FUNDAMENTALS OF COMPUTER AND INFORMATION TECHNOLOGY

Contents

BLOCK 3 : INFORMATION TECHNOLOGIES

Unit 9 INTRODUCTION TO NETWORKS

Introduction, What is Network ? Classification of Networks, Types of Networks, Topologies

Unit 10 THE INTERNET

Introduction, Evolution of the Internet, Connecting to the Internet, IP–Addresses, Domain Names, The Web

Unit 11 DIGITAL SECURITIES

Introduction, Digital security risks, Internet Attacks, Securing system from attacks, Firewalls, Prevention from unauthorized access

BLOCK 4 : COMPUTER APPLICATIONS

Unit 12 SYSTEM SOFTWARES

Introduction, Operating Systems, Network Operating Systems, Utilities, Summary, Other Books For Reading

Unit 13 APPLICATION SOFTWARES

Introduction, Word Processing Software, Spreadsheets, Database Management Systems, Presentation Programs, Graphic Programs, Multimedia Authoring Applications, Entertainment and Education Software

Unit 14 INTRODUCTION TO DATABASE

Introduction, Hierarchy of data, Advantages of Database, Disadvantages of Database, Types of Databases

OPERATING SYSTEM AND SOFTWARE INSTALLATION

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Unit 5 Threads and Concurrency

Introduction, Multithreading, Thread implementation, User Space Thread, Kernel Space Thread, Hybrid Thread implementation, Thread Management, Concurrency and Its Problems, Inter–Process Communication, Concurrency Problem, Mutual Exclusion

Unit 6 Process Scheduling

Introduction, Overview of Process Scheduling, Schedular, Long–Term Schedular, Short–Term Scheduler, Scheduling, Process Scheduling Policies, Non Preemptive Scheduling, Pre–Emptive Scheduling, Context Switch and the Interrupt Handler, Scheduling Criteria, Scheduling Algorithms, First–Come First–Served (FCFS) Scheduling, Shortest Job First (SJF)Scheduling, Shortest Remaining Time Scheduling, Round Robin Scheduling (RR), Priority Scheduling, Multilevel Queue Scheduling, Thread Scheduling, Multiple Processor Scheduling

Unit 7 Process Synchronization and Deadlocks

Introduction, Dead lock Conditions, Resource–Allocation (R–A) Graph, Deadlock Handling Mechanisms, Deadlock Detection, Deadlock Recovery, Deadlock Avoidance, Deadlock Prevention

BLOCK 3 : PROCESS MANAGEMENT

Unit 8 Memory Management

Introduction, Swapping, Partitions, Paging, Implementation of Paging, Hierarchical Page Table, Address Translation With a 2–Level Page Table, Segmentation

Unit 9 Page Replacement Algorithms

Introduction, The Optimal Page Replacement Algorithm (PRA), The Not Recently Used (NRU) PRA, First In, First Out (FIFO) PRA, Second Chance PRA, Clock PRA, Last In, First Out (LIFO) PRA, Least Recently Used (LRU) PRA, The Aging PRA

Unit 10 Device Management

Introduction, Characteristics of I/O Devices, Principles of I/O Hardware, Principles of I/O Software, Disk, Disk Scheduling Algorithms

Unit 11 File Systems

Introduction, File Naming, File Types, File Attributes, File Operations

Unit 12 Directories and File System Hierarchy

Introduction, File Organization, Directory Organization, File System Hierarchy

Unit 13 File System Implementation

Introduction, File System Layout, File Storage Allocation Methods, Directory Implementation, File Sharing, Disk Space Management, File System Reliability, File System Consistency, File System Performance

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BLOCK 4 : PROTECTION, SECURITY AND SOFTWARE INSTALLATION

Unit 14 File System Implementation

Introduction, Key Terms, System Security Objectives, System Security Attacks

Unit 15 Protection

Introduction, Design Principles of an Operating System, Cryptography, User Authentication, Access Control

Unit 16 Operating System and Application Software Installation

Introduction, Windows 10 Upgrade Installation, Windows 10 Clean installation, Windows 10 Out–Of–Box Experience, Install Microsoft 365 or Office 2019 on a PC

FUNDAMENTALS OF PROGRAMMING USING 'C' LANGUAGE

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BLOCK 3 : ARRAYS AND FUNCTIONS

Unit 9 ARRAYS

Introduction, Understanding arrays, One-Dimensional array, Operations on arrays, Two-Dimensional array

Unit 10 HANDLING STRINGS

Introduction, Understanding strings, Displaying strings in different formats, Standard functions of string handling, Table of strings

Unit 11 FUNCTIONS

Introduction, Need for User Defined Functions, A Multifunction Program, The Form of C Functions, Return values and their types, Calling of Functions, Category of Functions

Unit 12 MORE ABOUT FUNCTIONS

Introduction, Handling of non-integer functions, Nesting of Functions, Recursion, Function with Arrays, Scope and Lifetime of Variables in Functions, ANSI C Functions

BLOCK 4 : STRUCTURES, POINTERS AND FILE HANDLING

Unit 13 STRUCTURES AND UNIONS

Introduction, Structures, Unions

Unit 14 POINTERS

Introduction, Understanding Pointers, Pointer Expressions, Pointers and Arrays, Pointers and Character Strings, Pointers and Functions, Pointers and Structures, Points on Pointers

Unit 15 FILE HANDLING

Introduction, Management of Files, Input/Output Operations on Files, Error Handling during I/O Operations

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INTRODUCTION TO INTERNET TECHNOLOGIES AND HTML

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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

Unit 4 Computer Name and Workgroup

Introduction Computer Name, Computer Name In Various O/S, 'Computer Name' : Rules, Introduction of Work Group, Need of Work Group, Windows Network Sharing Resource, Sharing Printer With Work Group

BLOCK 3 : INTERNET TECHNOLOGY AND APPLICATION

Unit 1 Internet Technologies

Introduction, How Internet Works ?, Packet Switching, Advantages of Packet Switching, Disadvantages of Packet Switching, Types of Packet Switching, Network To Network, ATM Architecture

Unit 2 Recent Internet Technology Applications

Introduction, Chatting and Instant Messages, What's The Difference Between E–Mail, Online Chat, and Instant Messaging ?, Video and Audio Conferences, E–Mail, Writing an E–Mail, How E–mail Works, E–Commerce, Business–to–Business (B2B), Business–to–Customer (B2C), What is E–Learning ?, E–Banking, Social Networking

Unit 3 Internet Protocols

Introduction, TCP and it's Services, IP and it's Services, Internet Service Protocols, Hyper Text System Protocol

Unit 4 Advance Protocol and Web Programming

Introduction, Advance IP, About IPV4, About IPV6, Compare IPV4 – IPV6, Mobile IP, Internet – TCP and OSI Model, Internet and Web Programming, Web Application Architecture, Web Application Architecture and Web Programming, Web Programming, HTML – HTTP

BLOCK 4 : HTML AND STRUCTURING WEB PAGE

Unit 1 **Introduction to HTML**

Introduction, HTML Document Structure, Starting with a Template, HTML Basic Examples, HTML Elements, XML Introduction, Structure of XML Data, XML Example, Example of Nested Elements, Attributes, DHTML Introduction, What is DHTML ?, Advantages of DHTML, DHTML Components, What is Dom ?, Components of Dom

Unit 2 **Practical Use in HTML**

Introduction, Text Formatting, Links and Anchors, Meta Tag, Sound and Video, Images

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**

Introduction, Webpage and Website, Web Access Location, Website History, Comparison of Web Page and Website, Types of Website, Static Website, Dynamic Website, Comparison Static and Dynamic Website, Web Server – Search Engine, Web Server, Search Engine

Communication Skills

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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

Sample Dialogues, Dialogue between a student and a teacher, Dialogue between a father and a son/daughter, Dialogue between two friends, Dialogue between siblings, Dialogue between a customer and a shopkeeper, Dialogue between a husband and his wife.

BLOCK 3: LETTER WRITING AND INTER-DEPARTMENTAL COMMUNICATION

Unit 1: Knowing other letters - 1

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Unit 2: Knowing other letters - 2

Condolence Letters, Gratitude Letters, Resignation Letters

Unit 3: Letter Writing

Personal Letter, Interview Letter, Appointment Letter, Calling for WrittenTest, Order of Appointment Letter, Show-Cause Notice, Charge Sheet, Letter of Dismissal, Discharge and otherFunctions, Secretarial Correspondence with Shareholders and Debenture Holders

Unit 4: Inter Departmental Communication

Inter-Office Memo, Office Circulars, Office Orders, Office Notes, Communication with Regional and Branch Offices, Report Writing

BLOCK 4: WRITING SKILLS AND ETIQUETTES

Unit 1: Report Writing

Business Reports, Individual Reports, Committee Reports

Unit 2: Essay Writing

Introduction: Essay Writing, Tips to Write Good Essay, Forms and Styles of Essays, How to Write a Good Business Essay, Sample Essays

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

Meaning of Email, Concept of Email, Use of Email in Business Communication, Email Etiquette, Tips to Write Professional Mails, Business and Workplace Email Etiquette, E-mail Mistakes

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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 Pueue, Link–List Representation of Queue, D–Queue, Circular Queue, Applications of Queue

BLOCK 3 : TREE AND GRAPHS

Unit 8 TREES

Introduction, Basic Terminology, Binary Tree, Binary Tree Representation using Array and Link–List, Array (Sequential) Representation, Link–List Representation, Binary Search Tree

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

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

Unit 11 SEARCHING TECHNIQUES

Introduction, Sequential or Linear and Binary Search, Algorithms for Sequential and Binary Search,

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

Introduction, File Structure – Concept of Fields, Files and Records, Sequential and Index File Organizations, Hashing Techniques

Unit 14 PROGRAMS OF SEARCHING AND SORTING

DATABASE MANAGEMENT SYSTEM

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Unit 8 SQL CONSTRAINTS

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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/DDL 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

BLOCK 4 : DATA (WARE HOUSING AND MINING) AND SECURITY

Unit 11 TYPES OF DATABASE

Introduction, Centralized Database, Distributed Database, Personal Database, End–User Database,

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

Introduction, Concept–Properties–States of Transaction, Introduction to Mechanisms, Log, Deferred Update, Immediate Update, Caching/Buffering, Checkpoint, Shadow Paging

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

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BLOCK 3 : DIGITAL COMPONENT

Unit 8 ARITHMETIC LOGIC UNIT

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

Introduction, Address, Data & Control Bus, Bus System for 4–Bit Register, Three–State Bus Buffer

BLOCK 4 : INPUT/OUTPUT DEVICES AND FLIP FLOPS

Unit 11 ADDRESS, DATA & CONTROL BUS

Introduction, Input/Output Devices, Key Board, Mouse, Display Unit, Printer (Types), Scanner, OCR, OMR, MICR

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

Introduction, Memory Hierarchy, Primary Memory, RAM and Types of RAM, ROM and Types of ROM, Secondary Memory, Magnetic Disk, Magnetic Tape, Optical Memory (CDROM), Concept of Virtual Memory, Concept of Cache and Their Need

Unit 14 FLIP–FLOPS

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Unit 15 CPU

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BLOCK 3 : INHERITANCE, EXCEPTION HANDLING AND MULTITHREADING

Unit 9 INHERITANCE

Introduction, Concept of Inheritance, Polymorphism, Final Keyword

Unit 10 EXCEPTION HANDLING

Introduction, Types of Exceptions, Uncaught Exception, Using Try and Catch Block, Using Multiple Catch Statements, Using Methods Defined by Exception and Throwable, User Defined Exceptions, Using Throws/ Throw Keyword, Using Finally Keyword, Nested Try Statements

Unit 11 UTILITIES & MULTITHREADING

Introduction, Comparing Arrays : Java Util, Creating a Hash Table : Java Util, Multithreading, Thread Life Cycle, The Thread Class and The Runnable Interface, Thread Priorities, Synchronisation, Deadlock, Suspending, Resuming and Stopping Threads

BLOCK 4 : ABSTRACT WINDOW TOOLKIT AND WORKING WITH FILES

Unit 12 APPLET

Introduction, Difference between Applet and Application, Applet Life Cycle, Creating an Applet, Applet Tag, Reading Parameters into Applet, Implementation of Background Colour, Implementation of Font in Applet

Unit 13 APPLET GRAPHICS

Introduction, Drawing Line, Drawing Oval, Drawing Circle, Drawing Rectangle, Drawing Arcs, Drawing Polygons, Drawing Polyline, Delegation Event Model

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

Introduction, I/O Streams, Streams, Reading Console Input, Writing Console Output, Reading and Writing Files, Serialisation

SYSTEM ANALYSIS AND DESIGN

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BLOCK 3 : FILE DESIGNING AND TESTING

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

BLOCK 4 : STRUCTURED SYSTEM DESIGN AND DATA ORIENTED SYSTEM DESIGN

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