

School of Computational Science

New Syllabus w.e.f. (2012-13)

Credit distribution and details of CGPA System

M. C. A. First Year [Two Semesters]

Semester I				
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits
MCA101	Information Technology	2	2	4
MCA-102	Computer Architecture and Organization	2	2	4
MCA-103	Programming Methods	2	2	4
MCA-104	Introduction to Management function	2	2	4
MCA-105	Mathematical Foundations of Computer Science	2	2	4
MCA-106	Lab-1. Programming Methods using C	2	2	4
MCA-107	Lab-2. Soft Computing(IT)	2	2	4
MCA-108	Seminar -1 on Current Topic and Trends	1	0	1
Total Credits		15	14	29

Semester II				
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits
MCA-201	Information system Analysis and Design	2	2	4
MCA -202	Data structures and Algorithm	2	2	4
MCA -203	Oral and Written Communication skills	2	2	4
MCA -204	Data Base Management System	2	2	4
MCA-205	Probability and Statistics	2	2	4
MCA -206	Lab- 3 (Data Structure)	2	2	4
MCA -207	Lab- 4 DBMS (My SQL)	2	2	4
MCA -208	Group Discussion	1	0	1
Total Credits		15	14	29

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M. C.A. Second Year

Semester III				
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits
MCA-301	Operating system	2	2	4
MCA -302	Foundations of OOPs	2	2	4
MCA -303	Management Information System	2	2	4
MCA-304	Data Communication	2	2	4
MCA-305	Graph Theory	2	2	4
MCA-306	Lab-5 Operating system Windows and Linux	2	2	4
MCA-306	Lab-6 (OOPs)	2	2	4
MCA-307	Seminar -2 on Current Topic and Trends	1	0	1
	Total Credits	15	14	29

Semester IV				
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits
MCA-401	Software Engineering	2	2	4
MCA-402	Project Management	2	2	4
MCA-403	Advance Programming Techniques	2	2	4
MCA-404	Computer Network	2	2	4
MCA-405	Machine Learning	2	2	4
MCA-406	Lab-7 Advance Programming Techniques	2	2	4
MCA-407	Lab-8 Machine Learning	2	2	4
MCA-408	Industrial Talk / Visit /Seminar	1	0	1
	Total Credits	15	14	29

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Semester V				
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits
MCA-501	Web Programming and Design	2	2	4
MCA-502	Information Security	2	2	4
MCA-503	Internetworking Protocols	2	2	4
MCA-504	Elective- I	2	2	4
A	E-Commerce			
B	Multimedia			
C	Cyber Forensic			
MCA-505	Elective-II	2	2	4
A	Cloud Computing			
B	Data Mining			
C	Compiler Design			
MCA-505	Practical -9 (Web Programming)	2	2	4
MCA-506	Practical 10 (Internetworking Protocol)	2	2	4
MCA-507	Mini Project	1	0	1
	Total Credits	15	14	29

Semester VI				
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits
MCA-601	Project Work**	13	12	25

Semester	No. of Credits
I	29
II	29
III	29
IV	29
V	29
VI	25
Total Credits	170

*The internal evaluation consists of two tests of 15% each, 20 % for home assignments, and end semester will be of 50% marks.

MCAS-101 Information Technology

(4 Credits)

Unit 1. Introduction

Computer Definition, Uses, Characteristics, Generation Of Computer, Block Diagram Of Computer, Input Devices: Keyboard, Point and Draw devices, Data Scanning devices, Digitizer, Electronic card reader, Voice Recognition device, Vision input device, Output Devices: Monitor, Printer, Plotter, Screen Image Projector, Voice Response System

Unit 2. Computer Memory

Primary and Secondary memory, Memory Hierarchy, Auxiliary Memory, Associate Memory, Cache Memory, Virtual Memory, Classification of computer

Unit 3. Software

System Software / Application Software Compilers, Interpreters, assemblers Linker, Loader Programming Language Paradigm - High Level, Low level Files - Types & operations, File Organization & accessing techniques – Indexed, sequential, hashed. File Handling functions – sorting, merging, Indexing & updating. Concept of file alloc

Unit 4. Operating System Fundamentals

Functions of OS, Roots of MS-DOS, The Kingdom of Dos

1. ROM Software ,2. ROM Startup Routines ,3. ROM-BIOS Routines 4. ROM BASIC Routines 5. ROM Extension Routines

Booting , Physical Structure of Disk, Logical Structure of Floppy Disk, Detailed Boot –

Unit 5. Networking Concepts

Data Communication Concepts, Classification – Serial/Parallel, simplex, half duplex, full duplex. Communication Media – Wired/microwave, E-mail.

LAN, WAN, MAN, Internet, intranet (Basic Concepts), Topologies, Protocols(Introduction), Media Access Methods – Ethernet, Arcnet (no Architecture), Communication Process, OSI – Layers(Introduction)

Unit 6. Microprocessor

Components of Microprocessor, Interfaces & their Tasks, Microprocessor Control Signals (Address, Data and controls), Buses and characteristics , Input/Output Ports, Memories and cache basics, CPU Organization (Pentium Family), Instruction & Execution Cycle

Suggested Readings:

1. Computer Fundamentals: By P.K. Sinha.
2. Operating System Concepts: By Peterson
3. Operating System: By Donovan
4. Computer Networking: By Tenaunbaum
5. Personal Computer Interfaces: By Michel Hordeski - McGraw Hill

MCA -102 Computer Architecture & Organization

(4 Credits)

Unit 1. Number system

Introduction to Number system, Binary, Octal, Hexadecimal, binary-complement representation, BCD-ASCII, conversion of numbers from one Number system to the other, binary arithmetic. , Signed numbers, 1's and 2's complement method,

Unit 2. Logic Gates

Basic Logic Gates – Basic Theorems and Properties of Boolean Algebra – NAND, NOR implementation – Sum of Products – Product of Sums, Karnaugh map, Tabulation Method, Don't Care Conditions. Full Adder, Half Adder,

Unit 3. Processor Organization

General Register Organization - ALU - Instruction codes - Instruction Formats - Stack Organization - Addressing modes

Unit 4. Control Unit

Register transfer and micro operations, Timing and Control, Control Memory, micro programming, Hard wired control

Unit 5. 8085 Microprocessor

Internal Architecture, Instruction Set, Assembly Language programming

Unit 6. Input – Output organization

Peripheral Devices, Input – Output interface , Asynchronous Data Transfer (Strobe & Handshaking Method), Modes of Transfer ,Priority Interrupt , DMA ,

Suggested Readings:

1. M. Morris Mano, "Digital Logic and Computer Design", PHI.
2. M. Morris Mano, "Computer system architecture" Third Edition, PHI/ Pearson Education.
3. Albert Paul Malvino, Donald P. Leach, "Digital Principles and Applications", Tata Mc GrawHill Pub. Company Ltd.
4. J.P.Hayes, "Computer Architecture and Organization" Tata Mc Graw Hill Pub. Company Ltd

MCA-103 Programming Methods

(4 Credits)

Unit 1. Language Fundamentals

Introduction to Languages, Basic types of languages (Machine, Assembly, High level Languages), History of C Programming, Structures of 'C' Programming, Function as building blocks

Character set, Tokens, Keywords , Identifiers, Variables and Constant, Data Types, comments, Types of operators, Operator Precedence and Associativity, Expression, Statement and types of statements

Unit 2. Built-in function and control structure

Console based I/O and related built-in I/O function:

printf(), scanf(), getch(), getchar(), putchar()

Control Structures, Decision making structures, Loop Control structures, Other statements : Break, Continue, Goto, exit

Unit 3. . Functions

Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing: Call by value & Call by reference, Scope of variables, Storage classes, Recursion
Arrays: One dimensional array :. Definition, declaration and initialization, . Accessing array elements, Displaying array elements, Sorting arrays, Arrays and function, . Memory representation of array, Two Dimensional array & Multidimensional array

Unit 4. Pointers and string Handling

Definition and declaration, Initialization of pointer, Indirection operator, address of operator
Pointer arithmetic, Dynamic memory allocation, Arrays and pointers, Function and pointers

Strings: Definition, declaration and initialization of strings, standard library functions :
Implementation without using standard library Functions

Unit 5. Structures,

Definition and declaration, Variables initialization, Accessing fields and structure operations
Nested structures, Union : Definition and declaration. Differentiate between Union and structure

Unit 6. C Processor and file Handling

C Preprocessor: Definition of Preprocessor, Macro substitution directives, File inclusion directives, Conditional compilation

File handling: Definition of Files, Opening modes of files

Standard function: fopen(), fclose(), eof(), fseek(), rewind()

Using text files: fgetc(), fputc(), fprintf(), fscanf()

Suggested Readings:

1. C - The complete Reference Herbert Schildt TMH
2. The C Programming Language Kerningham and Ritchie
3. Understanding Pointers in C - Y.Kanetkar

MCA -104 Introduction to Management functions

(4 Credits)

Unit 1. Introduction to Management

Definition, Characteristics of management, Importance of Management, Administration , Management thoughts: Contribution of F.W. Taylor , Henry Fayol , Peter Drucker, etc Management process school, Systems Management School,

Unit 2. Planning and Controlling

Planning: Definition, Characteristics, Nature, Importance, Types of Plans:(Standing and Single Use Plans) , Planning Process
Controlling: Concept, Definition, Principles of Controlling, Objectives of controlling, Importance of Controlling

Unit 3. Organizing

Concept, Definition, Process of organization, Principles of organization, Authority, Responsibility and Delegation, Forms of organization. Centralization and Decentralization

Unit 4. Leadership and Motivation

Concept of Leadership, Definition, Qualities of Leadership, Leadership Styles
Motivation: Meaning and Definition, Theories of Motivation1. Maslow's Need Hierarchy
McGregor's Theory "X" and Theory "Y"

Unit 5. Staffing

Human Resource Planning, Recruitment, Selection, Training, Training and development, Performance appraisal methods

Unit 6. Quality Concepts and Social responsibility of Business

Total Quality Management, ISO, Quality Circle
Social Responsibility of Business: Definition, Responsibilities towards owners, workers, consumers, suppliers, state, society etc.

Suggested Readings:

1. Essentials Of Management: Harold Koontz ,Heinz Weihrich, Tata Mcgraw Hill.
2. Principles And Practice Of Management: Dr.S.C.Saxena, Sahitya Bhavan Publications.
3. Principles Of Management: R.N.Gupta, S.Chand & Company

MCA-105 Mathematical Foundation of Computer Science

(4 Credits)

Unit 1. Mathematical Logic

Propositions, Logical Connectives and compound Propositions, Truth Tables, Logical Equivalence, Algebra Of Propositions, Conditional Propositions, Converse, Contra positive and Inverse, Biconditional Statements, Negation Of Compound Statements, Tautologies, Contradictions and Contingency, Methods Of Proof, Predicate Calculus

Unit 2. Boolean Algebra and Logic Circuits

Boolean Algebra, Unique Features, Basic Operations, Boolean Functions, De-Morgan's Theorem, Logic Gates, Sum Of Products and Product Of Sums Forms, Normal Form, Expression of Boolean Function as a Canonical Form, Simplification of Boolean Expression, Boolean Expression From Logic and switching Network, Implementation Of Logic Expressions With Logic gates and switching Circuits, Functionally Complete Sets, Karnaugh Map Method For Simplification Of Boolean Expression

Unit 3. Crisps sets and fuzzy sets

Introduction, Crisps sets, Fuzzy sets, Containment, Normal fuzzy set, Support of fuzzy set Alpha Cut set, Basic operation of fuzzy sets, Fuzzy Cartesian product, Fuzzy relation

Unit 4. Relations And Functions

Relations On Sets, Types Of Relations, Properties Of Relations, Representation Of Relation Relational Database, Functions Classification Of Functions
Types Of Functions, Composition Of Functions, Some Special Functions

Unit 5. Groups Rings And Field

Binary Operations, Group, Groupoid, Semi Group and Monoid, Sub Group, Cyclic Group Permutation Group, Homomorphism and Isomorphism Of groups, Ring, Sub Ring, Fields,

Unit 6. Elements Of Coding Theory

Introduction, Definitions, Group Codes, Parity-Check and Generator Matrix

Suggested Readings:

1. Text Book of Discrete mathematics. By swapan Kumar sarkar (S Chand and company)
2. Fuzzy sets uncertainty and Information By George J. Klir, Tina A. Folger.(Prentice Hall of India.)
3. Logic for C.S. By Gallier.
4. Discrete maths by Stant.
5. Discrete maths by Tremblay and Manohar.
6. Discrete mathematical structures for computer science By Kolman B and Busby R.
7. Concept of discrete mathematics By Sahni's.
8. Discrete mathematical structure with Application By Tremblay J.P.
9. Practical foundation of mathematics by Taylor.

MCA-106 Lab-1 Programming Method using C
MCA-107 Lab-2 Soft Computing (IT)
MCA-108 Seminar -1 on Current Topic and Trends

MCA-201 Information System Analysis and Design (4 Credits)

Unit 1. System

Definition, Characteristics, elements and types of system. System Development Life Cycle, Role of system analyst, Initial investigation, Feasibility study-Technical, economic and behavioral feasibility, Cost and Benefit analysis.

Unit 2. System Analysis

Problem Definition, Information requirements, Information gathering tools, Tools of structured Analysis – Data Flow Diagrams, Data Dictionary, Decision Tree, Decision tables and structured

Unit 3. System Design and File Organization

Structured Design, Input design, and Output design, Form Design.
File Organization: Sequential Indexed Sequential, Chaining and Inverted list organization.

Unit 4. System Implementation

Implementation Plan, activity network for conversion, combating resistance to change

Unit 5. System Testing

Test Plan AND test data, types of system test.

Unit 6. Hardware/Software Selection

Procedure for selection, Major phases in selection, Make v/s buy decision, Criteria for software selection.

Suggested Readings:

1. Awad, EM: System Analysis and Design, Galgotia Publications Pvt. Ltd
2. Gane and Sarson: Structured System Analysis and Design.
3. Silver, GA, Silver, ML: System Analysis and Design, Addison-Wesley Publishing Co

MCA – 202 Data structures and Algorithm

(4 Credits)

Unit 1. Introduction to Algorithm

Introduction to Algorithm, The efficiency of Algorithms, Analysis of Algorithms, overview of Space and Time Complexities, some fundamental algorithms for exchange , counting , summation .

Unit 2 . Introduction to data structures

Introduction to data structures, Basic terminology, Primitive data structure operations
Overview of STACKS, QUEUES, LINKED LISTS, BINARY TREES and GRAPHS (Basic Definition , Representations, Characteristics , Types, Applications)

Unit 3. Tree and Graph

Minimum Spanning Trees, Growing a minimum spanning tree, The algorithms of Kruskal and Prim

Graphs : DFS and BFS algorithms associated with Graphs, Single-source shortest Paths, The Bellman-ford algorithm,

Unit 4. Sorting and Searching

Introduction to searching and sorting problems, Linear search , Binary search, Selection sort , Bubble sort , Insertion sort , Merge sort, Complexities of searching and sorting algorithms.

Unit 5. Divide and Conquer Techniques

Divide and conquer, General method, Binary search, Merge sort
Strassen's matrix multiplication

Unit 6. Advanced Data Structure

Introduction to Greedy method, The general method, Container loading knapsack problem,
Introduction to Dynamic Programming, General method
Introduction to NP Theory

Suggested Readings:

1. How to solve it by Computers, R.G. Dromey , 8th Edition , Pearson Education
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahani, S.
3. Rajasekaran , 2nd Edition , Universities Press Inc
4. Data Structures, Lipschutz , Tata McGraw Hills
5. Introduction to Algorithms, Corman , Leiserson and others, 2nd edition , PHI

MCA-203 Oral and Written Communication Skills

(4 Credits)

Unit 1. Oral Communication: Speaking with Correct Pronunciation/ Paralanguage

Phonemes: English Vowels and Consonants

Syllable, Accent, Intonation

Word and Sentence Transcription

Reading Phonetic Transcription

Unit 2. Communication Techniques

Importance of communication

Types/Methods of communication: Verbal and Non-verbal

Process of communication: One way and two way, horizontal, vertical, upward, downward

Barriers to communication and overcoming barriers

Use of audio-visual aids for effective communication

Unit 3. Developing Creative Writing

Note Taking & Note Making Skills, Essay Writing, Précis Writing, Oral Presentation Principles

Unit 4. Correspondences

Business Letters: Enquiry, Placing Supply Order, Complaint, Adjustment, Circular, Memo, Curriculum Vitae and Effective Profiling, British and American Format of Letters

Unit 5. Career Skills

Interviews: concept, purpose, types, procedure.

Group Discussions: preparation and practice

Meeting: notice, agenda, minutes

Seminars: preparation and presentation

Unit 6. Soft Skills and Interpersonal Skills

Concepts of Self: Personality Development, Self Awareness and Self Assessment, Self Confidence, Self Esteem, Values, Attitudes etc.

Stress Management, Managing Time, Meditation, Improving Personal Memory

Suggested Readings:

1) **English for Practical Purposes**, Z. N. Patil, B. S. Valke, Ashok Thorat, Zeenat Merchant

2) **Business Communication**, Urmila Rai and S.M. Rai

3) **Personality Development and Communicative English**, Dr. S.R. Pandya and Dr. Pratima Dave Shastri

4) **Better English Pronunciation**, J D O'Connor,

5) **Oxford Guide to Effective Writing and Speaking**, John Seely

6) **7 Habits of Highly effective People**, Stephen Covey

7) **Think and growth**, Napoleon Hill

MCA- 204 Data Base Management System

(4 Credits)

Unit 1. Introduction to DBMS

Basics of database systems, problems in traditional file oriented approach, Three level architecture of DBMS, General architecture of DBMS , discussions on various modules in it

Unit 2. Data models

Concept of abstraction and data model, Introduction of entity relationship model, elements of the e-r model, types of entities, relationships, modeling examples using e-r model
Introduction to relational model , elements of the relational model , modeling examples using relational models

Unit 3. Relational algebra and Normalization

Relational algebra: basics of relational algebra, unary and binary operators including set operators , cross product ,division etc
Join and its types , nested loop join method, Relational calculus, tuple relational calculus, domain relational calculus. Introduction to data retrieval languages like qbe, quel, sql
Various normal forms and normalization process, First normal form, second normal form, third normal form, Basic concept of query execution.

Unit 4. Security aspects and Integrity mechanism

Basic threats, General defense mechanism, Authorization, identification and authentication policies, Discussions on roles of DBA, data dictionary
Basic integrity threats, General integrity model, Domain level constraints , referential constraints. .

Unit 5. Concurrency control

Basic concept of Transaction management, Concurrency control Needs, Use of locks, lock protocols – s, x, binary, 2pl, graph based, granularity, Concurrency control by timestamps, Concurrency control by validation. Concurrency control by optimistic scheduling, multi version schemes

Unit 6. Recovery management

Types of failures
Log based recovery – deferred and immediate mode
Check points, shadow page tables
Backup

Suggested Readings:

1. Raghu Ramakrishnan/Johannes Gehrke, “Database Management Systems”, Tata Mc Graw Hill.
2. Silber Schatz. Korth, “Database System Concepts”, Tata Mc Graw Hill.
3. ShamKanth B. Navathe, “Fundamental of DataBase System”, Pearson Education.
4. Database management System, Bipin desai
5. Oracle by Ivan N. Bayross
6. Oracle PL/SQL Programming by Scott Urmann

MCA-205 Probability and Statistics

(4 Credits)

Unit 1. Probability

Definitions of probability, Addition theorem, Conditional probability, Multiplication theorem, Bayes theorem of probability and Geometric probability.

Unit 2. Random variables and their properties

Discrete Random variable, Continuous Random variable, Probability Distribution joint probability distributions their properties, Transformation variables, Mathematical expectations, probability generating functions.

Unit 3. Probability Distributions / Discrete distributions

Binomial, Poisson Negative binomial distributions and their properties. (Definition, mean, variance, moment generating function., Additive properties, fitting of the distribution.)

Unit 4. Continuous distributions

Uniform, Normal, exponential distributions and their properties.

Unit 5. Multivariate Analysis

Correlation, correlation coefficient, Rank correlation, Regression Analysis, Multiple Regression, Attributes, coefficient of Association, χ^2 test for goodness of fit, test for independence.

Unit 6. Estimation

Sample, populations, statistic, parameter, Sampling distribution, standard error, unbiasedness, efficiency, Maximum likelihood estimator, notion & interval estimation.

Suggested Readings:

1. Probability & Statistics for Engineers and Scientists, Walpole, Myers, Myers, Ye. Pearson Education.
2. Probability, Statistics and Random Processes T.Veerarajan Tata McGraw – Hill
3. Probability & Statistics with Reliability, Queuing and Computer Applications, Kishor S. Trivedi, Prentice Hall of India ,1999

MCA-206 Lab -3 Data Structure

MCA-207 Lab-4 DBMS

MCA-208 Group discussion