# COURSE STRUCTURE FOR MCA

## FIRST SEMESTER

### A. THEORY

<table>
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<tr>
<th>SL. NO.</th>
<th>CODE</th>
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<th>CONTACTS (PERIODS/WEEK)</th>
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<tr>
<td>1</td>
<td>MCA101</td>
<td>Computer Organisation &amp; Architecture</td>
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<td>Business Systems and Applications</td>
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<td>Computer Programming with C</td>
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<td>MM101</td>
<td>Discrete Mathematical Structure</td>
<td>3 1 - 4 4</td>
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<td>HU101</td>
<td>Business English and Communication</td>
<td>3 1 - 4 4</td>
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**Total of Theory** 20 20

### B. PRACTICAL

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<th>CONTACTS (PERIODS/WEEK)</th>
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<tr>
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<td>Micro Programming &amp; Architecture Lab</td>
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<td>Business presentation and language lab</td>
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**Total of Practical** 12 9

**Total of Semester** 32 29
## COURSE STRUCTURE FOR MCA

### SECOND SEMESTER

#### A. THEORY

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<td>MCA201</td>
<td>Data Communication &amp; Computer Networks</td>
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<td>2</td>
<td>MCA202</td>
<td>Information Systems Analysis &amp; Design</td>
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<td>3</td>
<td>MCA203</td>
<td>Data Structures with C</td>
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<td>MCA204</td>
<td>Data Base Management System I</td>
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<td>MCA205</td>
<td>Object-Oriented Programming With C++</td>
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<td>Database lab</td>
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**Total of Practical**

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**Total of Semester**

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# COURSE STRUCTURE FOR MCA

## Third Semester

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<tr>
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<td>MCA301</td>
<td>Operating Systems and Systems Software</td>
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<td>2</td>
<td>MCA302</td>
<td>Unix and Shell Programming</td>
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<td>MCA303</td>
<td>Intelligent Systems</td>
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<td>Statistics and Numerical Techniques</td>
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**Total of Theory** 20 20

### B. PRACTICAL

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<td>Statistics and Numerical Analysis lab</td>
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<td>MBA392</td>
<td>Accounting Systems lab</td>
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**Total of Practical** 12 9

**Total of Semester** 32 29
## COURSE STRUCTURE FOR MCA

### Fourth Semester

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<td>Data Base Management System II</td>
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<td>Operation Research &amp; Optimisation Techniques</td>
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<td>Environment and Ecology</td>
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# COURSE STRUCTURE FOR MCA

## Fifth Semester

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<td>Elective 1</td>
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<td>Values and Ethics of Profession</td>
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**Total of Theory** 19 19

### B. PRACTICAL

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**Total of Practical** 16 12

**Total of Semester** 35 31
COURSE STRUCTURE FOR MCA

Sixth Semester

A. THEORY

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Total of Theory

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Total of Practical

Total of Semester

Electives for Semesters 5

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<td>MCA E503A</td>
<td>Advanced Unix programming</td>
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<td>MCA E503B</td>
<td>Object Oriented Programming With Java</td>
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<td>MCA E504A</td>
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Summary

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Semester duration: 15 weeks
COURSE STRUCTURE FOR MCA

Detailed MCA Syllabus

Computer Organisation & Architecture
Code: MCA101
CONTACTS: 3L + 1 T
CREDITS: 4
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.
Structure of a digital machine (VON-Neumann architecture), Logic gates, basic logic operations, truth tables, Boolean expression, simplification.
Combination circuits, adders, multiplexer, Sequential circuits, Registers.
ROM, PROM, EPROM and dynamic RAM, Digital Components, bus structure- Address bus, Data bus & DMA controller.
Karnaugh Map, Coder, Decoder, Counter – Asynchronous & Synchronous.
Flip Flops – RS, JK, and D &T.
Basic Computer Organisation & Design, Micro-programmed Control.
Data representation, Register transfer & micro-operations, Central processing unit, Pipeline & vector processing, Computer arithmetic.
Input - output organisation, Memory organisation, Microprocessors (8085), Personal Computing.
CPU architecture, instruction format, addressing mode, stacks and handling of interrupts.
Assembly language – Elementary problems.
Books:
1. Computer System Architecture, Morris Mano, PHI
2. Computer Organization, Hamacher, MGH
3. Computer Architecture, Carter, Schaum Outline Series, TMH
4. System Architecture, Buaad, VIKAS
5. The Fundamentals of Computer Organization, Raja Rao, Scitech

Business Systems and Applications
Code: MCA102
CONTACTS: 3L + 1 T
CREDITS: 4
Use of computers for managerial applications
Technology issues and data and information processing in organisations
Introduction to Information Systems, shift in Information system thinking, latest trends in Information Technology
Computer Based Information Systems- office automation systems, decision making and MIS, transaction processing systems, decision support system, Group Decision Support, Executive Information systems, DSS generator
Overview on:
1) Artificial Intelligence based systems, end user computing, distributed data processing, Knowledge Management, Business system.
2) Deciding on IS architecture, IT leadership & IS strategic planning, IS strategy and effects of IT on competition
3) ERP, re-engineering work processes for IT applications, Business Process Redesign
COURSE STRUCTURE FOR MCA

Knowledge engineering and data warehouse.
Books:
2. Management Information System, Kelkar, PHI
3. Management Information System, Jawadekar, TMH
4. Business Information Systems, Munish Kumar, VIKAS
5. ERP: Concepts & Practice, Garg, 2nd Ed, PHI
6. Business Application in Computer, M.M.Oka, EPH
7. Management Information System, M.M.Oka, EPH

Computer Programming with C
Code: MCA103
CONTACTS: 3L + 1 T
CREDITS: 4
Overview of C
Constants, variables & data types
Operators and expressions
Managing input and output operators
Decision-making and branching/Looping.
Arrays, handling of character Strings.
User-defined functions
Structures and unions
Pointers, file management in C
Dynamic memory allocations in relation to array (Use malloc(), calloc(), realloc(), free() )
Overview of Pre-processor statements.
Program through Command Line Arguments

1. Programming with C, Gottfried, TMH
2. C The Complete Reference, Schildt, TMH
3. Practical C Programming, 3rd Ed, Oualline, SPD/O’REILLY
4. A First Course in programming with C, Jeyapoovan, VIKAS
5. The C answer Book, Tondo, 2nd Ed, PHI
6. C Programming Made Easy, Raja Ram, SCITECH
7. Projects Using C, Varalaxmi, SCITECH
8. Mastering Algorithms With C, Loudan, SPD/O’REILLY

Discrete Mathematical Structure
Code: MM101
CONTACTS: 3L + 1 T
CREDITS: 4
Set Theory foundation mapping (bijective, surjective, injective), Relations-equivalence, Poset, Lattice
Mathematical induction, Propositional logic, Logical equivalence.
Permutation 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, Floyd’s, Warshall’s, DFS, BFS.
Isomorphism, Homomorphism of Graphs.
COURSE STRUCTURE FOR MCA

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
4. Discrete Mathematical Structure, G.S.RAO,New Age International
5. Discrete Mathematics With Applications, Rosen, TMH, 5th Ed
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
12. Discrete Structure and Graph Theory,S.K.S Rathore,EPH

Business English and Communication
Code:     HU101
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, organisation 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
4. Business Communication, Kaul,PHI
5. Communication Skill for Effective Mgmt., Ghanekar,EPH

Data Communication & Computer Networks
Code:     MCA201
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, BIPLOAR, MANCHESTER, DIFF. MANCHESTER).
Digital To Analog – ASK, PSK, FSK, QPSK.
COURSE STRUCTURE FOR MCA

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.
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).
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
9. Data Communication & Network, Dr. Prasad, Wiley Dreamtech
10. Computer network Theory, Prasad, Scitech
11. TCP/IP Network Administration, Hunt, SPD/O’REILLY

Information Systems Analysis & Design

Code: MCA202
CONTACTS: 3L + 1 T
CREDITS: 4

Overview of System analysis and design: Development life cycle, Requirements determination, Logical design, Physical design, Program design, Risk and feasibility analysis, SRS, prototyping
Information requirement analysis: Process modelling with physical and logical data flow diagrams, Data modelling with entity relationship diagrams, Addition modelling method, Developing proposal: feasibility studies, cost benefit analysis.
System design: Process descriptions, Input/output controls, object modelling, Database design, and User Interface design, Documentation
Introduction to - Project management, scheduling, measurement of quality and productivity, ISO and capability maturity models, Strategic planning, system audit.
Quality assurance: reviews, walkthroughs, and inspection.

Books:
1. Analysis & Design of Information Systems, Senn, MH.
COURSE STRUCTURE FOR MCA

3. Analysis, Design of Information System, Rajaraman, PHI
4. System Analysis & Design, Parthasarathi, EPH
5. System Analysis, Design & MIS, EXCEL BOOKS
6. Analysis, Design & implementation of Information Systems, Sharma, VIKAS
7. System Analysis & Design Hand Book, V.K. Jain, Wiley Dreamtech

Data Structures with C

Code: MCA203
CONTACTS: 3L + 1 T
CREDITS: 4

Algorithm concept, Complexity – Big O- Notation, time space trade-off.
Array- Row/Column major representation, sparse matrix, shifting.
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), dequeue(operations), priority queue(operations)- Both iterative & recursive implementation.
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, Loudan, SPD/O’REILLY

Data Base Management System I

Code: MCA204
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
COURSE STRUCTURE FOR MCA

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 optimisation 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. Database System Concepts, Silverchatz, Korth & Sudarshan, MH.
2. Database Management Systems, Majumder & Bhattacharyya, TMH
3. Oracle PL/SQL Programming, Feuerstein, SPD/O'REILLY
5. Fundamentals of Data Base Mgmt. System, Vig & Walia, ISTE/EXCEL
6. Data Base Management Systems, Leon, VIKAS
7. Data Base Processing: Fundamentals, Design & Implementation, Kroenke, PHI
8. SQL PL/SQL for Oracle 8 & 8i, P.S Deshpande, Wiley Dreamtech
9. Data Base Management Systems, V.K Jain, Wiley Dreamtech
10. Beginning SQL Programming, Kauffman, SPD/WROX

Object-Oriented Programming With C++
Code: MCA205
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
6. Object-Oriented Programming With C++, Suburaj, VIKAS
7. Object-Oriented Programming With C++ & JAVA, Samanta, PHI
9. Programming with C++, Radhaganesan, Scitech
10. Projects using C++, Varalaxmi, Scitech
11. Object Oriented modelling & Design, RumBaugh, PHI
COURSE STRUCTURE FOR MCA

Operating Systems and Systems Software
Code: MCA301
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 synchronisation, 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 & synchronisation, 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 synchronisation.
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 OS

Books:
1. Operating Systems, Galvin & Silberschatz, John Wiley
2. Modern Operating System, 2nd Ed, Tannenbaum, PHI
3. Systems Programming & Operating Systems, Dhamdhere, TMH
4. Systems Programming, Donovan, TMH
5. Guide to Operating Systems, Palmer, VIKAS
6. Operating Systems, Prasad, Scitech
7. Operating System, P. Bhatt, PHI
Unix and Shell Programming
Code: MCA302
CONTACTS: 3L + 1 T
CREDITS: 4

Overview of The UNIX Operating System
General Purpose Utilities.
File system & Handling ordinary Files.
Shell commands & simple programming. (Bourne Shell)
   Vi editor advanced Vi Editor.
Basic & More File attributes
Concept of I-Node.
Simple filters. grep command.
Overview of process.
Overview of sed & awk.
Overview of TCP/IP networking- basic concept of 4 layers, network class, basic concepts of the applications, subnet.

Books:
1.UNIX: Concepts & Applications, Sumitava Das, TMH
3.Design of UNIX Operating System, Maurice Bach, PHI
4.Learning the UNIX operating Systems,Peek,SPD/O’REILLY
5.Mastering UNIX/LINUX/Solaris Shell Scripting, Randal k. Michael, Wiley Dreamtech
6.Unix, Xavier,Scitech
7.Learning the Vi Editor,Lamb, SPD/O’REILLY

Intelligent Systems
Code: MCA303
CONTACTS: 3L + 1 T
CREDITS: 4

Overview of Artificial intelligence- Problems of AI, AI technique, Tic – Tac – Toe problem.
Problems, Problem Space & search.
Heuristic Search Techniques,
Knowledge representation issues.
Representing knowledge using rules.
Symbolic reasoning under uncertainty.
Statistical reasoning.
Weak slot & filler structures.
Strong slot & filler structures.
COURSE STRUCTURE FOR MCA

Game planning – Minimax search procedure, adding alpha beta cut-off’s, iterative deepening,
Planning.
Natural language processing, Understanding.
Learning – induction & explanation based learning.
Expert systems- expert system shells, knowledge acquisition.
Basic knowledge of programming language like Prolog & Lisp.

Books:
1. Artificial Intelligence, Ritch & Knight, TMH
2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
3. Logic & Prolog Programming, Saroj Kaushik, New Age International
4. Expert Systems, Giarranto, VIKAS

Statistics and Numerical Techniques
Code: MM 301
CONTACTS: 3L + 1 T
CREDITS: 4

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- Newtons 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.
Gram-Schmidt orthogonalisation, Tchebycheff polynomial
Solution of system of linear equations- Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel, LU factorisation, Tri-diagonalisation.
Inverse Interpolation.
Least Square Curve fitting- linear & non-linear

Books:
1. Numerical Analysis, Shastri, PHI
2. Numerical Analysis, S. Ali Mollah
3. Numerical Analysis, James B. Scarborough
5. Numerical Analysis, G.S. Rao, Navi International
6. Programmed Statistics (Questions – Answers), G.S. Rao, New Age International
7. Numerical Analysis & Algorithms, Pradeep Niyogi, TMH
9. Numerical Methods, Arumugam, Scitech
11. Numerical Methods in Computer Application, Wayse, EPH
COURSE STRUCTURE FOR MCA

Business Management
Code: MBA301
CONTACTS: 2
CREDITS: 2

Basics of management; Planning, scheduling, organising, staffing, directing, controlling
Managerial economics and financial management, productivity management

Human resource development and management, selection, training and role of IT

Introduction to management control systems: goals, strategies; Performance measures

Strategy: firm and its environment, strategies and resources, industry structure and
analysis, corporate strategies and its evaluation, strategies for growth and diversification,
strategic planning

Books:
1. Essentials of Management, Koontz, TMH
2. Management: Text & Cases, Satya Raju, 2nd Ed, PHI
3. BO and Principles of Management, A. Roy, TMH
5. Mgmt. Concept & Strategies, Chandan, VIKAS
6. Management Science, Rao, Scitech
7. Principal & Practice of Mgmt., Ghanekar, EPH
8. Principal & Practice of Mgmt, Amrita Singh, EPH

Management Accounting
Code: MBA302
CONTACTS: 2
CREDITS: 2

Financial accounting, financial statements and analysis
Conceptual framework of cost accounting
Cost-volume profit (CVP) relationship, budgeting, cost accumulation system, variable and
absorption costing system
Financial accounting computer packages.

Books:
1. Management Accounting, Khan & Jain, TMH
2. Management Accounting, M.E. Thukaram Rao, New Age International
COURSE STRUCTURE FOR MCA

3. Financial Accounting for Business Managers, Bhattacharyya, PHI
4. Management Accounting, I.M. Pande, VIKAS
5. Accounting and Financial management for MCA & MBA Students, Ramachandran, Scitech
6. Management Accounting for non-specialists, Atrill, PHI
7. Management Accounting, A.P. Rao, EPH

Software Engineering & TQM
Code: MCA401
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 modelling.

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
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
COURSE STRUCTURE FOR MCA

Graphics & Multimedia
CODE: MCA 402
CONTACTS: 3L + 1 T
CREDITS: 4


Clipping—Cohen-Sutherland subdivision line clipping algorithm, Mid-Point subdivision algorithm, 2-dimensional clipping algorithm (Convex Boundaries & Partially visible lines), Cyrus-Beck 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:
2. Procedural & Mathematical Elements in Computer Graphics, Rogers, TMH
5. Computer Graphics, EXCEL BOOKS
6. Introduction to Computer Graphics, A. Mukherjee, VIKAS
8. Computer Graphics, Bhandari & Joshi, EPH

Data Base Management System II
Code: 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.
Brief introduction to distributed database, temporal database and object-oriented database. Embedded SQL & Applications.

Books:
COURSE STRUCTURE FOR MCA

1. Database System Concepts, Silberschatz Korth, Sudarshan, MH
2. Database Management Systems, Ramakrishnan, MH
4. Oracle PL/SQL Programming, Feuerstein, SPD/O’REILLY
5. Database Management Systems, Leon, VIKAS
6. Data Base Processing: Fundamentals, Design & Implementation, Kroenke, PHI
7. SQL PL/SQL for Oracle 8 & 8i, P.S Deshpande, Wiley Dreamtech
8. Data Base Management Systems, V.K Jain, Wiley Dreamtech
9. Beginning SQL Programming, Kauffman, SPD/WROX

Operation Research & Optimisation Techniques
Code:       MM401
CONTACTS:   3L + 1 T
CREDITS:    4

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

Integer Programming- Cutting Plane, Branch & Bound

Network Optimisation Models- The shortest path problem, Minimum Spanning Tree Algorithm, Maximal Flow Algorithms, PERT/CPM.


Queuing Theory- Basic Structure, Exponential distribution, Birth-and-Death Model, M/M/1 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 Machines

Books:
1. Operation Research, Kanti Swaroop
2. Operation Research, V.K. Kapoor
3. Operation Research, Paneer Selvam, PHI
4. Operations Research, Hillier & Lieberman, TMH
5. Operations Research, Kalavati, VIKAS
6. Operation Research, Humdy Taha, PHI
7. Statistics, Random Process & Queuing Theory, Prabha, Scitech
8. Operations Research, Vijayakumar, Scitech

Environment and Ecology

Code:       HU401
CONTACTS:  3L
CREDITS:    3

Introduction, components of the environment, environmental degradation

Ecology: Elements of Ecology; Ecological balance and consequences of change, principles of environmental impact assessment

Air Pollution and Control: Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, greenhouse effect, depletion of ozone layer, standards and control measures.

Water Pollution and Control: Hydrosphere, natural water, pollutants: their origin and effects, river / lake / ground water pollution, standards and control.

Land Pollution: Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes); their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Noise Pollution: Sources, effects, standards and control.

Books:
1. Environmental Science, Cunningham, TMH
2. Environmental Science, Wright & Nebel, PHI
3. Fundamentals of Ecology, Dash, TMH
4. Environmental Pollution Control Engineering, C.S. Rao, New Age International
5. Environmental Pollution Analysis, S.N. Khopkar, New Age International
7. Environmental Management, Mukherjee, VIKAS
8. Ecosystem Principles & Sustainable Agriculture, Sithamparanathan, Scitech
Values and Ethics of Profession
Code: HU 501
CONTACTS: 3L
CREDITS: 3

Science, Technology and Engineering as Knowledge and as Social and Professional Activities (2 lectures)

Effects of Technological Growth:

Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth; sustainable development (2 lectures)

Energy Crisis; Renewable Energy Resources (2 lectures)


Appropriate Technology Movement of Schumacher: later developments (2 lectures)

Technology and developing nations. Problems of Technology transfer. Technology assessment, impact analysis (4 lectures)


Ethics of Profession:


Profession and Human Values

Value Crisis in contemporary society (2 lectures)

Nature of values: Value Spectrum of a ‘good’ life (2 lectures)

Psychological values: Integrated personality; mental health (2 lectures)

Societal values: The modern search for a ‘good’ society, justice, democracy, secularism, rule of law; values in Indian Constitution (4 lectures)

Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity (2 lectures)

Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility (8 lectures)
COURSE STRUCTURE FOR MCA

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
4. Ethics, Indian Ethos & Mgmt., Balachandran, Raja, Nair, Shroff Publishers

Electives

System Administration and Linux
Code: MCA E502A
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:
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
8. CGI Programming with PERL, Gundavaram, SPD/O’REILLY

Windows Programming With VB
COURSE STRUCTURE FOR MCA

Code: MCA E502B
CONTACTS: 3L + 1 T
CREDITS: 4

Windows concepts and terminology, key elements
Creating the look, communication via messages, windows resources and functions, adding multimedia and sound resources
Writing windows applications, taking control of windows, adding menus, dialog boxes, Special controls.
Introduction to Visual Basic & difference with BASIC. Concept about form Project, Application, Tools, Toolbox, Controls & Properties. Idea about Labels, Buttons, Text Boxes.
Data basics, Different type variables & their use in VB, sub-functions & Procedure details, Input box () & MsgBox (). Making decisions, looping
List boxes & Data lists, List Box control, Combo Boxes, data Arrays.

Books:
1. Win32 API Programming With VB , Roman,SPD/O’REILLY
2. Learn Microsoft VB 6.0 Now,Halvorson, PHI/MSP
3. Visual Basic 6 from the Ground Up, Cornell,TMH
4. Visual Basic 6, CDG, TMH
5. Visual basic 6.0 in 30 days, Krishnan, Scitech
6. Beginning VB 6 ,Wright,SPD/WROX

E-Commerce
Code: MCA E504B
CONTACTS: 3L + 1 T
CREDITS: 4

Computer Systems in Electronic Business
Business Process Re-Engineering
Electronic commerce Policy and Theory
Supply Chain Management
Customer Relationship Management
International trading network & communication protocols
Electronic payment standards
E-Commerce strategy, Marketing and Business Processes

Books:
1. E-Commerce & managerial Perspective,Joseph,PHI
2. E Commerce, Rayport, TMH
3. E Commerce, Diwan & Sharma, EXCEL
4. Creating & winning E-Business, Napier,VIKAS
5. Beginning E-Commerce,Reynolds,SPD/WROX
6. E-Commerce,M.M. Oka, EPH
COURSE STRUCTURE FOR MCA

Object Oriented Programming with Java
Code: MCA E503B
CONTACTS: 3L + 1 T
CREDITS: 4

Oops Concept and Introduction to JAVA
An overview of Java
Data Types - variables and arrays
Operators, Control statements
Classes and objects, Inheritance, String and string buffer, Packages, Interfaces, Exception handling, Multithreaded Programming, Applets, Event handling
Abstract Window Toolkit

Books:
1. Object Oriented Programming with JAVA, Wu, TMH
2. Beginning JAVA 2: SDK 1.4, Horton, SPD/WROX
3. JAVA 2: The Complete Reference, Schildt, TMH
4. Programming in JAVA, EXCEL BOOKS
5. Object Oriented Programming with C++ & Java, Samanta, PHI
6. Object Oriented Application Development using JAVA, Doke, VIKAS
7. Programming with Java 2, Xavier, Scitech
8. Projects on Java 2, Xavier, Scitech

Compiler Design
Code: MCA E504A
CONTACTS: 3L + 1 T
CREDITS: 4


Books:
1. Compiler Design, Aho & Ullman
2. Compiler Design in C, Holub, PHI
Advanced Unix programming
Code: MCA E503A
CONTACTS: 3L + 1 T
CREDITS: 4


Memory mapped I/O. Inter-process communication: Pipes, shared memory, semaphores, messages. Advanced inter-process communications. Streams, Pipes, Open server.

Basics of Visual programming tools like X-windows.

Books:
1. Design of UNIX Operating System, Bach, PHI
2. Your UNIX: The Ultimate Guide, Sumitava Das, TMH
3. UNIX Systems Administration, Maxwell, TMH
4. UNIX Power Tools, Powers, SPD/O’REILLY
5. Essentials of System Administration, Frisch, SPD/O’REILLY
6. UNIX File Systems: Evaluation, Design & Implementation, Steve D. Pate, Wiley Dreamtech

Distributed database management
Code: MCA E501A
CONTACTS: 3L + 1 T
CREDITS: 4

Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, replication. Distributed database design – fragmentation, allocation criteria.
COURSE STRUCTURE FOR MCA


Distributed data dictionary management. Distributed database administration. Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled.


Books:
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, Alexender Pachev, Wiley Dreamtech

Image Processing
Code: MCA E501B
CONTACTS: 3L + 1 T
CREDITS: 4


Books:
1. Digital Image Processing & Analysis, Chanda & Majumder, PHI
2. Fundamentals of Digital Image Processing, Jain, PHI
1. Image Processing, Analysis & Machine Vision, Sonka, VIKAS
Parallel Programming
Code: MCA E501C
CONTACTS: 3L + 1 T
CREDITS: 4


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

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
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, practising English and communication skills

Data structure lab
Code: MCA293
CONTACTS: 4P
CREDITS: 3
Experiment of data structure problems written in C as covered in the theory sessions.

Database lab
Code: MCA294
CONTACTS: 4P
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.

Object-Oriented Programming lab (C++)
Code: MCA295
CONTACTS: 4P
CREDITS: 3
Lab to complement MCA205
COURSE STRUCTURE FOR MCA

Unix lab
Code: MCA392
CONTACTS: 4P
CREDITS: 3
Lab complement to MCA 302

Statistics and Numerical Analysis lab
Code: MM391
CONTACTS: 4P
CREDITS: 3
Programs to be written through C-language.
Familiarization of the language “LINGO”.

Accounting Systems lab
Code: MBA392
CONTACTS: 4P
CREDITS: 3
Lab to complement MBA302

Laboratory exercises using a business accounting software package (Tally 5.0).

Software Project Management lab
Code: MCA491
CONTACTS: 4P
CREDITS: 3
Lab to complement MCA401.

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

**Graphics & Multimedia Lab**
- **Code:** MCA492
- **CONTACTS:** 4P
- **CREDITS:** 3

Lab to complement MCA402

Creating and experimenting with computer graphics. Developing web pages with HTML, DHTML.

**Advanced Database lab**
- **Code:** MCA493
- **CONTACTS:** 4P
- **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.

**Minor project and seminar**
- **Code:** MCA591
- **Credits:** 9
- **Contacts:** 12P

**System Administration & Linux Lab**
- **Code:** MCA E592A
- **Credits:** 3
- **Contact:** 4P

Lab complement to MCA E502A

**Windows Programming Lab**
- **Code:** MCA E592B
- **Credits:** 3
- **Contact:** 4P
Lab complement to MCA E502B

**Major project and seminar**
- **Code**: MCA 691
- **Credits**: 29
- **Contacts**: 36P