

## **Course Name: Fundamentals of Programming**

### **Course Code: MCA111**

**Objectives:** The aim of this course is to introduce the rudiments of programming to the students. Students will become familiar with problem solving techniques and algorithm development using computers. This will include structured programming using C, a high-level programming language.

**Prerequisites:** None

### **Contents:**

- 1.Introduction to programming& Basics of C:** Concepts of Algorithm and Flowcharts, Process of compilation, Generation of languages, Basic features of C Language like Identifier, Keywords, Variable, data types, Operators and Expression. Basic screen and keyboard I/O **[10%]**
- 2.Control Statements:** Test Conditions, Conditional execution and selection, Iteration and Repetitive Executions, Nested loops. **[10%]**
- 3.Arrays:** Introduction to contiguous data types. One dimensional arrays, multidimensional arrays, Array as strings, multidimensional character arrays. Operations on strings. **[15%]**
- 4.Functions:** Concept of modular programming, Using functions, Scope of data, Recursive functions. Command line arguments. **[15%]**
- 5.Pointers:** Need of pointer, Types and uses of pointer, Array and Pointers, Pointers and strings, Pointer to Pointer, Pointers and functions, other aspect of pointers. **[15%]**
- 6.User Defined Data Types:** Introduction to structures, usage of structure, nested structures, Union and its usage, Enumeration types, bit fields. **[10%]**
- 7.Files:** Types of files, working with files, usage of file management functions. **[15%]**
- 8.Linked List:** Introduction to dynamic memory allocation, singly link list, operations on singly link list. **[5%]**
- 9.Other features of C:** Bitwise operators and its usage, C Preprocessor statements. **[5%]**

### **Main Reference Book(s):**

1. **Programming in C**, by Pradip Dey & Manas Ghosh, Publisher – Oxford

### **Suggested Additional Reading :**

1. **Computer Science: A Structured Programming Approach Using C**, by Behrouz A. Forouzan & Richard F. Gilberg, Publisher – Thomson Education.
2. **Programming in ANSI C**, by Balagurusamy, Publisher - Tata McGraw Hill.
3. **Programming with ANSI and Turbo C**, by Ashok N Kamthane, Publisher – Pearson Education.
4. **Mastering C**, by Venugopal & Prasad, Publisher – Tata McGraw Hill.
5. **C: The Complete Reference**, by Herbert Schildt, Publisher – Tata McGraw Hill.
6. **Let us C**, by Yashwant Kanitkar, Publisher – BPB Publication
7. **Schaum's Outline of Programming with C**, By: Byron Gottfried, Publisher – Schaum Series.

### **Chapter wise coverage from main reference Book(s) :**

Chapter 1 to 11 except 10.4-10.6, 11.5-11.7

### **Accomplishments of the student after completing the course :**

After completion of the course students should become reasonably good at problem solving and algorithm development. They would become capable of solving problems using computers through C programming language.

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**Course Name: Discrete Mathematics for Computer Science**

**Course Code: MCA 112**

**Objectives:** The objective of this course is to present the foundations of many basic computer related concepts and provide a coherent development to the students for the courses like Fundamentals of Computer Organization, RDBMS, Data Structures, Analysis of Algorithms, Theory of Computation ,Cryptography, Artificial Intelligence and others. This course will enhance the student's ability to think logically and mathematically.

**Prerequisites:** Knowledge of basic concepts on Sets, different operations on sets, binary operations, functions.

**Contents:**

**1: Lattices and Boolean Algebra [20%]:**

Relation and ordering, partially ordered sets, Lattices as poset, properties of lattices, Lattices as algebraic systems, sublattices, direct product and homomorphism, complete lattices, bounds of lattices, distributive lattice, complemented lattices.

Introduction, definition and important properties of Boolean Algebra, Sub Boolean algebra, direct product and homomorphism, join-irreducible, meet-irreducible, atoms, anti atoms, Stone's representation theorem. (Without Proof)

**Note:** No proof is required for Theorems or Results on lattices and Boolean Algebra. Theorems should be justified and explained by suitable examples .

**2: Applications of Boolean Algebra [20%]:**

Boolean expressions and their equivalence, Minterms and Maxterms, Free Boolean algebra, Values of Boolean expression, canonical forms, Boolean functions, representation of Boolean function, Karnaugh maps, minimization of Boolean function, Quine\_ Mccluskey algorithm.

**3: Group Theory [20%]:**

Definition and example of groups, abelian group, cyclic groups, subgroups, permutation groups, cosets decomposition of groups, Normal subgroups, Lagrange's theorem (Without proof)

**4: Graph Theory [20%]:**

Basic concepts of Graph theory, paths, reachability and connectedness, matrix representation of graph, trees.

**5: (a) Predicate Calculus [10%]:**

Introduction, predicates, statement functions, variable and quantifiers, predicate formulas, free and bound variables, the universe of discourse.

**(b) Algorithm and time complexity [10%]:**

**Main Reference Books :**

1. Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, by J. P. Tremblay and R. Manohar.
2. Discrete Mathematical Structure, Pearson Education, Bernard Kolmann & others, Sixth Edition
3. Discrete Mathematical Structure (Theory and Application), Cengage Learning  
D. S. Malik, M. K. Sen

**Suggested Additional Reading :**

1. Discrete Mathematics and its applications, Tata McGraw-Hill, 6<sup>th</sup> edition, K. H. Rosen.
2. Discrete Mathematics with Graph Theory, PHI, Edgar G. Goodaire, Michael M. Parmenter.
3. Logic and Discrete Mathematics, Pearson Education, J. P. Tremblay and W. K. Grassman.

**Chapter wise coverage from the main reference books:**

1. From Book # 1  
Chapter – 1, article 1.5 (1-5.1 to 1-5.5)  
Chapter – 2, article 2.3 (2-3.1 to 2-3.9)  
Chapter – 4, articles 4.1, 4.2, 4.3, 4.5  
Chapter – 5, article 5.1 (5-1.1 to 5-1.4)
2. From Book # 2  
Chapter – 9, articles 9.4, 9.5 From Book # 3
3. From Book # 3  
Chapter – 9, article 9.1

**Accomplishment of the student after completing the course :**

The student will be able to find minimal Boolean expressions, shall learn the fundamentals of graphs, trees, representations methods for computers, predicate calculus complexities of algorithms and algebraic structures.

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**Course Name: Fundamentals of Computer Organization**

**Course Code : MCA113**

**Objectives:** Students will learn

- The elements of Computer Organization and Architecture.
- The basic knowledge necessary to understand the hardware operations of digital computers.

**Prerequisites: ----**

**Contents:**

- 1. Basic Components of a digital computer [4%]**
- 2. Number Systems[10%]**
  - Decimal System
  - Bistable Devices
  - Binary, Octal and Hexadecimal numbers.
  - Number Base conversions
  - Binary Addition, Subtraction, Multiplication, Division
  - Complements
    - Use of complements to represent Negative Numbers
    - Binary Number Complements
    - Complements in other Number Systems.
  - Binary codes
    - Weighted and Non-weighted codes
      - BCD Code
      - Excess Three (XS-3) Code
      - Gray Code
        - Binary to Gray & Gray to Binary
    - Error detecting and correcting codes
      - Parity and Hamming code
- 3. Boolean Algebra and Logic Gates [16%]**
  - Fundamental Concepts of Boolean Algebra
  - Logical Multiplication
  - AND & OR gates
  - Complementation & Inverters
  - Evaluation of Logical Expressions
  - Basic Laws of Boolean Algebra
  - Proof by Perfect induction
  - Simplification of Expressions
  - De Morgan's Theorems

- Basic duality of Boolean Algebra
- Derivation of a Boolean Expression
- Interconnecting gates
- Sum of Products and Product of Sums
- Derivation of Product-of-Sums expressions
- Derivation of Three input variable expressions
- NAND & NOR gates
- Map Method for Simplifying Expressions
  - K-map ( Four Variables)
  - Cubes & covering
  - Don't Cares
- Design Using NAND Gates
- Design Using NOR Gates
- NAND to AND & NOR to OR gate Networks

**4. Logic Design [16%]**

- Flip-Flops
- Transfer Circuit
- Clocks
- Flip-Flop Designs
- Gated Flip-Flop
- Master Slave Flip-Flop
- Shift Register
- Binary Counter
- BCD Counter
- Counter Design

**5. The Arithmetic-Logic Unit [10%]**

- Construction of the ALU
- Integer Representation
- Binary Half-Adder
- Full-Adder
- Parallel Binary Adder
- Positive & Negative Numbers
- Addition in the 1'S Complement System
- Addition in the 2'S Complement System
- Addition and subtraction in a parallel Arithmetic Element
- Binary Coded Decimal Adder
- Shift Operations
- Binary Multiplication
- Binary Division

**6. Digital Components [10%]**

- Integrated Circuits
- Decoders
  - NAND gate Decoder
  - Decoder Expansion
- Encoders
- Multiplexers
- Memory Units
  - Random-Access Memory
  - Read-Only Memory
    - Types of ROMs

**7. Central Processing Units [6%]**

- Stack Organization (Intro.)
- Instruction Formats
- Addressing modes

**8. Input-Output Organization [8%]**

- Peripheral Devices
- Asynchronous Data Transfer
  - Handshaking
- Modes of Transfer
  - Programmed I/O
  - Interrupt-initiated I/O
  - Direct Memory Access (DMA)
- Direct Memory Access (DMA)

**9. Memory Organization [6%]**

- Memory Hierarchy
- Main Memory
  - RAM, ROM, Bootstrap Loader
- Auxiliary Memory
  - Magnetic Disk
  - Magnetic Tape
- Cache Memory (Intro)
- Virtual Memory (Intro)

**10. Peripheral Devices \* ( Intro) [14%]**

- Key Board
- Mouse
- Display Unit
- Printer (Types)
- Scanner
- OCR-OMR-MICR
- Multimedia Projector

**Main Reference Book(s):**

1. Digital Computer Fundamentals , Tata McGraw Hill, 6<sup>th</sup> Edition, Thomas C. Bartee
2. Computer System Architecture, PHI/Pearson Education, 3<sup>rd</sup> Edition, M. Morris Mano

**Suggested Additional Reading:**

1. Fundamentals of Digital circuits, PHI/Pearson education, A. Anand Kumar

**Chapter wise Coverage from the main reference book(s):**

1. Digital Computer Fundamentals – Thomas C. Bartee

Chapter – 1:	1.7
Chapter – 2:	Whole
Chapter – 3:	3.1 to 3.23
Chapter – 4:	4.1 to 4.9, 4.12
Chapter – 5:	5.1 to 5.9, 5.11, 5.14, 5.16 to 5.18

2. Computer System Architecture – M. Morris Mano

Chapter – 2:	2.1 to 2.3, 2.7
Chapter – 8:	8.3 to 8.5
Chapter – 11:	11.1, 11.3, 11.4, 11.6
Chapter – 1:	12.1 to 12.3, 12.5, 12.6

\* Peripheral Devices may be covered from Internet or any latest books.

**Accomplishments of the student after completing the course:**

Students will get the knowledge of computer organization and architecture. They will know the actual working and organization of digital computer system.

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## **Course Name: Database Management Systems-I**

### **Course Code : MCA114**

**Objectives:** This course is intended to give students a solid background in relational database management systems (RDBMS).

**Prerequisites:** Basic knowledge of working with Computer.

### **Contents:**

#### **1. Introduction : [10%]**

Basic Concepts: data, database, database systems, database management system, Purpose and advantages of Database management system (over file systems) , data models: Introduction, Three level architecture, Overall architecture of DBMS, Various components of a DBMS

#### **2. Data Modeling/Conceptual Design [15%]**

Entity sets, attributes and keys, Types of entities, Relationships (ER) and Types of relationships, Database modeling using entity and relationships, Enhanced entity-relationship diagrams

#### **3. Relational Data Model [10%]**

Relational structure - tables (relations), rows (tuples), domains, columns (attributes), keys: super key, candidate keys, primary key, entity integrity constraints, referential integrity constraints

#### **4. Database Design [20%]**

Relational structure - tables (relations), rows (tuples), domains, columns (attributes), keys: super key, candidate keys, primary key, entity integrity constraints, referential integrity constraints, Database design process, Anomalies in a database, Functional Dependencies(Lossless decomposition, Dependency preservice, Closure set of FD, Canonical cover, Lossless Joins ), Finding Candidate keys using Armstrong rules, Stages of Normalisation: 1NF ,2NF ,3NF, BCNF ( with general definition also) and Multi-valued Dependency : 4NF & 5NF( Project Join NF)

Translation of E-R schemes (logical design) to relational schemes (physical design): A case study.

## **5. Relational Algebra [15%]**

Basic operators (Select, project, union, set, difference, cartesian product and rename)  
Additional operators (Set interaction, Natural Join, Division and Assignment operator),  
Insert, Update, Delete operators

## **6. Query languages [25%]**

Introduction to SQL, Advantages of using SQL, Data definition language and Data manipulation language commands using SQL, Basic and Advanced queries in SQL, Views.

## **7. Data Dictionary [5%]**

Introduction to data dictionary, Usage of data dictionary

### **Main Reference Book(s):**

- 1.Database Design, Application Development and Administration (Micahel V. Mannino)- Second/Third edition, Mc-Graw Hill.
- 2.SQL, PL/SQL – The programming Language of Oracle, BPB Publications, Ivan Bayross

### **Suggested Additional Reading:**

- 1.Database Management Systems, Ramakrishnan, Gehrke, Third edition, McGraw Hill.
- 2.Database Systems: Design, Implementation and Management, seventh edition, Peter Rob, Carlos Coronel, Thomson Course technology.
- 3.Database Systems: Concepts, Design and Applications, Pearson Education, S.K.Singh.

### **Chapter wise Coverage from the main reference book(s):**

**Book No. 1 : Chapter 1,2,5,6,7,14.2.4**

**Book No. 2 : Complete**

**Accomplishments of the student after completing the course:** Effective user or a DBMS Professional. A student would be able to effectively squeeze the "real world" data into the relational data model of the database system and would be able to retrieve the data afterwards.

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**Course Name:** Enterprise Resources & Financial Management

**Course Code:** MCA115

**Objectives:** To provide awareness of the underlying financial structure and procedure of the organization so that the interaction of financial systems with information systems can be understood by the information system designers.

**Prerequisites:** --

**Contents:**

1. ERP Introduction – Enterprise resource planning, Benefits of ERP, business process reengineering, Data warehousing, Data Mining, On line Analytical Processing (OLAP), Supply Chain Management [15%]
2. ERP Modules – Introduction, Business modules in ERP , finance [15%]
3. Introduction to accounting, Accounting mechanics-I Basic records, Accounting mechanics-II Final Accounts [15%]
4. Analysis and Interpretation of Financial Statements [10%]
5. Budgetary Control [20%]
6. Project Management [10%]
7. Fixed Assets and Depreciation Accounting, Standards for Control [15%]

**Main Reference Book(s):**

1. A textbook of Financial Cost and Management Accounting by Dr. P. Periasamy , Himalaya Publishing House.
2. Accounting and Financial Management by D.R. Patel, Atul Prakashan.
3. ERP Demystified by Alexis Leon, Tata McGrawHill Publication.

**Suggested Additional Reading:**

1. Accounting for Management by N.P. Srinivasan, M. Sakthivel Murugan, S. Chand.

**Chapter Wise Coverage from Main Reference Book(s):**

1. ERP Introduction – Chapter 1-9 (From Alexis Leon)
2. ERP Modules – Chapter 20,21 (From Alexis Leon)
3. Accounting Principles and Concepts, Double Entry System of Accounting, Accounting Books and Records, Final Accounts (Chapter 2 to 4 from Dr. Periasamy).
4. Ratio Analysis (Chapter 9 from Dr. Periasamy).
5. Forecasting and Budgetary Control (Chapter 11 from D.R. Patel) excluding methods of forecasting and proforma financial statements.
6. Project Management (Chapter 12 from D.R. Patel), only project appraisal techniques.
- 5a. Fixed Assets and depreciation Accounting (Chapter 5 from D.R. Patel) excluding implication of the cost concepts and financial accounting treatment of depreciation, cash flow implications of depreciation, taxation and depreciation accounting, accounting standards for depreciation.
- 5b. Standard Costing (Chapter 8 from D.R. Patel)
- 5c. Break Even Analysis (Chapter 10 from D.R. Patel)

**Accomplishments of the student after completing the course:** Students will have insight of Enterprise resource planning, Business modules and Financial management

## **Course Name: Software Lab**

### **Course Code : MCA116**

#### **Objectives:**

Since the advent of computers, technology has come a long way. Before plunging into high end computing, it is necessary for any computer user to understand the fundamentals of the functioning of a computer. Hence it is inevitable that the user gets acquainted with the two basic operating systems : DOS and Windows XP. Computers are widely and popularly used for the storage, representation, analysis and reproduction of data and thus it is important to have a thorough understanding of the various software packages available for use. The objective of this course is thus to acquaint the students with computers, its basic operating systems and Office suite of programs for effective representation and analysis of data.

#### **Prerequisites: ---**

#### **Contents:**

##### **1 : Disk Operating System (DOS) [10%]**

What is DOS ?, configuring DOS, working at command prompt, commands and programming, data organization in DOS, managing directories, DOSKEY, copying and moving files, file management, formatting and unformatting disks, disk management, DOS Editor, batch programs and macros

##### **2 : Windows XP [10%]**

Introduction to Windows basic, using the Windows XP interface effectively, working with files and folders, viewing and managing files and folders, configuring, customizing and optimizing Windows, using Control Panel, customizing the taskbar, start menu, desktop, keyboard settings and mouse settings, creating and customizing shortcuts, configuring the Recycle Bin, file and data management, using and customizing Windows Explorer, using Windows interface to create, installing and uninstalling applications and devices, print and store a file, managing system resources, disk defragmenter, understanding and using digital certificates, benefits of Windows XP Professional,

##### **3 : Microsoft Office [50%]**

Introduction to MS-Office suite of programs, file management, using common office tools

- I. MS-Word : Laying out text, laying out the page, speeding text entry, quick text changes, using scroll bar, using Go To command, viewing files, techniques for entering text and graphics, finding and replacing text and other things, using textboxes, border, shading and color, creating numbered and bulleted lists, adding “text effects”, creating and removing columns, working with tables, macros, using mail merge, managing footnotes and endnotes, using headers and footers, page numbering,

inserting captions, forging cross-references, paragraph and character styles, creating and applying styles, constructing Word templates, using hyperlinks, table of contents and indexes, using spell check, grammar and thesaurus, object linking and embedding

- II. MS-Excel : Types of data, entering, editing and erasing data, resizing rows and columns, hiding and unhiding rows and columns, formatting, auto formatting, conditional formatting, adding comments, working with ranges, working with formulas and functions, fixing formulas, evaluating formulas, entering functions, nesting functions, recording, storing and using macros, understanding data series and categories, using the chart wizard, adjusting data on charts, formatting charts, mixing different types of charts in the same chart, filtering data with auto filter and advanced filter, sorting data, working with lists, Pivot Tables and Pivot Charts, using PivotTable wizard, creating one-variable and two-variable data tables, what-if analysis using Goal Seek and Scenario, working with Add-ins, protecting and unprotecting a worksheet and a workbook
- III. MS-Powerpoint : Creating a presentation with AutoContent wizard, with a template and from scratch, inserting, deleting, rearranging and copying slides, using numbers and bullets, customizing and sprucing up presentations by adding images, slide transitions, animation schemes, including graphs, charts, tables, columns, sound and video, creating and modifying WordArt objects, managing headers and footers, using Action buttons, using Masters like the Slide Master, Handout Master and Notes Master, creating slide shows, rearranging and hiding slides, adding comments, moving between slides, setting up the slide show, custom slide show, using recording narration, creating self-running presentations, using Pack and Go wizard, printing slides, speaker notes, handouts, an outline
- IV. MS-Access : Introduction to database, tables, records, fields, forms, queries macros, modules and reports, creating a database with the Database wizard and from scratch, creating tables, defining data types and its properties, refining and customizing a table, understanding and creating relationships and indexes, entering data in datasheet view or through form, using form views, controlling form appearance using Auto Format, binding a form to data, working with controls, exporting of data to other programs and databases, sorting, filtering and querying data, using select queries, action queries, customizing queries, creating forms and its layouts, creating, editing and executing macros, creating and printing reports and creating mailing labels

#### **4 : Internet and the World Wide Web [30%]**

Introduction to Internet and WWW, elements of www, browsers, Internet services, Intranet – its advantages and disadvantages, difference between Internet and Intranet, difference between Intranet and LAN, email concepts, sending and receiving email messages, email netiquette, using smileys, abbreviations and emoticons, signatures

and attachments to emails, filtering emails, securing emails by using digital certificates, forms of chats and conferencing, chat netiquette, ways to use chat effectively, usenet newsgroups concepts, web-site development through MS-FrontPage

**Reference Books : (all these books to be purchased by the Institute Library)**

1. Peter Norton's Complete Guide to DOS 6.22, Sixth Edition, Techmedia
2. Windows XP Bible Desktop Edition by Alan Simpson, Wiley-Dreamtech India Pvt. Ltd., Wiley Publishing Inc.
3. Windows XP Computer Basics All in One by Greg Perry, Jill T. Freeeze, Galen A. Grimes, Matt Hayden & Ned Snell, Sams Teach Yourself, Pearson Education
4. Windows XP Professional : The Complete Reference by Guy Hart-Davis, Tata-McGraw Hill Publishing Company, New Delhi
5. Windows XP Simplified, Maran Graphics & Wiley Publishing, Inc.
6. Office XP : The Complete Reference by Stephen L. Nelson & Julia Kelly, Osborne / McGraw Hill
7. Microsoft Office 2003 Bible by Edward C. Willett, Wiley-Dreamtech India Pvt. Ltd., Wiley-India Publication
8. Internet : The Complete Reference, Millenium Edition by Margaret Levine Young, Doug Muder, Dave Kay, Kathy Warfel & Alison Barrows, Tata-McGraw Hill Publishing Company, New Delhi
9. Mastering Microsoft Frontpage-2000, Daniel A. Tauber, Brenda Kienal & Molly E. Holzschlag, BPB Publications

**Assignments to be given to students for Lab sessions :**

- 1 : Execution of DOS commands at command prompt, execution of macros at command prompt and batch programs
- 2 : Customizing of various Windows XP components to be explored by the students
- 3 : Exercises encompassing the features explored in each of the four components of this Unit to be given
- 4 : Net surfing, browsing Internet contents using any browser, Creation of email account using any provider to be exercised, Designing a website

**Accomplishments of the student after completing the course :**

- ✓ Be able to work in both DOS (non GUI) and Windows (GUI) operating environment with ease
- ✓ Be in a position to create one's own document, perform analysis using a spreadsheet, prepare exotic presentations, and also be able to work with databases
- ✓ Be in a position to search for information on the Internet, read and send emails and communicate effectively over the Web
- ✓ Be able to design simple websites

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