

# FUNDAMENTALS OF COMPUTER AND INFORMATION TECHNOLOGY

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### BLOCK 1 : COMPUTER FUNDAMENTALS

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**Unit 2 COMPUTER ORGANIZATION AND DATA PROCESSING**

Introduction, Block-Diagram of computer, Advantages and Limitation of Computers, Characteristics of Computer, Applications of Computer, Programming Languages, Computer Data Processing

**Unit 3 THE NUMBER SYSTEMS**

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**Unit 4 BINARY ARITHMETICS**

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### BLOCK 2 : MEMORY AND IO DEVICES

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**Unit 6 MEMORY ORGANISATION : II**

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**Unit 8 OUTPUT DEVICES**

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**BLOCK 3 : INFORMATION TECHNOLOGIES**

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**Unit 10 THE INTERNET**

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**Unit 11 DIGITAL SECURITIES**

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**BLOCK 4 : COMPUTER APPLICATIONS**

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**Unit 13 APPLICATION SOFTWARES**

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#### Unit 2 Structure and Services of Operating System

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### BLOCK 2 : PROCESS MANAGEMENT

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**Unit 5      Threads and Concurrency**

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**Unit 6      Process Scheduling**

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**Unit 9      Page Replacement Algorithms**

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**Unit 10      Device Management**

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**Unit 11      File Systems**

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**Unit 12      Directories and File System Hierarchy**

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**Unit 13      File System Implementation**

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**BLOCK 4 : PROTECTION, SECURITY AND SOFTWARE INSTALLATION**

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**Unit 15      Protection**

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**Unit 16      Operating System and Application Software Installation**

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#### Unit 2 UNDERSTANDING CONSTANTS, DATA-TYPES & VARIABLES

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#### Unit 3 OPERATORS AND EXPRESSIONS

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and associativity, Mathematical functions

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### BLOCK 2 : DECISION MAKING AND LOOPING

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#### Unit 5 DECISIONMAKING AND BRANCHING

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**BLOCK 3 : ARRAYS AND FUNCTIONS**

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**Unit 11       FUNCTIONS**

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**Unit 12       MORE ABOUT FUNCTIONS**

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**BLOCK 4 : STRUCTURES, POINTERS AND FILE HANDLING**

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**Unit 14       POINTERS**

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#### Unit 2      **Topologies**

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#### Unit 3      **Extranet**

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#### Unit 4      **Web Essentials**

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### BLOCK 2 : NETWORK CONNECTION & APPLICATION OF INTERNET

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#### Unit 2      **Application of Internet - I**

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**Unit 3      Application of Internet II**

Introduction, Web Portal, Today's Portal, What a Portal Does, What are The Major Functions of Portals ?, A Portal Should, Personalization, Types of Personalization, Architecture of The Portal, Types of Portals, Vortal, Blogs, Micro Blogging, Remote Login

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**BLOCK 3 : INTERNET TECHNOLOGY AND APPLICATION**

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**Unit 2      Recent Internet Technology Applications**

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**Unit 3      Internet Protocols**

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**Unit 4      Advance Protocol and Web Programming**

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**BLOCK 4 : HTML AND STRUCTURING WEB PAGE**

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**Unit 2 Practical Use in HTML**

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**Unit 3 Structuring Web Pages**

Introduction, Tables, Table Heading, Cell Padding and Cell Spacing Attributes, Colspan and Rowspan Attributes, Tables Backgrounds, Table Height and Width, Table Caption, Nested Tables, Forms, Frames

**Unit 4 Concept of Website**

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# Communication Skills

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#### **Unit 2: Type of Communication**

Verbal Communication, Non-Verbal Communication

#### **Unit 3: General English**

Parts of Speech, Some Important Aspects, Use of Articles

#### **Unit 4: Reading Comprehension**

Paragraph Writing, Comprehension

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### **BLOCK 2: BUSINESS LETTER WRITING AND DIALOGUE FORMATION**

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#### **Unit 1: Basics of Letter Writing**

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#### **Unit 2: How to Write Business Letters**

Stages of Writing, Preparing Notes, How to Compose Business Messages, Style and Tone, Dictionary and Thesaurus Usage, Punctuation, Deleting Redundancies/Using Simple Words

**Unit 3: Types of Business Letters**

Sample Letters, Inquiry Letters, Reply Letters, Order Letters, Letters for Execution of Orders, Complaint Letters, Reply and Adjustment Letters, Sales Letters, Reminder Letters

**Unit 4: Dialogue Writing**

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**BLOCK 3: LETTER WRITING AND INTER-DEPARTMENTAL COMMUNICATION**

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**Unit 2: Knowing other letters - 2**

Condolence Letters, Gratitude Letters, Resignation Letters

**Unit 3: Letter Writing**

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**Unit 4: Inter Departmental Communication**

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**BLOCK 4: WRITING SKILLS AND ETIQUETTES**

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**Unit 2: Essay Writing**

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**Unit 3: E-mail Writing and E-mail Etiquettes**

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# DATA STRUCTURE USING C

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#### Unit 1 INTRODUCTION TO DATA STRUCTURES

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#### Unit 3 REPRESENTATIONS OF ARRAYS IN MEMORY

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### BLOCK 2 : STACK, QUEUES AND LINK-LIST

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**Unit 5      MORE ON Link-List**

Introduction, Types of Link-List, Singly Link-List, Doubly Link-List, Circular Link-List, Doubly Link-List Implementation, Declaring of Node and First Pointer, Creating a Doubly Link-List, Inserting a Value to The Link-List, Displaying Doubly Link-List, Deleting a Node From Doubly Link-List

**Unit 6      STACK AND THEIR APPLICATIONS**

Introduction, Definitions, Array and Link Representation of Stack, Array Representation of Stack, Link-List Representation of Stack, Operations and Applications of Stack

**Unit 7      QUEUES AND THEIR APPLICATIONS**

Introduction, Definition, Basic Operations Performed on Queue, Array and Link-List Representation of Queue, Array Representation of Queue, Link-List Representation of Queue, D-Queue, Circular Queue, Applications of Queue

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**BLOCK 3 : TREE AND GRAPHS**

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**Unit 9      OPERATIONS ON BINARY TREE**

Introduction, Operations on Binary Search Tree, Binary Tree Traversals, Inorder Traversal, Preorder Traversal, Postorder Traversal, Recursive Algorithms for Inorder, Preorder and Postorder

**Unit 10     GRAPHS**

Introduction, Definition, Terminology, Types and Representation of a Graph, Graph Traversal, Breadth First Search (BFS), Depth First Search (DFS), Shortest Path Algorithm, Kruskal's Algorithm, Prim's Algorithm

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**BLOCK 4 : TECHNIQUES (SEARCHING AND SORTING) AND FILE STRUCTURE**

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**Unit 11     SEARCHING TECHNIQUES**

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Implementation of Linear Search, Implementation of Binary Search

**Unit 12      SORTING TECHNIQUES**

Introduction, What is Sorting, Types of Sorting, Internal and External, Bubble, Insertion, Selection, Quick, Merge, Radix Sorting

**Unit 13      FILE STRUCTURE**

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# DATABASE MANAGEMENT SYSTEM

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**Unit 2      DATA MODELS**

Introduction, Types of Data Models, Object Base Logical Model, Record Base Logical Model, Physical Data Models, Relational, Network, Hierarchical Model

**Unit 3      ENTITY RELATIONSHIP MODEL AND DIAGRAMS**

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### **BLOCK 2 : RELATIONAL DATABASE AND DATABASE DESIGN**

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**Unit 5      DATABASE DESIGN**

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**Unit 6      NORMALISATION**

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Introduction, History, Basic Structure, DDL Commands, DML Commands, Simple Queries, Nested Queries, Aggregate Functions

**Unit 8 SQL CONSTRAINTS**

Introduction, Not Null Constraint, Default Constraint, Unique Constraint, Primary Key, Foreign Key, Check Constraint

**Unit 9 TRANSACTION PROCESSING**

Introduction, Types of Transactions, Concurrent Transactions, Discreet Transactions, Distributed Transactions, In-Doubt Transactions, Normal Transactions, Read-Only Transactions, Remote Transactions, Read-Consistency, Steps to Processing a Transaction, Entering DML/DDI Statements, Assigning Rollback Segments, Long-Running Transactions and Rollback Segment Allocation, Using the Optimizer, Cost-Based Analysis, Rule-Based Analysis, Overriding the Optimizer\_Mode Parameter, Parsing Statements, Handling Locks, Stepping Through the Transaction, Processing a Remote or Distributed Transaction, Entering DDL/DML Statements, Assigning Rollback Segments, Breaking down Statements, Optimizing Local Statements, Forwarding Remote Commands, Assigning Remote Rollback Segments and Writing Redo Logs, Optimizing Remote Statement, Returning Data to the Local Database, Summarizing Remote and Distributed Transactions

**Unit 10 OBJECT ORIENTED DATABASE MANAGEMENT SYSTEM**

Introduction, Introduction to Database Management Systems (DBMS), Example of Bank Transactions, Object Oriented Database (OODB), Related terms, Distributed Object Computing (DOC), Objects Methods Users, Interfaces, Associations, Persistent Objects, Persistence Data, Transient Data, Referential Integrity, MDBS, ODBC (Open Database Connectivity), Locks, ActiveX, OOSAD, CORBA, DCOM, OMG, CORBA Open DOC ActiveX, Virtual DBMS, Object Oriented Database Management Systems (OODBMS), Comparison between RDBMS and OODBMS, A Three Schema Architecture, Mapping of OODBMS to RDBMS, Example of Railway Reservation System

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Commercial Database, NoSQL Database, Operational Database, Relational Database, Cloud Database, Object-Oriented Database, Graph Database

**Unit 12 DATA WAREHOUSING AND DATA MINING**

Introduction, Concept, Architecture, Various Tools in Data Warehousing, Tools in Data Mining, Difference Between Data Mining and Normal Query

**Unit 13 DATABASE SECURITY**

Introduction, Password Authentication, Operating System Authentication, Why Protect Passwords ?, Control, Protection, Integrity, Privileged Accounts, SYS, SYSTEM, Other Issues, Operating System Group : DBA, Object Security, Access Rights, Resolving Object Synonyms, System Security, Defined System Privileges, Object Security Model, Database Auditing, Recovery from Various Problems of Volatile and Non-Volatile Storage Devices

**Unit 14 RECOVERY MECHANISMS**

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# DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

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#### Unit 2      COMPUTER ARITHMETIC

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#### Unit 3      CODES FOR CHARACTER REPRESENTATION

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#### Unit 7      SIMPLIFICATION OF BOOLEAN ALGEBRA - II

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**BLOCK 3 : DIGITAL COMPONENT**

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Introduction, Construction of ALU, Adder, Binary Half Adder, Binary Full Adder, Parallel Binary Adder, Binary Adder–Subtractor, Addition in 1's and 2's Complement System

**Unit 9      DIGITAL COMPONENT**

Introduction, Integrated Circuits, Decoders and its Expansion, Encoders, Multiplexer and its Expansion, Memory Unit

**Unit 10     ADDRESS, DATA & CONTROL BUS**

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**BLOCK 4 : INPUT/OUTPUT DEVICES AND FLIP FLOPS**

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**Unit 12     INPUT/OUTPUT INTERFACE and DATA TRANSFER**

Introduction, Input/Output Interface, Asynchronous Data Transfer and Mode of Data Transfer, Concept of Programmed I/O, DMA

**Unit 13     MEMORY**

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**Unit 14      FLIP-FLOPS**

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**Unit 15      CPU**

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# OBJECT ORIENTED CONCEPTS & PROGRAMMING-1 (CORE JAVA)

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#### Unit 2 PROGRAMMING CONCEPTS OF BASIC JAVA

Introduction, Tokens, Data Types in Java, Declaring a Variable, Java Coding Conventions, Typecasting, Constants

#### Unit 3 OPERATORS AND PRECEDENCE

Introduction, Arithmetic Operator, Increment / Decrement Operator, Assignment Operator, Bitwise Operator, Relation Operator, Logical Operator, Ternary Operator, Operator Precedence

#### Unit 4 LOOPS AND SELECTION STATEMENTS

Introduction, Loops, Nested Loops, Selection Statements, Arrays

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### BLOCK 2 : OBJECT, CLASSES AND FEATURES

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#### Unit 5 OBJECTS AND CLASSES

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#### Unit 6 LANGUAGE FEATURES

Introduction, Static Keyword, Using Abstract Classes, Interfaces, Packages, Access Protection

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Introduction, Collection Interface, List Interface, LinkedList Class, ArrayList Class, Stack Class, Queue Interface, Set Interface, TreeSet Class, HashSet Class, Map Interface, TreeMap Class, HashMap Class, Iterator

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**BLOCK 3 : INHERITANCE, EXCEPTION HANDLING AND MULTITHREADING**

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**Unit 10     EXCEPTION HANDLING**

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**BLOCK 4 : ABSTRACT WINDOW TOOLKIT AND WORKING WITH FILES**

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**Unit 13     APPLET GRAPHICS**

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**Unit 14      ABSTRACT WINDOW TOOLKIT**

Introduction, Window Fundamentals, Working with Graphics, Controls, Understanding Layout Managers, Adapter Classes, Inner Classes, Anonymous Inner Classes

**Unit 15      WORKING WITH FILES**

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# SYSTEM ANALYSIS AND DESIGN

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#### **Unit 1 OVERVIEW OF SYSTEM ANALYSIS AND DESIGN**

Introduction, Constraints of a System, Properties of a System, Elements of a System, Types of Systems, Systems Models, Categories of Information

#### **Unit 2 SYSTEM AND WORKING WITH TECHNOLOGY**

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#### **Unit 3 MODELLING TOOLS FOR SYSTEM ANALYST**

Introduction, Role of Data in Business, Modelling with DFD, DFD'S with CASE, Structured Methodology

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### **BLOCK 2 : SYSTEM ANALYSIS AND PHOTOTYPING**

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#### **Unit 4 SYSTEM DEVELOPMENT LIFE CYCLE**

Introduction, Stages of System Development Life Cycle, Project Selection, Feasibility Study, Analysis, Design, Implementation, Post - Implementation and Maintenance, Considerations for Candidate System, Planning and Control for System Success

#### **Unit 5 PRELIMINARY SYSTEM ANALYSIS**

Introduction, Fact Finding and Interview, Detailed Analysis, Review and Assignment, Working with People with Technology

#### **Unit 6 SYSTEM REQUIREMENT SPECIFICATIONS & ANALYSIS**

Introduction, What is Requirements Determination ?, Fact - Finding Techniques, What is Structured Analysis ?, Pros and Cons of Each Tool

#### **Unit 7 PROTOTYPING AND 4GLS**

Introduction, Prototyping, 3GLs and 4GLs, Object Oriented Analysis, Working with People and Technology, System Design

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**BLOCK 3 : FILE DESIGNING AND TESTING**

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**Unit 8 FILE DESIGN**

Introduction, File Design, Database Design, Overview of Implementation, Scheduling and Assigning Tasks

**Unit 9 TESTING AND MAINTENANCE**

Introduction, Testing, Training, System Maintenance, Management Issues

**Unit 10 SYSTEM ADMINISTRATION AND TRAINING**

Introduction, Training, Training Systems Operators, User Training, Training methods, Vendor and In-Service Training, In-house Training, Conversion, Conversion Methods, Conversion Plan, Operating Plan

**Unit 11 SYSTEM SECURITY, AUDIT AND QUALITY ASSURANCE**

Introduction, System Audit, Quality Assurance in SDLC, Specifications for Quality Factors, Software Requirement Specification, Software Design Specification, Software Testing and Its Implementation, Software Support and Maintenance

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**BLOCK 4 : STRUCTURED SYSTEM DESIGN AND DATA ORIENTED SYSTEM DESIGN**

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**Unit 12 STRUCTURED SYSTEMS ANALYSIS AND DESIGN**

Introduction, Procedure Specifications in Structured English, Examples and Cases, Decision Tables For Complex Logical Specifications, Specification Oriented Design Vs Procedure Oriented Design

**Unit 13 DATA ORIENTED SYSTEMS DESIGN**

Introduction, Entity Relationship Model, E-R Diagrams, Relationships Cardinality and Participation, Normalizing Relations, Various Normal Forms and their Need, Examples of Relational Data Base Design

**Unit 14      OBJECT ORIENTED ANALYSIS AND DESIGN**

Introduction, Object-Oriented Analysis and Design, Basic Terms of Object-Oriented Analysis, UML Diagrams, Use-Case Diagram, Class Diagram, Sequence Diagram, Analysis Modeling