano, PHI
- 2.Computer Organization, Hamacher, MGH
3. Computer Architecture, Carter, Schaum Outline Series, TMH



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4. System Architecture, Buad, VIKAS

5. The Fundamentals of Computer Organization, Raja Rao, Scitech

SYSTEM ANALYSES AND DESIGN MCA-102

OBJECTIVES: The syllabus has been designed to provide a solid foundation of systems principles and an understanding of how business functions, while heightening students to the issues analysts face daily.

COURSE CONTENTS:

1. Introduction [L-2]: System definition and concepts: Characteristics and types of system, Manual and automated systems
2. Systems analyst [L-1]: Role and need of systems analyst, Qualifications and responsibilities, Systems Analyst as an agent of change
3. System Development cycle [L-3] Introduction to systems development life cycle (SDLC): Various phases of development: Analysis, Design, Development, Implementation, And Maintenance Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, enforcing documentation discipline in an organization.
4. System Planning [L-5] Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits.
Feasibility study and its importance Types of feasibility reports System Selection plan and proposal Prototyping, Cost-Benefit and analysis: Tools and techniques
5. Systems Design and modeling [L-8] Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD and ERD diagrams.
6. Input and Output [L-2] Classification of forms: Input/output forms design, User-interface design, Graphical interfaces
7. Modular and structured design [L-5] Module specifications, Module coupling and cohesion, Top-down and bottom-up design.
8. System Implementation and Maintenance [L-2] Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems quality Control and assurance, Maintenance activities and issues.
9. System Audit and Security [L-2] Computer system as an expensive resource: Data and Strong media. Procedures and norms for utilization of computer equipment, Audit of computer system usage, Audit trails, Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning



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TEXTS BOOKS

1. System analysis and design - Elias M.Awad.

REFERENCES

1. System analysis and design – Lee, 2. Analysis and design of information systems – James A.Senn

PRINCIPLE OF PROGRAMMING using C (MCA 103)

CONTACTS: 3L + 1 T

CREDITS: 4

A brief history of evolution of programming languages. Program Development Life Cycle (PDLC) – problem statement, flowchart, pseudo code.

Illustration on compiler and interpreter including brief description of all its steps. Linker and Loader. Modular design, Points to ponder for Good Programming Practice.

Overview of C, Data type, Variable, Operator – arithmetic, relational, logical, bit-wise, shift, and conditional operators, Precedence and Associativity, Constructs – if else, switch, for, while, do-while, array, string, pointer, Function – Definition, parameter passing strategies.

Memory Allocation – static vs dynamic, malloc() vs calloc(), storage types, structure, union, enum. Pointer to function, function pointer, pointer to string, string pointer, variable number of arguments passed in function, Macro, Program through command line arguments,

File Programming – Text file vs Binary file, Signal Handling

Books:

1. Concepts of Programming Languages- Robert W. Sebests 6/e, Pearson Education
2. Programming Languages – Loudon, 2nd Edition, Thomson



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3. Programming in C – J. B. Dixit
4. Programming Using C – Gottfried
5. Programming Languages – Ghezzi, 3/e, John Wiley
6. Programming Languages Design and Implementation – Pratt and Zelkowitz, 4/e, Pearson Education
7. Programming Languages – Watt, Wiley Dreamtech

BUSINESS ENGLISH AND COMMUNICATION HU – 101

CONTACTS: 3L + 1 T

CREDITS: 4

This should cover general and technical writing, oral communications and listening skills: letter writing, technical report writing, and business communication.

Expression: Practical communication skill development, business presentation with multimedia, speaking skill, prepared speech, extempore speech

Reading skill: comprehension test

Writing: precise, technical/business letter, organization of writing material, poster presentation, writing technical document, preparing software user manual, preparing project documentation.

Books:

1. Business Correspondence & Report Writing, Sharma, TMH
2. Business Communication Strategies, Monipally, TMH
3. English for Technical communication, Laxminarayanan, Scitech



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4. Business Communication, Kaul, PHI

5. Communication Skill for Effective Mgmt., Ghanekar, EPH

DISCRETE MATHEMATICAL STRUCTURE & AUTOMATA THEORY MCA104

CONTACTS: 3L + 1 T

CREDITS: 4

Set Theory foundation mapping (bijective, surjective, injective), Relations-equivalence, Poset, Lattice

Mathematical induction, Propositional logic, Logical equivalence. Permutations and combinations.

Generating functions, Recurrence relations.

Concepts of Graph Theory, sub-graphs, cyclic graphs. Trees, spanning trees, binary trees.

Algorithms- Kruskal's , Prim's , Dijkstra's , Flyod's ,Warshall's, DFS, BFS.

Isomorphism, Homomorphism of Graphs.

Finite automata – Construction & Conversion of NFA, DFA, State minimization, Mealy

M/C, Moore M/C. Definition Of Grammars – Type 0,1,2,3.

Fuzzy sets – basic properties

Books:

1.Theory of Computer Science, Mishra & Chandrasekharan, PHI

2.Discrete Mathematics for Comp. Scientists & Mathematicians, Mott, Kandel & Baker, PHI

3.Discrete Mathematical Structure, C.L.Liu, TMH



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4. Discrete Mathematical Structure, G.S.RAO, New Age International
5. Discrete Mathematics With Applications, Rosen, TMH, 5th Ed
6. Discrete Mathematics, Ash & Ash, MH.
7. Discrete Mathematical Structure, Somasundaram, PHI
8. Discrete Mathematical Structure, Dubey, EXCEL BOOKS
9. Discrete Mathematics, Iyenger, VIKAS
10. Discrete Structure and Graph Theory, Bhisma Rao, Scitech
11. Invitation to Graph Theory, Arumugam, Scitech

DATA COMMUNICATION AND COMPUTER NETWORKS MCA – 201

CONTACTS: 3L + 1 T

CREDITS: 4

Introduction to computer network- Topology; Base Band & Broad Band Topology; Guided & Unguided Media. Overview of Data & Signal Bits. Baud & Bit Rate. Modulation (AM, PM, FM); Multiplexing (TDM, FDM, STDM). Encoding (RZ, NRZ, BIPOAR, MANCHESTER, DIFF. MANCHESTER). Digital To Analog – ASK, PSK, FSK, QPSK.

Transmission methods – Synchronous & Asynchronous, Flow Control, Error Control, Error Detection methods. Goals of Layered protocols- Introduction to OSI, TCP/IP, IBM, SNA, ATM. Bit oriented (BSC) & Character oriented Protocol (SDLC, LAPB, LAPD, LLC) HDLC- frame format, station, states, configuration, access control. LAN Topology – Ethernet (IEEE 802.3), Token Bus (IEEE 802.4), Token Ring (IEEE 802.5)

Introduction to WAN – DQDB (IEEE 802.6) & FDDI. Switching Technologies – Circuit, Message, and Packet. X.25, X.21, RS-232 C – frame format, channel, packet frames, facilities (In brief only). ISDN- D channel, B-Channel, International Standards, NT1, NT2, TA, TE Devices.

Introduction to leased lines, DSL, Digital Carriers. Bridging & Routing – Static & Dynamic (In Brief).



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IP, IP addressing, ICMP, ARP, RARP, Congestion Control, TCP, UDP, HTTP, FTP, Telnet, SMTP.

Introduction to data security (private key, public key, ISO standards).

Introduction to Mobile technology (Topology, FDM, TDM, CDMA), Satellite Communication (LEO, GEO, TDM).

Books:

1. Data Communication & Networking, Forouzan, TMH
2. Computer Networks, Tannenbaum, PHI
3. Data & Computer Communications, Stallings, PHI
4. Communication Networks, Walrand, TMH
5. Computer Communication Networks, Shanmugam & Rajeev, ISTE/EXCEL
6. Data Communications, Prakash C. Gupta, PHI
7. Computer Networking, Tittel, Schaum Outline Series, TMH
8. Data & Network Communications, Miller, VIKAS

DATA STRUCTURE AND ALGORITHM WITH C MCA – 202

CONTACTS: 3L + 1 T

CREDITS: 4

Algorithm concept, Complexity – Big O- Notation, time space trade-off. Array- Row/Column major representation, sparse matrix. Linked List- Singly, circular, doubly, doubly & circular Stack- Push, Pop, Conversion from infix – to postfix, evaluation of postfix expression. Stack representation using array & linked list.

Queue – insert, delete, representation using array & linked list, circular queue (operations), deque(operations), priority queue(operations)-Both iterative & recursive implementation.



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Garbage collection-different techniques. Tree- definition – traversal algorithms (pre, post, in).

Threaded tree (One Way & Two Way), heap tree, Avl tree-balancing , B-tree, Trie

Binary search tree, Huffman algorithm, Creation of Heap. Sorting with complexity analysis – bubble, merge, quick, selection, insertion, shell, tournament, radix, heap.

Search- Linear & Binary (Complexity Analysis). Recursion Technique- overview including tail recursion.

Hashing- definition. Functions- Midsquare, Folding, remainder, Collision resolution & linear probing.

Overview On – Sequential file, random access file, indexed sequential, hash file. Pattern matching algorithms- Brute force, Knuth-Morris-Pratt.

Books:

1. Data Structure Using C, Ajay Agarwal, Cyber Tech
2. Data Structure Using C, Radhakrishnan & Shrinivasan, ISTE/EXCEL
3. C and Data Structures, Radhaganesan, Scitech
4. Data Structure Using C & C++, Tannenbaum, PHI
5. Data Structures & Program Design in C, 2nd Ed, Kruse, Tondo & Leung, PHI
6. Mastering Algorithms with C. Loudon, SPD/O'REILLY



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DATA BASE MANAGEMENT SYSTEM MCA – 203

CONTACTS: 3L + 1 T

CREDITS: 4

Introduction to DBMS, architecture, administration roles, data dictionary, Traditional models, three-level architecture, hierarchical model, network model and relational model Relational model – definitions and properties, keys integrity rules, relational algebra, joins, set operations, Tuple relational calculus and Domain relational calculus.

SQL constructs, PL/SQL, Query & its optimization techniques

Singled valued functional dependencies. Database design, conceptual, logical and physical models, ER diagram and model, normal forms (1,2,3,BCNF).

Storage structure- Sequential, Indexed Sequential. B+ tree – creation, insertion & deletion.

Indexing- Primary, Secondary, Multi Level

Books:

- 1.Data Base System Concepts, Silverchatz, Korth & Sudarshan, MH.
- 2.Data Base Management Systems, Majumder & Bhattacharyya, TMH
- 3.Oracle PL/SQL Programming,Feuerstein, SPD/O'REILLY
- 4.Data Base Management System, A.K. Pujari, ISTE/EXCEL
- 5.Fundamentals of Data Base Mgmt. System , Vig & Walia, ISTE/EXCEL



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MATHEMATICAL APPLICATION OF COMPUTER SCIENCE MCA – 204

CONTACTS: 3L + 1 T

CREDITS: 4

PART - A

Basic Statistics-measure of central tendency, dispersion, Probability, distribution introduction to mass function, density function, distribution function (Binomial, Poisson, Normal), estimation of parameters (unbiasedness-concept of noise/error, consistency)

Interpolation-Newton's Forward, Backward, Sterling & Bessel's Interpolation formula, Lagrange's Interpolation. Integration- Trapezoidal, Simpson's 1/3 rd, Weddel's Rule, Romberg Integration, Gauss- Legendre two & three point formula, Newton Cotes Formula.

Solution of transcendental equations- Method of Iteration, Method of Bisection, Newton -Raphson Method, Regula-Falsi method, Secant Method. Solution of system of linear equations- Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel. Inverse Interpolation. Least Square Curve fitting- linear & non-linear .

PART – B

Linear Programming-Simplex Method, Duality Method, Assignment Problem, Transportation Problem.

Integer Programming-Cutting Plane, Branch & Bound. Dynamic Programming- Characteristics, Deterministic & Probabilistic Dynamic Programming.

Queuing Theory- Basic Structure, Exponential distribution, Birth-and-Death Model, M/M/I Queue.

Game Theory-Two person Zero Sum game, saddle point determination, algebraic method, graphical method etc.

Inventory Control- Determination of EOQ, Components, Deterministic Continuous & Deterministic Periodic Review Models, Stochastic Continuous & Stochastic Periodic Review Models.

Sequencing- Two men two machines, Three Men Two Machine

Books:

1.Numerical Analysis, Shastri, PHI

2.Numerical Analysis, S. Ali Mollah



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3. Operation Research, Kanti Swaroop

4. Operation Research, V.K. Kapoor

ELECTRONIC WASTE MANAGEMENT MCA – 205

CONTACTS: 3L + 1T

CREDITS: 4

Introduction to e waste, Global trade issues, Environmental impact of e waste, environmental degradation, Information security.

Environmental Management: Goals, Features, Models, Eco management audit scheme.

E waste management: recycling and its benefits, consumer awareness efforts, processing techniques.

Electronic waste substances: Introduction to hazardous and non – hazardous substances.

Policy and Conventions: Basel Action Network and convention, Restrictions of hazardous substance directive, Soesterberg Principles, Waste Electrical and Electronic Equipment Directive

Organization and Case Studies: Swiss Federal Laboratories, Institute of Scrap Recycling Industries, Solving the e waste problem, World Reuse Repair and Recycling Association.

Books:

1. E waste: Implication, regulations and management in India and current global best practices by Rakesh Johri
2. E waste management: Challenges and Issues by Nina Godbole (IBM India Pvt. Ltd.)
3. Waste Electrical and Electronic Equipment Handbook by Vanessa Goodship and A. Stevels (Woodhead Publishing Series)



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OPERATING SYSTEM MCA – 301

CONTACTS: 3L + 1 T

CREDITS: 4

Importance of OS, Basic concepts and terminology, types of OS, different views, journey of a command execution, design and implementation of OS.

Process: Concept and views, OS view of processes, OS services for process management, scheduling algorithms, performance evaluation; Interprocess communication and synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problem of concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks.

Resource manager, file management, processor management, device management, Memory management – paging, swapping, page replacement algorithm, design issues for paging system, segmentation, Scheduling algorithm and performance evaluation. Security and protection, policies and mechanism, authentication, protection and access control, formal models of protection, cryptography, worms and viruses.

In-process communication & synchronization, File systems, security and protection mechanism, Input/output systems, processes and processors in distributed system Performance measurement, monitoring and evaluation .

Multiprocessor system, classification and types, OS functions and requirements, introduction to parallel computing, multiprocessor interconnection synchronization. Distributes OS - rationales, algorithms for distributed processing.

Introduction to compilers, Assemblers, loaders & linkers, Introduction to OS, OS services and kernel, Multiprogramming and time sharing, Processor scheduling. Performance measurement and monitoring – measures, evaluation techniques, bottlenecks and saturation, feedback loops.

Introduction to UNIX and Shell Programming

Books:

1. Operating Systems, Galvin & Silverschatz, John Wiley
2. Modern Operating System, 2nd Ed, Tannenbaum, PHI
3. Systems Programming & Operating Systems, Dhamdhare, TMH



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4. Systems Programming, Donovan, TMH
5. UNIX and Shell Programming, Yashavant P. Kanetkar, BPB Publications

COMPUTER GRAPHICS AND MULTIMEDIA MCA – 302

CONTACTS: 3L + 1 T

CREDITS: 4

Application of Computer Graphics, Graphics Devices, Cathode Ray Tube, Raster Scanning, Raster

Refresh graphics displays.

Graphics Operations –2D & 3D Graphics, Bezier, B-Spline, Hermite, Bresenham Line & Circle

Drawing Algorithms, Polygon filling, Edge Filling Algorithms.

Clipping—Cohen-Sutherland subdivision line clipping algorithm, Mid-Point subdivision algorithm, 2-dimensional clipping algorithm (Convex Boundaries & Partially visible lines), CyrusBeck algorithm for Partially & Totally Visible Lines) , Visible Surfaces- Floating Horizon Algo. ,

Upper & Lower Horizon, Roberts algo, Warnock algo, Scan-line Z-buffer algo.

Rendering- introduction (illumination models), shading- Gouraud Shading, Phong Shading.

Shadowing- Shadow Algorithms

Introduction to GKS.

Multimedia, concepts, design, hardware, standards – MPEG, JPEG, MIDI, multimedia design methodology, development and testing

Books:

1. Computer Graphics, 2nd Ed., Hearn & Baker, PHI



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2. Procedural & Mathematical Elements in Computer Graphics, Rogers, TMH
3. Computer Graphics, Plastock,, Schaum Outline Series, TMH
4. Engineering Graphics, K. Venugopal, New Age International
5. Computer Graphics, EXCEL BOOKS
6. Introduction to Computer Graphics, A. Mukherjee, VIKAS

OBJECT ORIENTED ANALYSIS AND DESIGN MCA – 303

CONTACTS: 3L + 1 T

CREDITS: 4

Basics of Object Oriented programming and software design

C++ object-oriented programming, C++ & ANSI standard C, Predefined classes in C++

Building objects with classes, Defining operations on objects, Using Inheritance in C++, Virtual functions and Polymorphism

Function overloading, Operator Overloading, Constructor, Constructor overloading, Destructor, Friend Function.

Overview of File Handling, streams. Advanced Topics in C++ - Overview of Template (Class & Functions).

Exception Handling.

Books:

1. Object-Oriented Programming With C++, Balagurusamy, TMH
2. Object Oriented Programming & C++, R. Rajaram, New Age International
3. C++ The Complete Reference, Schildt, 4th Ed, TMH
4. Programming in C++, Shah & Thaker, ISTE/EXCEL



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5. Beginning C++, The Complete Language, Horton, SPD/WROX
6. Object-Oriented Programming With C++, Suburaj, VIKAS
7. Object-Oriented Programming With C++ & JAVA, Samanta, PHI
8. Object-Oriented Programming With C++, N.R Parsa, Wiley Dreamtech

DESIGN AND ANALYSIS OF ALGORITHM MCA – 304

Contacts: 3L + 1T

Credits: 4

Models of computation: RAM, TM etc. time and space complexity

Asymptotic Notation: Big-O, omega, theta etc.; finding time complexity of well known algorithms like- heap sort, search algorithm etc.

Algorithm Design techniques: Recursion- Definition, Use, Limitations, Examples: Hanoi problem. Tail Recursion

Divide and Conquer: Basic method, use, Examples: Merge sort, Quick Sort, Binary Search

Dynamic Programming: Basic method, use, Examples: matrix-chain multiplication, All pair shortest paths, single-source shortest path, Travelling Salesman problem

Branch and Bound: Basic method, use, Examples: The 15-puzzle problem

Backtracking: Basic method, use, Examples: Eight queens problem, Graph coloring problem, Hamiltonian problem

Greedy Method: Basic method, use, Examples: Knapsack problem, Job sequencing with deadlines, minimum spanning tree (Prim's and Kruskal's algorithms)

Lower Bound Theory: Bounds on sorting and sorting techniques using partial and total orders.

Disjoint Set Manipulation: Set manipulation algorithm like UNION-FIND, union by rank, Path compression.

Properties of graphs and graph traversal algorithms: BFS and DFS



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Matrix manipulation algorithms: Different types of algorithms and solution of simultaneous equations, DFT & FFT algorithm; integer multiplication Schemes

Notion of NP-completeness: P class, NP-hard class, NP-complete class, Circuit Satisfiability problem, Clique Decision Problem.

Approximation algorithms: Necessity of approximation scheme, performance guarantee, Polynomial time approximation schemes: 0/1 knapsack problem

Text Books:

1. A.Aho, J.Hopcroft and J.Ullman "The Design and Analysis of algorithms"
2. D.E.Knuth "The Art of Computer Programming", Vol. I & Vol.2
3. Horowitz Ellis, Sahani Sartaz, R. Sanguthevar " Fundamentals of Computer Algorithms".

ACCOUNTING AND FINANCIAL MANAGEMENT MBA – 301

CONTACTS: 3L + 1 T

CREDITS: 4

Unit I

Overview: Accounting concepts, conventions and principles; Accounting Equation, International Accounting principles and standards; Matching of Indian Accounting Standards with International Accounting Standards.

Unit II

Mechanics of Accounting: Double entry system of accounting, journalizing of transactions; preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation, inventory and intangible assets like copyright, trademark, patents and goodwill.



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Unit III

Analysis of financial statement: Ratio Analysis- solvency ratios, profitability ratios, activity ratios, liquidity ratios, market capitalization ratios ; Common Size Statement ; Comparative Balance Sheet and Trend Analysis of manufacturing, service & banking organizations.

Unit IV

Funds Flow Statement: Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis; Cash Flow Statement: Various cash and non-cash transactions, flow of cash, preparation of Cash Flow Statement and its analysis.

Books

- 1) Narayanswami - Financial Accounting: A Managerial Perspective (PHI, 2nd Edition).
- 2) Mukherjee - Financial Accounting for Management (TMH, 1st Edition).
- 3) Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
- 4) Ghosh T P - Accounting and Finance for Managers (Taxman, 1st Edition).
- 5) Maheshwari S.N & Maheshwari S K – An Introduction to Accountancy (Vikas, 9th Edition)
- 6) Ashish K. Bhattacharya- Essentials of Financial Accounting (PHI, New Delhi)
- 7) Ghosh T.P- Financial Accounting for Managers (Taxman, 3rd Edition)
- 8) Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 1st Edition)
- 9) Gupta Ambrish - Financial Accounting for Management (Pearson Education, 2nd Edition)
- 10) Chowdhary Anil - Fundamentals of Accounting and Financial Analysis (Pearson Education, 1st Edition).

ARTIFICIAL INTELLIGENCE MCA – 401

CONTACTS: 3L + 1 T

CREDITS: 4

Problems and Search: What is Artificial Intelligence?, The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success, Some General References, One Final Word.



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Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional Problems.

Heuristic Search Techniques: Generate-and- Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Knowledge Representation: - Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representation, The Frame Problem.

Using Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

Representing Knowledge Using Rules: - Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.

Symbolic Reasoning under Uncertainty: - Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem solver, Implementation: Depth-First Search, Implementation: Breadth First Search.

Statistical Reasoning:- Probability and Baye's Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

Weak Slot-and-Filler Structures:- Semantic Nets, Frames.

Strong Slot-and Filler Structures: Conceptual Dependency, Scripts, CYC.

Knowledge Representation Summary:- Syntactic-Semantic Spectrum of Representation, Logic and Slot-and-Filler Structures, Other Representational Techniques, Summary of the Role of Knowledge.

Text Book:

Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGrawHill

Reference:

Artificial Intelligence – A modern approach, Stuart Russel, Peter Norwig, Pearosn Education.



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SOFTWARE ENGINEERING and TQM MCA – 402

CONTACTS: 3L + 1 T

CREDITS: 4

Introduction to Software Engineering, Software life cycles - different models, Software Project Management

Structured system design, Cost Estimation-COCOMO, Data Oriented Analysis and Design Object Oriented Analysis & Design, development methodologies- Computer Aided Software Engineering (CASE) tool, Object Oriented modeling.

Software quality assurance, Software testing techniques and strategies, test planning, reporting and bug fixing, Test automation, regression testing

Software maintenance, Software Complexity & Reliability

Books:

1. Software Engineering, Rogers G. Pressman, MH
2. Fundamentals of Software Engineering, 2nd Ed. ,Ghezzi, PHI
3. Software Engineering, Pankaj Jalote, PHI
4. Classical and Object Oriented Software Engineering, Schach, TMH
5. Software Engineering: Principles & Practice, Van Vliet, SPD/JOHN WILEY
6. Software Engineering, K.K. Aggarwal & Yogesh Singh, New Age International
7. Software Engineering, Leon, VIKAS
8. Software Testing Fundamentals: Methods & Metrics, Marmie Hutcheson, And Wiley
Dreamtech
9. Managing for Total Quality, Logothetis, PHI
10. TQM, J. Kiron, EPH



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ADVANCED DATABASE MANAGEMENT SYSTEM MCA – 403

CONTACTS: 3L + 1 T

CREDITS: 4

Database Design: Multivalued dependencies, theory of normalisation-4NF, 5NF, 6NF, DKNF

ANSI SQL2: DDL, DML, constraints and assertions, views, database security.

Transaction processing, concurrency control, Recovery management. Transaction model properties, lock base protocols, Two-phase locking, Live – Lock, Time- Stamp Protocol.

Brief introduction to distributed database, temporal database and object-oriented database.

Embedded SQL & Applications.

1.Database System Concepts, Silberschatz Korth, Sudarshan, MH

2. Database Management Systems,Ramakrishnan, MH

3. Database Management Systems, A.k. Pujari, ISTE/EXCEL

4.Oracle PL/SQL Programming,Feuerstein, SPD/O'REILLY

5. Database Management Systems, Leon, VIKAS

6. SQL PL/SQL for Oracle 8 & 8i, P.S Deshpande, Wiley Dreamtech



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THINKING IN CORE JAVA MCA – 404

CONTACTS: 3L + 1 T

CREDITS: 4

An introduction to Java: Brief History of Java, Salient features of Java. Java Programming Environment: Java Development Kit, Using Command-line tools, Building and running applets

Fundamental Programming structures in Java: Data types, Variables and Constants, Operators, Strings & String Buffer, Input & Output, Control Flow, Arrays, Conversions

Objects and Classes: Objects, Defining your own classes, Static Fields & methods, Object Constructions, Packages, Documentation Comments. Inheritance: Classes, Super Classes & Subclasses, Object – The Universal Superclass, Object Wrappers, Reflection, Enumeration Classes

Interface and inner classes: Interface, Polymorphism & Interface, Cloning, Inner Classes, Proxies

Graphics Programming: Introduction to AWT & SWING, Creating Frames, Working with D Shapes, Using color Class

Event Handling: Basics of event handling, The AWT event hierarchy, Semantics and low-level events in AWT, Actions, Multicasting

User- Interface Components with Swing: Model-View-Controller Design pattern, Layout Managers, Text Input, Choice components, Menus, Dialog boxes

Exception Handling: Classification of exceptions, declaring checked exceptions, How to throw an exception, creating exception classes, Catching exceptions, re throwing and chaining exceptions, The finally clause, Analyzing stack trace elements

Applets: Applets basics, Applets HTML tags and attributes, Inter-applet communication

Multithreading: Thread basics, Thread states, Thread properties, Synchronization, Thread & Swing

File and Object: I/O Streams & Stream Classes, Data streams, Text streams, ZIP file streams, String Tokenizes, Object streams

JDBC: JDBC architecture, Basic JDBC programming concepts (making connection, creating statement, executing query), Prepaid statements, Scrollable and updatable Result sets, Metadata



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Text Books: 1. Core Java volume I & II By: Cays Horstmann, Gary Cornell (7th edition) Pearson Publication

Reference Books: 1. "Complete Reference for JAVA" By: Herbert Schildt

VALUE and ETHICS HU – 401

CONTACTS: 4L

CREDITS: 4

Science, Technology and Engineering as Knowledge and as Social and Professional Activities

Effects of Technological Growth: Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth; sustainable development

Energy Crisis; Renewable Energy Resources

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations Environmental Ethics

Appropriate Technology Movement of Schumacher: later developments

Technology and developing nations. Problems of Technology transfer, Technology assessment, impact analysis

Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation , Human centered Technology

Ethics of Profession: Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies.

Profession and Human Values, Value Crisis in contemporary society, Nature of values: Value Spectrum of a 'good' life, Psychological values: Integrated personality; mental health.

Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution



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Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity

Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility

Books:

1. Blending the best of the East & West, Dr. Subir Chowdhury, EXCEL

2. Ethics & Mgmt. & Indian Ethos, Ghosh, VIKAS

3. Business Ethics, Pherwani, EPH

DISTRIBUTED SYSTEMS MCA – 501

CONTACTS: 3L + 1 T

CREDITS: 4

Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, replication. Distributed database design – fragmentation, allocation criteria Storage mechanisms. Translation of global queries. / Global query optimization. Query execution and access plan. Concurrency control – 2 phases locks. Distributed deadlocks.

Time based and quorum based protocols. Comparison. Reliability- non-blocking commitment protocols.

Partitioned networks. Checkpoints and cold starts. Management of distributed transactions- 2 phase unit protocols. Architectural aspects. Node and link failure recoveries.

Distributed data dictionary management. Distributed database administration.

Heterogeneous databases- federated database, reference architecture, loosely and tightly coupled.

Alternative architecture. Development tasks, Operation- global task management. Client server databases-SQL server, open database connectivity. Constructing an application.

Books:



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1. Database System Concepts, Silberschatz Korth, Sudarshan, MH
2. Database Management Systems, Ramakrishnan, MH
3. Beginning SQL Server 2000 programming, Dewson, SPD/WROX
4. Database Management Systems, Leon, VIKAS
5. My SQL :Enterprise Solutions, Alexander Pachev, Wiley Dreamtech

NETWORK SECURITY AND CRYPTOGRAPHY MCA – E501A

CONTACTS: 3L + 1 T

CREDITS: 4

UNIT-I Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, transposition techniques, rotor machines, steganography. Block Ciphers and the Data Encryption standards: Simplified DES, block cipher principles, the data encryption standard, the strength of DES, differential and linear cryptanalysis, block cipher design principles, block cipher modes of operation. Advanced Encryption Standard: Evaluation Criteria for AES, the AES cipher, Contemporary symmetric ciphers: Triple DES, blowfish. Confidentiality using symmetric encryption: Placement of Encryption function, traffic confidentiality, key distribution, and random number generation.

UNIT-II Public key Encryption and Hash functions: Prime numbers, Fermat's and Euler's Theorems, testing for primality, the Chinese remainder theorem, discrete logarithms. Public key cryptography and RSA: Principles of Public key cryptosystems, the RSA algorithm. Key Management other public key cryptosystems: Key management, diffie-Hellman key exchange, elliptic curve arithmetic, and elliptic curve cryptography.

UNIT-III Message authentication and Hash function: Authentication Requirements, Authentication functions, message authentication codes, hash functions, security of hash function and MACs. Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm, ripemd-160, HMAC. Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital signature standard. Authentication Applications: Kerberos, X.509 Authentication service.



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UNIT-IV Electronic Mail Security: Pretty Good privacy, S/MIME. IP Security: IP Security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management. Web Security: Web security considerations, Secure sockets layer and transport layer security, secure electronic transaction.

UNIT-V Part four system security: Intruders, intrusion detection, and password management. Malicious software: Viruses and related threats, virus countermeasures. Firewalls: Firewall Design Principles, Trusted systems.

BOOKS

1. William Stallings “Cryptography and Network Security”, 3 ed, Pearson Education.
2. W.Stallings “ Network security Essential “ Applications & Standards”, Pearson ed.
3. Kanfren “Network Security : Private Communications in a public world 2/e
4. Eric Maiwald “ Network Security : A Preginner’s Guide, second ed.”, Tata Mcgraw Hill.

ADVANCED COMPUTER ARCHITECTURE MCA – E501B

CONTACTS: 3L + 1 T

CREDITS: 4

Section -1 Basic Computer Design: Computer Registers (General Purpose Registers, Accumulator. Status Register, Program Counter, Stack Pointer (SP), Word Size and Register Size); Main Memory; Interfacing Various Registers (Data Movement among Registers, Selection Control Variables). Computer Instructions (Direct Addressing Mode, Memory Reference Instructions, Register Reference Instructions, Input and Output Instructions); Timing Signals; Timing and Control (Sequence Counter, Control Logic Gates for Inputs/Outputs, Timings, Fetch Cycle , Execution Cycle), Micro operations (Memory Reference Instructions, Register-Reference Instructions); Concept of Interrupt (Interrupt Cycle); Design of a Basic Computer and its Working (Control of Registers, Control of Memory, Control of Common Bus, Control of Flip-flops).

Section -2 Central Processing Unit(CPU) Organization: Addressing Modes, Instruction Formats (Instruction Types), Stack Organized CPU (POP and PUSH functions in Stack, Reverse Polish Notation or Postfix Notation, Infix Expression into



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Postfix Expression), Program Control (External interrupts, Internal Interrupts, Software interrupts); General Register Organization; Arithmetic Logic Unit (Status Register, Design of Accumulator Logic Unit)

Section -3 Input-Output Organization: Peripheral Devices (Input Devices, Output Devices); Synchronous and Asynchronous Communications, I/O (Input/Output) Interface (Parallel and Serial Ports); Modes of Data Transfer (Programmed I/O, Interrupt-initiated, I/O, Polling, Direct Memory Access (DMA)); Interrupt (Software Interrupt, Hardware Interrupt), Priority Interrupt (Vectored Interrupt, Non-vectored Interrupt, Priority Interrupt, Daisy Chain); I/O Processor; DMA(DataTransferthrough DMA, DMA controller).

Section -4 Memory Organization: Memory Hierarchy ,Main Memory or Primary Memory (RAM, ROM, Memory Unit, Design of Main Memory); Auxiliary Memory (Magnetic Tape, Magnetic Disk), Cache Memory (Locality of Reference, Hit Ratio, Mapping Process, How to Write Data into Cache Memory?); Virtual Memory (Paging, Page Replacement), Memory Management Hardware, Memory Protection); Associative Memory.

Books:-

1. Advanced Computer Architecture: Parallelism, Scalability, Programmability by Kai Hwang
2. Advanced Computer Architecture and Parallel Processing by Hesham El-Rewiniand Mostafa Abd-El-Barr(Hardcover- Jan 18, 2005)
3. Computer Architecture: A Quantitative Approach, 4th Edition by John L. Hennessy and David A.Patterson (Paperback - Sep 27,2006)

CLOUD COMPUTING MCA – E501C

CONTACTS: 3L + 1 T

CREDITS: 4

UNIT – I Introduction: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective -Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption. Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure Self Service Cloud as a Service: Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design and Implementation using SOA - Conceptual Cloud Model - Cloud Service Defined



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UNIT – II Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloud sourcing, Cloud Offerings: Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Cloud Management: Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

UNIT – III Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR) - VIO Server - Virtual Infrastructure Requirements. Cloud Virtualization: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

UNIT – IV Cloud and SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS -SOA-based Cloud Infrastructure Steps - SOA Business and IT Services. Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark – e Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

Text Book: 1. Cloud Computing – Insight into New Era Infrastructure, Dr. Kumar Saurabh, Wiley India.

Reference Books:

1. Cloud Computing, Roger Jennings, Wiley India
2. Cloud Computing Explained, John Rhoton, Recursive Press
3. Cloud Computing Bible, Barry Sosinsky, Wiley
4. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Wiley
5. Cloud Computing for Dummies, Judith Hurwiz, Wiley Publishing.



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COMPILER DESIGN MCA – E501D

CONTACTS: 3L + 1 T

CREDITS: 4

Classification of grammars. Context free grammars. Deterministic finite state automata

(DFA) Non-DFA Scanners. Top down parsing, LL grammars. Bottom up parsing.

Polishing expressions Operator precedence grammar. IR grammars. Comparison of parsing methods.

Error handling.

Symbol table handling techniques. Organization for non-block and block structured languages. Run time storage administration. Static and dynamic allocation. Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation. Code optimization, folding, and redundant sub-expression evaluation.

Optimisation within iterative loops.

Books:

1. Compiler Design, Aho & Ullman
2. Compiler Design in C, Holub, PHI

INTERNET TECHNOLOGY THROUGH .NET FRAMEWORK MCA – E502A

CONTACTS: 3L + 1 T

CREDITS: 4

Unit-I Basic of the .Net framework: .Net architecture, managed code, assemblies, CLR, execution of assemblies code, IL, JIT, .NET framework class library, common type system, common language specification, interoperability with unmanaged code.

Unit-II Introduction to VB.Net and C#:

VB.Net: Net features, Data Types



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C#: Data Types, Operators, Garbage Collection, Jagged Array, Collection (Array list, Hash table), Indexer(One Dimension) and property, Delegates and events (Multicasting, Multicasting Event), Exception Handling.

Unit-III ADO.Net & Object Oriented Concepts (Using VB.Net or C#): Basic window control, Architecture of ADO.Net, Comparison with ADO, .Net Data provider, Data Adapter, Data Set, Data Row, Data Column, Data Relation, command, Data Reader, Data Grid Constructor, Destructor, Abstraction, interface, polymorphism (Over loading and over ridding)

Unit-IV ASP.Net : Anatomy of ASP.NET Page, Server Controls : label, dropdown list box, validation controls, list box, text box, radio button, check box, State Management: session, caching, Authentication (window,.Net Passport, Forms Based), Authorization, web services, Advance Grid Manipulation.

Suggested Readings:

1. Jeffrey Richter, Francesco Balena: Applied .Net Frmework Prog. In MS VB.Net, TMH Publication.
2. Herbert Schildt: Complete Reference C#, TMH Publication.
3. Michael Halvorsan: Microsoft Visual Basic.NET step by step, PHI Publication.
4. G.Andew Duthie: Microsoft ASP.Net With C#.Net step by step, PHI Publication

ADVANCED JAVA TECHNOLOGIES MCA – E502B

CONTACTS: 3L + 1 T

CREDITS: 4

Introduction to J2EE technology: Web server, Application Server, N-tier architecture, JDBC Overview

Java Beans: Introduction to Java Beans, advantages of Java Beans, The Beans Development Kit. Java Servlets: Introduction to Java Servlet, Servlet Implementation , Servlet Configuration, Servlet Exceptions & Servlet Lifecycle, Request & Response, Servlet Sessions, Context & Collaboration

Java Servlet Pages: Introduction to JSP, JSP Directives, Scripting Elements, Standard Actions, Implicit Objects, Scope, JSP Tag Extensions, Integrating JSPTL into JSP pages



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Enterprise Java Beans (Version 3.1): Introduction to EJBs, EJB Container & its services, The Client Developer's View, The Bean Provider's View, Session beans, Business logic, Entity beans, Persistence, EJB Container Services (Transaction only), JMS & Message Driven Beans (Overview)

Introduction to XML and XML usage. Security: Specifying the security requirements, Programmatic Access, Control, Security & Application Design

Introduction to Struts 2 Framework: Introduction The MVC pattern, Framework Overview, Struts architecture Struts classes - ActionForward, ActionForm, ActionServlet, Action classes , Understanding struts-config.xml, Understanding Action Mappings, Struts Validation Framework Struts <s:form/> components overview. (s:checkbox,s:textfield etc....) , Model driven concept, Message handling , Struts flow with an example application.

Introduction to Hibernate: Introduction to ORM, Introduction to Hibernate, Hibernate, Object Life cycle, Hibernate configuration file and mapping files, Session operations, Hibernate strategies, Mapping of relations, Lazy loading, Fetching strategies, Querying using HQL, Criteria and QBE, Hibernate Caching.

Books:

1. Professional Java Server Programming J2EE Edition By: Daniel O'Connor, Gordon Van Huizen, Jason Diamond ; Wrox publication
2. Sams Teach Yourself J2EE in 21 Days By: Martin Bond, Dan Haywood
3. Struts in Action: Building Web Applications with the Leading Java Framework By: Ted N. Husted, Cedric Dumoulin, George Franciscus, David Winterfeldt Publisher: Manning
4. Hibernate in Action By: Christian Bauer (Author), Gavin King (Author) Publisher: Manning
5. Beginning Java EE 6 with GlassFish 3, Second Edition By: By Antonio Goncalves Publisher: Apress



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ENTERPRISE RESOURCE PLANNING AND ITS TECHNOLOGY MCA – E 502C

CONTACTS: 3L + 1 T

CREDITS: 4

UNIT - I ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, The Structure of ERP

UNIT - II Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM),LAP, Supply chain Management.

UNIT - III ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, The Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.

UNIT - IV ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.

UNIT - V ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study

References:

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill
2. Rahul V. Altekar "Enterprisewide Resource Planning", Tata McGraw Hill,
3. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI
4. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology
5. Mary Summer, "Enterprise Resource Planning"- Pearson Education



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E COMMERCE and CYBER LAWS MCA – E502D

CONTACTS: 3L + 1 T

CREDITS: 4

Building Blocks of Electronic Commerce: Introduction, internet and networking technologies, Internet and network protocols, web server scalability, software technologies for building E-commerce applications, distributed objects, object request brokers, component technology, web services, web application architectures, BizTalk framework Compliant Server

Security of E-commerce transactions: Review of cryptographic tools, authentication, signatures, observers, anonymity, privacy, traceability, key certification, management and escrow

Payment protocols and standards: Smart card, e-cash, e-wallet technologies, electronic money and electronic payment systems, business models for electronic commerce, electronic marketplaces, auctions and other market mechanisms, design of auctions, optimization algorithms for marketplaces, multi-agent systems.

Laws, Investigation and Ethics: Cyber Crime, Information Security and Law, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management Overview of Indian IT Act, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

Books:

1. E.M. Awad, Electronic Commerce From Vision to Fulfillment (3rd ed.), Prentice-Hall of India, 2006
2. P.T. Joseph, E-Commerce An Indian Perspective, Prentice-Hall of India, 2007
3. Scott Bonneau, Tammy Kohl, Jeni Tennison, Jon Duckett and Kevin Williams, XML Design Handbook, Wrox Press Ltd., 2003.
4. W.J. Pardi, XML in Action: Learn to quickly create dynamic, data-driven sites with the Web's hottest new technology, Prentice Hall of India, 1999.
5. Sood, "Cyber Laws Simplified", Mc Graw Hill
6. Furnell, "Computer Insecurity", Springer
7. IT Act 2000



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EMBEDDED SYSTEMS MCA – E503A

CONTACTS: 3L + 1 T

CREDITS: 4

Introduction to Embedded Systems: Overview of embedded systems, features, requirements and applications of embedded systems, recent trends in the embedded system design, common architectures for the ES design, embedded software design issues, communication software, introduction to development and testing tools.

Embedded System Architecture: Basics of 8 – bit RISC microcontroller (PIC), block diagram, addressing modes, instruction set, timers, counters, stack operation, programming using PIC controller, basics of 32 – bit microprocessor (ARM), processor and memory organization, data operations, flow of control, pipelining in ARM, ARM bus (AMBA).

Embedded Software: Programming in embedded environment, Programming for microcontrollers such as Intel 8051 and PIC. Overview of Java 2 micro edition (J2ME), concept of a MIDLET, applications of J2ME in mobile communication.

Interfacing and Communication Links: Serial interfacing, real time clock, SPI / micro wire bus, I2C bus, CAN bus, PC parallel port, IRDA data link, PCI bus architecture.

Operating Systems for Embedded Systems: OS Fundamentals, processes and threads, context switching, scheduling issues, inter task communication, introduction to memory management, evaluating OS performance, real time operating systems, popular RTOS and their applications.

Applications of Embedded Systems: Industrial and control applications, networking and telecom applications, DSP and multimedia applications, applications in the area of consumer appliances, concept of smart home.

Books:

1. Daniel W. Lewis, Fundamentals of Embedded Software, where C and assembly meet, Pearson Education 2001.
2. John B. Peatman, Design with PIC Microcontrollers, Pearson Education, 1997.
3. Robert B. Reese, Microprocessors: From assembly language to C using PIC18Fxx2, Shroff Publishers and Distributors Pvt Ltd. 2005.
4. Michael Juntao Yuan, Enterprise J2ME – Developing Mobile Java Applications, Pearson Education, 2003.



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5. Andrew N. Sloss, Dominic Symes, Chris Wright, ARM System Developer's Guide – Designing and Optimizing System Software, Elsevier Publications, 2007.

ENTERPRISE LINUX SYSTEM ADMINISTRATION MCA – E503B

CONTACTS: 3L + 1 T

CREDITS: 4

Introduction to System Administration, Essential Administrative Tools, Starting and shutdown

User Accounts, Security

TCP / IP Network Management

Getting started in LINUX, Linux Data Management

POSIX Threads

Pipes, Semaphores, Message Queues, Shared Memory, Sockets

Tool Command Language, PERL & CGI.

Books:

1. Linux Administration : A Beginner's Guide, Shah, TMH

2. LINUX: The Complete Reference, Petersen, TMH

3. Guide to LINUX installations & administration, Wealls, VIKAS

4. Red Hat LINUX-Administrator's Guide, Cox, PHI

5. LINUX Network Administrator's Guide, Kirch, SPD/O'REILLY

6. Essentials System Administration, Frisch, SPD/O'REILLY

7. Installing & administering LINUX, Linda, McKinnon, Wiley Dreamtech



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8.CGI Programming with PERL,Gundavaram,SPD/O'REILLY

MODELING AND SIMULATION MCA – E503C

CONTACTS: 3L + 1 T

CREDITS: 4

Systems and environment: Concept of model and model building, model classification and representation, Use of simulation as a tool, steps in simulation study.

Continuous-time and Discrete-time systems: Laplace transform, transfer functions, state space models, order of systems, z-transform, feedback systems, stability, observability, controllability. Statistical Models in Simulation: Common discrete and continuous distributions, Poisson process, empirical distributions

Random Numbers: Properties of random numbers, generation of pseudo random numbers, techniques of random number generation, tests for randomness, random variate generation using inverse transformation, direct transformation, convolution method, acceptance-rejection

Design and Analysis of simulation experiments: Data collection, identifying distributions with data, parameter estimation, goodness of fit tests, selecting input models without data, multivariate an time series input models, verification and validation of models, static and dynamic simulation output analysis, steady-state simulation, terminating simulation, confidence interval estimation, Output analysis for steady state simulation, variance reduction techniques

Queuing Models: Characteristics of queuing systems, notation, transient and steady-state behavior, performance, network of queues. Large Scale systems: Model reduction, hierarchical control, decentralized control, structural properties of large scale systems

Books:

1. Narsingh Deo, System Simulation with Digital Computer, Prentice Hall of India, 1999
2. Averill Law, Simulation Modeling and Analysis (3rd ed.), Tata McGraw-Hill, 2007
3. G. Gordan, System Simulation (2nd ed.), Pearson Education, 2007.



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4. A.F. Seila, V. Ceric and P. Tadikamalla, Applied Simulation Modeling (International Student Edition), Thomson Learning, 2004
5. Jerry Banks, Handbook of Simulation: Principles, Methodology, Advances, Applications, and Practice, Wiley Inter Science, 1998
6. J. Banks, J.S. Carson, B.L. Nelson, Discrete Event System Simulation (4th ed.), Prentice Hall of India, , 2004
7. N.A. Kheir, Systems Modeling and Computer Simulation, Marcel Dekker, 1988.

DATAWAREHOUSE AND DATA MINING MCA – E504A

CONTACTS: 3L + 1 T

CREDITS: 4

Unit-I Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables. Partitioning, partitioning strategy – horizontal partitioning, vertical partitioning,

Unit-II Data warehouse and OLAP technology, multidimensional data models and different OLAP operations, OLAP Server: ROLAP, MOLAP and HOLAP. Data warehouse implementation, efficient computation of data cubes, processing of OLAP queries, indexing OLAP data.

Unit-III Data preprocessing, data integration and transformation, data reduction, Discretization and concept Hierarchy Generation, Data mining primitives, Types of Data Mining, Data Mining query language, Architectures of data mining. Data generation & Summarization based characterization, Analytical characterization, mining class comparisons, Mining descriptive statistical measures in large data bases

Mining Association Rules in large databases: Association rule mining, single dimensional Bookan association rules from Transactional DBS, Multi level association rules from transaction DBS, multidimensional association rules from relational DBS and DWS, Correlation analysis, Constraint based association mining.

Unit-IV Classification and Prediction: Classification by decision tree induction, Back propagation, Bayesian classification, classification based in association rules, Prediction, classifier accuracy, Cluster analysis, partitioning and hierarchical methods, Denrity based methods, Grid based methods, web mining, Temporal and spatial data mining.



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Suggested Readings:

1. W.H.Inmon: Building Data Ware House, John Wiley & Sons.
2. S . Anahory and D.Murray: Data warehousing, Pearson Education, ASIA.
3. Jiawei Han & Micheline Kamber: Data Mining - Concepts & Techniques, Harcourt India PVT Ltd. (Morgan Kaufmann Publishers).
4. Michall Corey, M.Abbey, I Azramson & Ben Taub: Oracle 8i Building Data Ware Housing, TMH.
5. A.K. Pujari: Data Mining Techniques, University Press.
6. IBM An Introduction to Building the Data Warehouse, PHI Publication.

PARALLEL PROGRAMMING MCA – E504B

CONTACTS: 3L + 1 T

CREDITS: 4

Processes and processors. Shared memory. Fork, Join constructs. Basic parallel programming techniques- loop splitting, spin locks, contention barriers and row conditions.

Variations in splitting, self and indirect scheduling. Data dependency-forward and backward block scheduling. Linear recurrence relations. Backward dependency.

Performance tuning overhead with number of processes, effective use of cache.

Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event time simulation. Parallel Programming constructs in HPF, FORTRAN 95. Parallel programming under UNIX.

Books:

- 1.Parallel Computing, Quinn,TMH
- 2.Introduction to Parallel Processing ,Sashi Kumar,PHI



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- 3.Elements of Parallel Computing, Rajaraman,PHI
- 4.Fundamentals of Parallel Processing, Jordan, PHI
5. Advanced Computer Architecture, Hwang, TMH

SOFT COMPUTING MCA – E504C

CONTACTS: 3L + 1 T

CREDITS: 4

UNIT-I AI Problems and Search: AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic and Rules.

UNIT-II Artificial Neural Networks: Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perception Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-III Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-IV Introduction to Classical Sets (crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalence relations. Membership functions- Features, Fuzzification, membership value assignments, Defuzzification.

UNIT-V Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making Fuzzy Logic Control Systems. Genetic Algorithm- Introduction and basic operators and terminology. Applications: Optimization of TSP, Internet Search Technique

Text Books:

- 1 Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007



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2 Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,. Pearson Edition, 2004.

References :

1. Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991, rp2008.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.

RESEARCH METHODOLOGY MCA - 601

CONTACTS: 3L + 1 T

CREDITS: 4

1. Introduction to Research Methodology: Meaning and definition of Research, Characteristics of Research, Objectives of research, Types of research, Process and steps of research
2. Process of Selection and formulation of Research Problem: Problem Selection/Identification of the problem, Sources of research problems, Criteria of good research problem, Principles of research problem, Hypothesis, Meaning & characteristics of good hypothesis
3. Data Collection and Analysis: Main forms of Data Collection Responses, Methods of data collection, Analysis of data, Types of analysis, Statistical tools and analysis, Interpretation of data, Need and importance, Technique of interpretation
4. Concept of Project Management: Meaning of project, Characteristics of a project, Project levels, Types of projects, Project cycle, Meaning & phases of project management, Need of Project Management
5. Project Formulation: Feasibility analysis, Technical analysis, Profitability analysis and financial analysis-cost of project, Means of financing & estimates of sales & production
6. Introduction to Software Project Management: The nature of software production, Key objectives of effective management, Quality, productivity, risk reduction, The role of the software project manager



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7. Project Management Information System (PMIS): Significance of PMIS in project management, Planning & control, Design of project management information system, Importance of materials & equipment in PMIS
8. Project Scheduling & Control: Meaning of project scheduling & project control, Network techniques to project management –PERT & CPM, Gantt charts

Suggested Readings:

1. Research Methodology and Project Work by Dr Mahesh A Kulkarni, Nirali Prakashan, Mumbai,
2. Research Methodology By N Thanulingon, Himalaya Publication, Mumbai
3. Methodology Of Research In Social Sciences By O.R Krishnaswami, M Rangnathan.
4. Project Management By S. Chaudhary, Tata Mcgraw Hill.
5. Project – Preparation, Appraisal, Budgeting & Implementation Prasanna Chandra, Tata Mcgraw Hill.
6. Project Management – A Development Perspective B.B. Goel, Deep & Deep.

LAB SYLLABUS

Micro Programming & Architecture Lab

Code: MCA191

CONTACTS: 4P

CREDITS: 3

Basic skills lab in using Personal Computer and common software tools, Logic Gates, Flip- Flop, Multiplexer, Coder & Decoder, 8085 Assembly Language (Turbo Assembler), Micro processor (8085 Kit).

Programming lab (C)

Code: MCA193

CONTACTS: 4P



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CREDITS: 3

Lab to complement MCA103

Business presentation and language lab

Code: HU191

CONTACTS: 4P

CREDITS: 3

Windows Overview, Office features, Templates and Wizards, MS Word, PowerPoint, Outlook, MS Excel, MS Access
Preparing business presentation with computers using PowerPoint, Developing structured project report with Word and Excel, practicing English and communication skills.

Network Programming Lab

Code: MCA 291

CONTACTS: 4P

CREDITS: 3

Lab of networking which will cover the concepts of MCA 201

Data structure Lab

Code: MCA292

CONTACTS: 4P

CREDITS: 3

Experiment of data structure problems written in C as covered in the theory sessions.

Database-I Lab

Code: MCA293

CONTACTS: 4P



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CREDITS: 3

Study of commercial DBMS package (Oracle-latest version). Developing database application with Oracle, creation of a database, writing SQL queries and retrieving data.

Hardware, Network Configuration and Trouble Shooting Lab

Code: MCA 294

CONTACTS: 4P

CREDITS: 3

Study of internal details of computer hardware, installation of system and application software , study of various network configurations, all types of trouble shooting.

UNIX System and Shell Programming Lab

Code: MCA 391

CONTACTS: 4P

CREDITS: 3

Lab to complement MCA 301

Computer Graphics and Multimedia Lab

Code: MCA 392

CONTACTS: 4P

CREDITS: 3

Lab to complement MCA302. Creating and experimenting with computer graphics. Developing web pages with HTML, DHTML.

Object-Oriented Programming lab (C++)

Code: MCA 393



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CONTACTS: 4P

CREDITS: 3

Lab to complement MCA 303

Accounting Systems Lab

Code: MBA391

CONTACTS: 4P

CREDITS: 3

Lab to complement MBA301. Laboratory exercises using a business accounting software package (Tally 5.0).

Artificial Intelligence Lab

Code: MCA 491

CONTACTS: 4P

CREDITS: 3

Programming Lab to complement MCA 401 using LISP or PROLOG.

Software Engineering and TQM Lab

Code: MCA 492

CONTACTS: 4P

CREDITS: 3

Lab to complement MCA402. Exercises in using commercial CASE tool for software engineering practice. Using project management software using MS Project.

Database-II Lab

Code: MCA 493

CONTACTS: 4P



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CREDITS: 3

Lab to complement MCA403. Using RDBMS like Oracle, application partitioning, developing applications in distributed environment -front end/back end. 4 GL's Forms management and reports writers.

Core JAVA Lab

Code: MCA 494

CONTACTS: 4P

CREDITS: 3

Programming in Core JAVA to complement MCA 404.

Elective – 3 Lab

Code: MCAE 593 A/B/C

CONTACTS: 4P

CREDITS: 3

Lab to complement MCAE503A / MCAE503B / MCAE503C.

Elective – 4 Lab

Code: MCAE 594 A/B/C

CONTACTS: 4P

CREDITS: 3

Lab to complement MCAE504A / MCAE504B / MCAE504C.



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Minor project and seminar

Code: MCA595

Credits: 6

Contacts: 8P Every student is required to carry out project work under the supervision of a faculty member of the department. However, a student may also opt to pursue his project work in a reputed industry/institution with the consent of Department/Institute. In such cases, the department must look into the suitability of the projects and assign one internal guide/supervisor. The internal supervisor shall monitor progress of the student continuously. A candidate is required to present the progress of the project work (at least twice) during the semester at an appropriate time decided by the department. There will a final presentation of the project work at the end of the semester.

Major project and seminar

Code: MCA 691

Credits: 28

Contacts: 36P There will be a 20 weeks project work to be undertaken by the students in any Industry / Institution. At the end of the project there will an evaluation of the project for 28 credits by a group of experts including one external expert, internal supervisor and teachers of the department.

Each student must have an internal supervisor who is a faculty of the department. Each student must submit the abstract of the project which will be approved by the department on the recommendation of the internal supervisor.