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

Total Number of Pages: 02

Course: B.Tech/IDD
Sub_Code: CSPC2002

3rd Semester Regular Examination: 2024-25
SUBJECT: Data Structures
BRANCH(S): IT, ELECTRICAL & C.E., CST,CSEDS, CSE,CSIT,CE
Time: 3 Hours
Max Marks: 100
Q.Code: R600

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) Differentiate between linear and non-linear data structure.
b) List out the advantages and disadvantages of a Linked-List over an Array.
c) Write the pseudocode for pushing an element into a stack.
d) Write the pseudocode for enqueue and dequeue operations.
e) With an example, explain about complete binary tree.
f) Define a graph. Explain the types of graphs with an example.
g) Distinguish between sorting and searching. Differentiate between internal and external sorting.
h) What is the need of hashing? Define a hash function.
i) A 2D array A [4.....7, –1.....3] requires 2 bytes of storage space for each element. If the array is stored in row-major order with the base address 100, then calculate the address of A [6, 2]. If the same array is stored in column-major order, then calculate the address of A [6, 2].
j) Difference between a B - Tree and a B+ - Tree

Part-II

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

a) Differentiate between Linear Search and Binary Search. Write the pseudocode for implementing Binary Search.
b) Give the prefix expression for (a+ ((b*(c – e))/f using Stack.
c) A circular queue has a size of 5 and has 3 elements 10, 20, and 40, where F = 2 and R = 4. After inserting 50 and 60, what is the value of F and R? Trying to insert 30 at this stage, what happens? Delete two elements from the queue and insert 70, 80, and 90. Show the sequence of steps with the value of F and R.

d) Give the preorder and postorder traversals for the following expression:
(a+b*c)+((d*e+l)*g)

e) Construct an AVL Tree by inserting the following elements:
63, 9, 19, 27, 18, 108, 99, 81

f) Perform quick sort on the following sequence of elements:
24, 56,47,35,10,90,100,70,25

g) Write the pseudocode for inserting an element in the middle of a 1D array.

h) Write the pseudocode for creating a double linked list with 4 nodes.

i) Explain different types of queues with an example from each.

j) Write the pseudocode for reversing a single linked-list with 10 nodes.

k) Write the algorithm for implementing bubble sort on the following sequence:
7, 1, 4, 12, 67, 33, 45. How many swaps will be performed for sorting?

l) Consider a hash table with size = 10. Using linear probing, insert the keys 27, 72, 63, 42, 36, 18, 29, and 101 into the table.

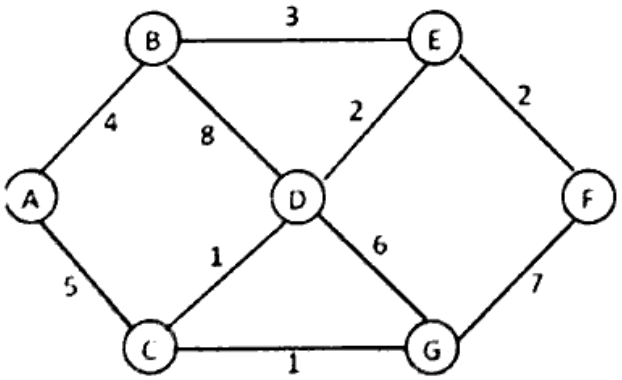
Part-III

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

Q3 Write a C program for implementing a sparse matrix of size 4*4 **(16)**

Q4 Write the pseudocode for inserting and deleting a node after a specific position in a single linked-list. **(16)**

Q5 For the given graph, construct the spanning trees and the final graph using Prim's algorithm: **(16)**



Q6 Create a binary search tree for the following numbers: **(16)**
45, 26, 10, 60, 70, 30, 40. Delete the keys 10, 60, and 45 and show the trees at each stage.