

Paper Code: DCSE401

Credit: 8

Paper Name: Data Structure using C

L-T-P: 3-1-0

Total Contact Hours: 42

Module 1: Introduction to Data Structure

Contact hours: 2

- 1.1 Introduction
- 1.2 Basic Terminology
- 1.3 Elementary Data Organization
- 1.4 Data Structures
- 1.5 Data Structure Operations
- 1.6 Algorithms, Complexity, Time-space Trade off

Module 2: Preliminary Concept

Contact hours: 3

- 2.1 Mathematical notations and functions
- 2.2 Algorithm Notations
- 2.3 Control Structures
- 2.4 Complexity of Algorithms
- 2.5 Asymptotic notations
- 2.6 Sub Algorithms
- 2.7 Variables, Data types

Module 3: String Processing and Terminology

Contact Hours: 2

- 3.1 Introduction to String
- 3.2 Basic Terminology
- 3.3 Storing Strings
- 3.4 Character Data Types
- 3.5 String Operation
- 3.6 Word Processing
- 3.7 Pattern Matching Algorithms

Module 4: Concept of Arrays, Records and Pointers

Contact Hours: 4

- 4.1 Introduction to Array
- 4.2 Linear Arrays
- 4.3 Representation of Linear Arrays in memory
- 4.4 Traversing Linear Array
- 4.5 Inserting and Deleting
- 4.6 Multidimensional Array
- 4.7 Pointers, pointer Array
- 4.8 Record and Its Structure

4.9 Representation of Records in Memory

4.10 Matrices, Spares Matrices

Module 5: Introduction to Linked List

Contact Hours: 5

5.1 Introduction to Linked Lists

5.2 Representation of Linked List in Memory

5.3 Traversing a Linked List

5.4 Searching a linked list

5.5 Memory Allocation, Garbage Collection

5.6 Insertion into a linked list

5.7 Deletion form a linked list

5.8 Header Linked list, Circular Linked List

5.9 Two-Ways Lists

Module 6: Concept of Stacks, Queues, Recursion

Contact Hours: 6

6.1 Stacks

6.2 Array Representation of Stacks

6.3 Arithmetic Expression, Polish Notation

6.4 Application of stacks

6.5 Recursion

6.6 Towers of Hanoi

6.7 Implementation of Recursive Procedures of stacks

6.8 Queues

6.9 Deques

6.10 Priority Queues

6.11 Application of Queues

Module 7: Concept of Tree and Tree Traversal

Contact Hours: 9

7.1 Introduction to Trees

7.2 Binary Tree

7.3 Representation of Binary Tree in memory

7.4 Traversing of Binary Tree

7.5 Traversal Algorithm using stacks

7.6 Header Nodes, threads

7.7 Binary Search Tree

7.8 Searching and inserting in a Binary Search tree

7.9 Deleting a Binary Search tree

7.10 Balanced Binary Trees

7.11 AVL Search Trees

7.12 Heap

7.13 General Tree

Module 8: Graphs & its Representation

Contact Hours: 4

8.1. Introduction to Graphs

8.2 Graph Theory Terminology

8.3 Sequential Representation of Graphs, Adjacency matrix, path matrix

8.4 Warshall's Algorithms

8.5 Linked Representation of a graph

8.6 Operation of Graph

8.7 Traversing a Graph

8.8 Spanning Trees

Module 9: Searching and Sorting Techniques

Contact Hours: 7

9.1 Introduction

9.2 Searching: Linear Search and Binary Search

9.3 Sorting: Bubble sort, Selection Sort, Insertion sort, Quick sort, Merge sort, Heap Sort

9.4 Hashing

Books / References:

1. Data Structure Using C - Seymour Lipschutz. , Mc graw Hill.
2. Fundamentals of Computer Algorithms- Horowitz, E & Sahani, S- Galgotia
3. Data Structures Using C - Reema Thareja, Oxford University Press

1. Implementation Traversing, Insertion, and Deletion operation of linear array.
2. Implementation of linked list.
3. Implementation of Stack using array and linked list.
4. Implementation of Queues using array and linked list.
5. Implementation of Linear and Binary Search techniques
6. Implementation of different sorting algorithms.
7. Implementation of Binary tree traversal
8. Implementation of Graph traversal

Paper Code: DCSE402

Credit: 6

Paper Name: Computer Communication & Networking

L-T-P: 3-0-0

Total Contact Hours: 42

Module 1: Introduction Computer Network

Contact hours: 5

- 1.1 Introduction to Networks
- 1.2 Uses of Computer Network
- 1.3 Network Architecture
- 1.4 Types of Computer Network
- 1.5 Protocols and Standards
- 1.6 O.S.I Reference Model
- 1.7 Service Primitives, Relationship of Services to protocols
- 1.9 Connection Oriented and Connection Less Services
- 1.10 TCP/IP Protocol Suite

Module 2: Physical Layer

Contact hours: 6

- 2.1 Transmission Medium
- 2.2 Wireless Transmission
- 2.3 Telephone System
- 2.4 ISDM
- 2.5 Transmission and Switching

Module 3: Medium Access Sub layer

Contact hours: 5

- 3.1 ALOHA
- 3.2 CSMA
- 3.3 Collision Free Protocols
- 3.4 Channelization protocols
- 3.5 IEEE Standard 802 for LAN Ethernet, Token Bus, Token Ring
- 3.6 Bridges

Module 4: Data Link Layer

Contact hours: 4

- 4.1 Data Link Layer Design Issue
- 4.2 Error Detection and Correction
- 4.3 Elementary Data Link Protocols
- 4.4 Sliding windows protocols

Module 5: Network Layer

Contact hours: 4

- 5.1 Network Layer Design Issues
- 5.2 Logical Addressing
- 5.3 Routing Algorithms
- 5.4 Congestion Control Algorithms

Module 6: Transport Layer**Contact hours: 4**

6.1 Transport layer Services

6.2 Elements of Transport Protocols

6.3 Different Transport Layer Protocols

Module 7: Session Layer**Contact hours: 4**

7.1 Design Issues

7.1 Concepts of Data Exchange, dialog management, activity management

7.2 Remote Procedure Call, Client server model

Module 8: Presentation Layer**Contact hours: 4**

8.1 Design Issues

8.2 Data compression Techniques

8.3 Elementary idea of cryptography

Module 9: Application Layer**Contact hours: 4**

9.1 Design Issues

9.2 File Services

9.3 DNS, E Mail, FTP, HTTP

Module 10: Concepts of Internet and www, HTML**Contact hours: 2****Books / References:**

1. Computer Networks- A.S. Tanenbaum, PHI
2. Data Communications and Networking- Behrouz A.Forouzan, Tata McGraw-Hill
3. Data Communication & Computer Networks –W.Stallings, PHI

Paper Code: DCSE403

CREDITS: 6

Paper Name: Microprocessor

L-T-P: 3-0-0

Contact Hours: 40

Module 1: Evolution of Microprocessor

Contact hours 2

- 1.1 Evolution of Microprocessor, Features of Microprocessors
- 1.2 Application Microprocessor in daily life with a few examples

Module 2: Architecture of a Microprocessor

Contact Hours 7

- 2.1 Explanation of the blocks
- 2.2 Concept of bus structure
- 2.3 Register to register transfer
- 2.4 Communication with I/O and memory (w.r.t 8086/8088 microprocessor).
- 2.5 Pin details of 8086/8088 CPU and their function in brief.

Module 3: Addressing Modes and Instruction Execution

Contact Hours 5

- (w.r.t 8086/8088 CPU),
- 3.1 Instruction cycles, Instruction set, Timing diagram (w.r.t 8086/8088 CPU).
 - 3.3 Concept of Assembler and Compilers.

Module 4: Memory and I/O interfacing

Contact Hours 7

- 4.1 Concept of address space, address/data bus de-multiplexing
- 4.2 Address and data bus buffering, address decoding
- 4.3 I/O concept, Memory interfacing concept, I/O mapped I/O and memory mapped I/O
- 4.4 Interrupts, Types of interrupts, data transfer schemes- Synchronous, asynchronous and interrupt driven
- 4.5 DMA data transfer scheme.

Module 5: Application of Assembly Language Programming in Microprocessor

Contact Hours 7

- (Use of assembly language may be limited to 8086/8088 CPU)
- 5.1 Examples of register to register, register to memory, memory to register, block of data movement from one area of memory to another, merging of two blocks of data, data block exchange.
 - 5.2 Examples of arithmetic addition, subtraction, multiplication and division
 - 5.3 Examples of searching and sorting (simple)
 - 5.4 Examples using of look up tables
 - 5.5 Use subroutines and delay program.

Module 6: Interfacing of Peripheral Chips

Contact Hours 6

- 6.1 Brief description of 8255, 8253, 8251, 8257, 8237 and 8259
- 6.2 Interfacing of the chips with some standard CPU.

Module 7: PC interfacing and Intel 386 & 486 processors**Contact Hours 6**

7.1 Interfacing of Input/output peripherals like LED

7.2 Seven(7) segment LED display modules, stepper motor, relays through digital I/O card or through the parallel port, EPROM programming using PC port

7.3 Architecture, register organisation and memory organisation of 386 and 486 processors

Books / References:

1. Advanced Microprocessor and Interfacing - Badri Ram, TMH
2. Microprocessor Architecture, Programming & Application – R.S. Gaonkar
3. Introduction to Microprocessor- R. Mathur
4. Microprocessors and Interfacing- Douglas V Hall

Experiment I.

Acquaintance with the microprocessor trainer kit hardware and the user's commands (Dyalog/Vinyties/ALS)

Experiment II. Assembly Language Program development in TASM/NASM

Data transfer program:

- i. Register to register, register to memory and vice-versa
- ii. Arithmetic Operation- 8bit addition and subtraction
- iii. Multi-byte addition and subtraction
- iv. Multiplication using repeated addition
- v. Multiplication using shift – add process
- vi. Signed multiplication, Binary division, BCD division.

Experiment III.

Array processing:

- i. Adding one entry to an array, checking of an ordered list
- ii. Replacing one or more entries in a list, storing and searching
- iii. Block movement, block exchange and data insertion.

Experiment IV.

Look-up table:

- i. Finding square cubes etc. of a number using look-up table
- ii. Code conversion using look-up table.

Experiment V. Delay program, use of subroutine (use the above programme as a sub routine in a main program)

Paper Code: DCSE404

Credit: 8

Paper Name: Operating System

L-T-P: 3-1-0

Total Contact Hours: 42

Module 1: Introduction to Operating System

Contact hours: 2

1.1 Definition

1.2 Brief history

1.3 Structure and Function of Operating System

1.4 Different Types of Operating Systems

Module 2: Processes and Process Control Block

Contact hours: 2

2.1 Definition

2.2 Process States

2.3 PCB

2.4 Threads

Module 3: Process Synchronization

Contact hours: 5

3.1 Inter-process Communication

3.2 Critical Section Problem

3.3 Synchronization Hardware

3.4 Semaphores

3.5 Classical Problems of Synchronization

Module 4: Process Scheduling and Context switching

Contact hours: 4

4.1 Basic concepts

4.2 Context Switching

4.3 Scheduling criteria

4.4 Different Scheduling Algorithms

Module 5: Memory Management

Contact hours: 8

5.1 Resident Monitor

5.2 Multiple Partition

5.3 Garbage Collection and Compaction

5.4 Page Memory Management, Page replacement Algorithm

5.5 Swapping

5.6 Segmentation,

5.7 Segmented page memory management

5.8 Demand paging

5.9 Virtual Memory

Module 6: File System & its implementation

Contact hours: 5

6.1 Concept of files and directories

6.2 File system Implementation

6.3 Security Issues in File

6.4 Protection Mechanism

6.5 Case Studies of UNIX file system

Module 7: Input/Output

Contact hours: 4

7.1 Principles of I/O Hardware and Software

7.2 Disk

7.3 Clocks

7.4 Serial and Parallel port Access

7.5 Terminal Access

Module 8: Device Management

Contact hours: 4

8.1 Techniques of Device Management –Dedicated, shared and Virtual

8.2 Device Allocation Consideration, I/Otraffic Control and I/O Schedule, I/Odevice handlers

8.3 Spooling

Module 9: Deadlock & its Prevention

Contact hours: 5

9.1 Concepts of Deadlock

9.2 Resources

9.3 Deadlock prevention: Ostrich Algorithm, Banker Algorithm and safety Algorithm

9.4 Deadlock Detection and Recovery

Module 10: Distributed Operating System

Contact hours: 3

10.1 Definition and types of distributed OS

10.2 WorkStation Server Model

10.3 The Processor Pool Model

10.4 The Hybrid Model

10.5 Case study: SUN NFS File Server

Books / References:

1. Operating System –Madnick and Donovan, MGH
2. Operating System Concepts –A. Silberschatz and P. Galvin, ADP
3. Modern Operating Systems- Andrew S. Tanenbaum, Pearson Education Limited

Paper Code: DCSE405

Credit: 4

Paper Name: Computer Hardware and Networking

L-T-P: 1-1-0

Total Contact Hours: 28

Module 1: Computer System Layout

Contact Hours: 3

- 1.1 Identification of System Layout.
- 1.2 Front Panel Indicators and Switches.
- 1.3 Front side and rear side Connectors.
- 1.4 Familiarize the System Layout: Making Positions of SMPS, Motherboard, FDD, HDD, CD, DVD, add on cards.

Module 2: Process of Installation & Configuration of BIOS and Secondary Memory

Contact Hours: 3

- 2.1 Configuring BIOS SETUP program and practicing the trouble shooting of typical problems using BIOS utility.
- 2.2 a) Install Hard disk, Configure CMOS- Setup.
- b) Partition HDD using FDISK.
- c) Format Hard Disk.
- d) Master/Slave/IDE Devices.
- 2.3 a) Install and configure a CD- Writer & a DVD writer and Recording a blank CD and DVD.

Module 3: Installation of various Devices

Contact Hours: 5

- 3.1 Printer Installation and Servicing.
 - a) Head Cleaning.
 - b) Install and Configure Dot Matrix and Laser Printer.
 - c) Troubleshoot DMP and Laser printer.
 - d) Check the data cable connectivity.
- 3.2 Network Installation and Troubleshooting
 - a) NIC, Router, Installing NIC, router and Modem for XP/Linux Environment.
 - b) Configuring using device drivers.
 - c) Diagnosis and trouble shooting.
- 3.3 Installation of multimedia components
 - a) Install audio/video devices, microphone, speaker and head set and Digital camera.
 - b) Trouble shoot the audio-video devices.
 - c) Install and configure Web Cam.

Module 4: Basic Trouble Shootings

Contact Hours: 5

- 4.1 a) Identifying the Problems in PC with add on Cards.
- b) Identify problems with software installation using drivers available in the motherboard CD.
- 4.2 Practice with scan disk, disk clean-up, disk Defragmentation, Virus Detection and Rectification Software.
- 4.3 Practice with backup and restore data in a network server using external storage Device.
- 4.4 Assemble a PC with add on cards and check the working condition on the system.

Module 5: Operating System Installation**Contact Hours: 2**

Windows and Linux- Operating System Installation.

Module 6: Basics of Networking**Contact Hours: 3**

6.1 Do the following cabling works in a network

- a) Cable Crimping.
- b) Creating straight Cable.
- c) Creating Cross Cable.

6.2 Establish a LAN connection amongst three nodes in a bus topology.

6.3 Establish Peer-to-Peer network connection between two nodes in LAN.

6.4 Interface PCs using connectivity devices-Hub, router and switch.

Module 7: Configuration of LAN**Contact Hours: 3**

7.1 a) Configure IP address in a system in LAN (TCP/IP Configuration).

b) Configure DNS to establish interconnection between systems.

7.2 a) Transfer files between systems in LAN using FTP Configuration.

b) Login a system remotely using telnet protocol.

7.3 a) Install and configure Network interface card in a LAN system.

b) Share a file and printer (remotely) between two systems in a LAN.

Module 8: Fundamentals of Security**Contact Hours: 2**

8.1 Establish security in a system using firewall configuration.

8.2 Create and share the user rights by accessing server for a specific user groups.

8.3 Install and configure the following:

- a) A DHCP server in windows with IP Address ranging from 192.168.1.1 to 192.168.1.100
- b) Configure a DHCP Client

8.4 Transfer Files Between systems using wireless Communication.

8.5 Configure Mail Server.

Module 9: Basics of Networking Implementation**Contact Hours: 2**

Write a Client Server Program to connect different PCs

Books / References:

1. Repairing and Upgrading PC's - Scott Mueller, Pearson
2. The Complete PC Upgrade and Maintenance Guide -Mark Minasi
3. Modern Computer Hardware Course - Manahar Lotia, Pradeep Nair and Payal Lotia.

Experiment on:

1.
 - i) Identification of Front Panel Indicators and Switches.
 - ii) Identification of Front side and rear side Connectors.
 - iii) Making Positions of SMPS
 - iv) Identification of Motherboard components
2.
 - i) Configuring BIOS SETUP
 - ii) Install Hard disk, Configure CMOS- Setup.
 - iii) Partition HDD using FDISK. iv) Format Hard Disk.
 - v) Data transfer using Master/Slave/IDE Devices.
 - vi) Install and configure a CD- Writer & a DVD writer and Recording a blank CD and DVD.
3.
 - i) Install and Configure Dot Matrix and Laser Printer.
 - ii) Installing NIC, router and Modem for XP/Linux Environment.
 - iii) Configuring devices using device drivers
 - iv) Installation of multimedia components
 - v) Install audio/video devices, microphone, speaker and head set and Digital camera.
 - vi) Install and configure Web Cam.
4.
 - i) Practice with scan disk, disk clean-up, disk Defragmentation, Virus Detection and Rectification Software.
 - ii) Practice with backup and restore data in a network server using external storage Device.
 - iii) Assemble a PC with add on cards and check the working condition on the system.
5. Installation of Windows and Linux- Operating System.
6.
 - i) Cable Crimping. ii) Creating straight Cable. iii) Creating Cross Cable.
 - iv) Establish a LAN connection amongst three nodes in a bus topology.
 - v) Establish Peer-to-Peer network connection between two nodes in LAN.
 - vi) Interface PCs using connectivity Devices-Hub, router and switch.
7.
 - i) Configure IP address in a system in LAN (TCP/IP Configuration).
 - ii) Configure DNS to establish interconnection between systems.
 - iii) Transfer files between systems in LAN using FTP Configuration.
 - iv) Login a system remotely using telnet protocol.
 - v) Install and configure Network interface card in a LAN system.
 - vi) Share a file and printer (remotely) between two systems in a LAN.
8.
 - i) Establish security in a system using firewall configuration.
 - ii) Create and share the user rights by accessing server for a specific user groups.
 - iii) Install and configure the following:
 - iv) Configure a DHCP Client
 - v) Transfer Files Between systems using wireless Communication.