Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: IDD (B.Tech and M.Tech)**
Sub_Code:CSPC2002

3rd Semester Regular/Back Examination: 2025-26
SUBJECT: Data Structures
BRANCH(S): CSE,CSEDS,CSEIOT,CSIT,CST,ELECTRICAL&C.E., IT
Time: 3 Hours
Max Marks: 100
Q.Code: U673
Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II, and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Mention the advantages of representing stacks using linked lists than arrays.
b) State the difference between queues and linked lists.
c) Emphasize on why we need data structures.
d) List the various operations that can be performed on data structures.
e) State the advantages of doubly linked lists over single linked lists.
f) Write the prefix and postfix notations of the given expression:
A + B * (C – D) / (P – R)
g) Define the following terms: Height of a tree, Depth of a tree
h) List out few of the applications of tree data structure.
i) Which sorting algorithm is best if the list is already sorted? Why?
j) What do you mean by divide-and-conquer strategy?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

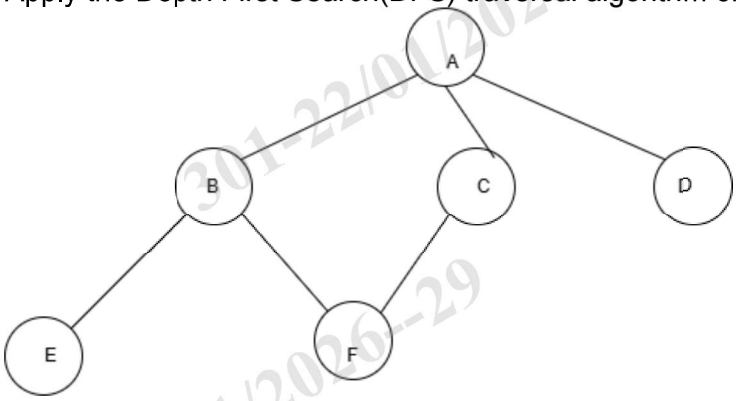
a) Write the pseudo-code for inserting an element to the end of an array.
b) Write the pseudo-code for implementing linear search? Analyze the time complexity of both algorithms.
c) Write the function for inserting an element into a queue using an array.
d) Write the pseudocode for inserting an element at the middle of a doubly linked-list.
e) Write the pseudocode for inserting and deleting an element from an priority queue.
f) Construct a binary search tree given the pre-order and post-order traversals:
Pre-order: 100,20,10,30,200,150,300
Post-order: 10,30,20,150,300,200,100
g) Perform merge sort on the following sequence of elements:
38,27,43,3,9,82,10
Also, write the pseudocode for implementing the Merge Sort.
h) Show the step-wise tree structure for performing the Heap-sort on the following sequence of elements:
73,6,57,88,60,42,83,72,48,85

i) Find the value of EXP(4,8) using recursion, given:

$$EXP(x,y) = \begin{cases} 1, & \text{if } y == 0 \\ X * EXP(x^{y-1}) \end{cases}$$

j) Apply quadratic hashing to fill the hash table of size 11 elements:
20, 5,10,22,33,40,50,30

k) Apply the Depth First Search(DFS) traversal algorithm on the following graph:



l) Write the pseudocode for inserting an element and deleting an element from the stack. Explain with an example.

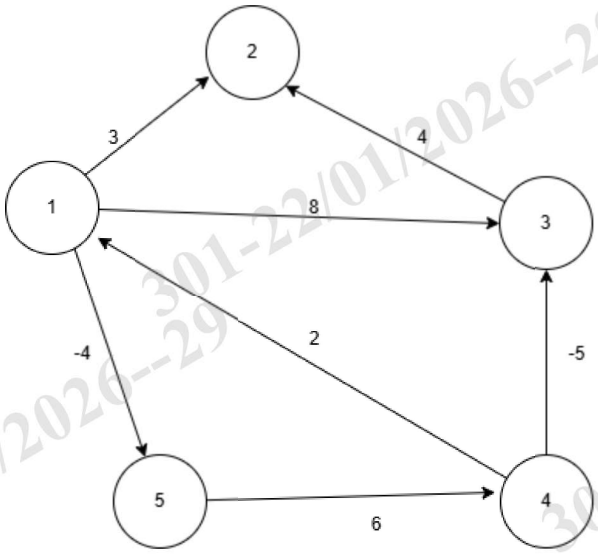
Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Write a C program for displaying an array in reverse order. **(16)**

Q4 Write a C program to insert and display the elements in a circular linked list. **(16)**

Q5 Apply the Floyd-Warshall's algorithm for constructing the shortest path from the following graph: **(16)**



Q6 Create an AVL Tree with the following sequence of numbers: **(16)**
3,14,7,1,8,5,11,17,13,6,23,12,20,26,4
Show each step