P P SAVANI UNIVERSITY

Third Semester of B. Tech. Examination

December 2021

SECE2071 Data Structures & Algorithm

14.12.2021, Tuesday **Time: 09:00 a.m. To 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 Define following terms: **[05]**

(i) Analysis

(ii) Linear Data Structure

(iii) Binary Tree

(iv) Depth First Search

(v) Graph

Q - 2 (a) What is Recursion? Which data Structure will be used for Recursion? Explain with suitable example. **[05]**

Q - 2 (b) What is doubly Linked List? Explain the advantages and Structure of doubly linked list. **[05]**

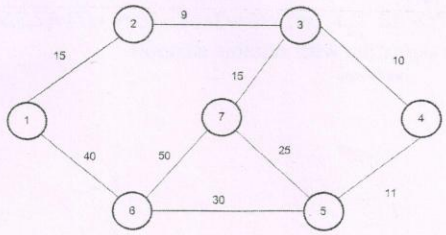
OR

Q - 2 (a) What is Stack? State real time applications of Stack. Explain Stack Operations. **[05]**

Q - 2 (b) What is the advantage of Linked list over array. Explain Singly Linked List Operations. **[05]**

Q - 3 (a) What is Graph? State Graph Traversal Techniques. Explain any one technique. **[05]**

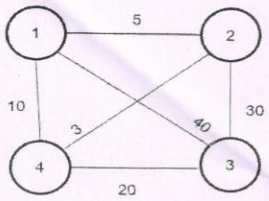
Q - 3 (b) Consider the following undirected weighted Graph. How many Spanning Trees will be possible for given Graph? Create Minimum Spanning Tree using Prim's Algorithm. Consider Vetex-1 as a Starting vertex. **[05]**



OR

Q - 3 (a) Convert following Expression: a*b/c+d^e-f^g*h/i in Postfix Expression. Show all steps. **[05]**

Q - 3 (b) What is Minimum Spanning Tree? Consider the following undirected weighted Graph. How many Spanning Trees will be possible for given Graph? Create Minimum Spanning Tree using Kruskal's Algorithm. Show all Steps. **[05]**



Q - 4 Consider given Elements : 15,12,50,4,21,8,7,16,1 and attempt the following, [05]

(i) Create Binary Search Tree.

(ii) Perform pre-order and post-order Traversal.

SECTION – II

Q - 1 Answer the following: [05]

(i) Which of the following method can be used to solve Merge sort?

a. Divide-and-conquer
b. Backtracking
c. Heuristic approach
d. Greedy approach

(ii) List any two characteristics of Greedy Algorithms.

(iii) Define Symbol Table.

(iv) List hashing methods.

(v) _____is in place sorting algorithm.(Quicksort/Mergesort)

Q - 2 (a) Write Merge Sort algorithm. Derive its worst case time complexity. [05]

Q - 2 (b) Demonstrate Binary Search method to search Key = 18, from the array A=< 2, 6, 9, 10, 12, 14, 18, 25, and 50>. Write the recursive algorithm for the same. [05]

OR

Q - 2 (a) Write pseudo code of Quick Sort Algorithm with Complexity Analysis. [05]

Q - 2 (b) Explain Divide and Conquer method with suitable example. [05]

Q - 3 (a) Explain hashing functions with suitable example. [05]

Q - 3 (b) Explain characteristics of greedy algorithms. Also write general greedy algorithm. [05]

OR

Q - 3 (a) Explain Job sequencing with deadlines problem and its solution using greedy algorithms. [05]

Q - 3 (b) Construct Huffman code for given data. [05]

Character	f	e	c	b	d	a
Frequency	5	9	12	13	16	45

Q - 4 Attempt any one. [05]

(i) Using greedy algorithm, find an optimal solution for knapsack instance n=7, W=15, (P1,P2,P3,P4,P5,P6,P7)=(10, 5, 15, 7, 6, 18, 3) & (w1,w2,w3,w4,w5,w6,w7)=(2,3,5,7,1,4,1).

(ii) Explain Single source shortest path algorithm with suitable example.

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