No. of Printed Pages : **2**

Sl. No.

C0-R4.B3 : DATA STRUCTURE THROUGH JAVA

NOTE :

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours | Total Marks: 100

1. (a) Explain outdegree and indegree.

(b) Explain Depth First Search operation.

(c) Write an algorithm for inserting an element in a stack and removing an element from a stack.

(d) Differentiate between linear and non linear data structures.

(e) List the advantages of a doubly linked list over singly linked list.

(f) What is a spanning Tree ?

(g) What is the difference between storing data on the heap vs. on the stack ? **(7x4)**

2. (a) Generate a binary search tree for following numbers and perform in-order and post-order traversals :

10,3,15,22,6,45,65,23,78,34 and 5

(b) What do you understand by Xtreme programming ? Explain with proper examples.

(c) Compare:

(1) Linked-list and Array

(2) Circular queue and Simple Queue. **(6+6+6)**

3. (a) What is AVL Tree? Insert the following sequence of elements into an AVL tree, starting with an empty tree: 10, 20, 15, 25, 30, 16, 18, 19

(b) Write a short note on Brute-Force String Pattern Matching algorithm. **(9+9)**

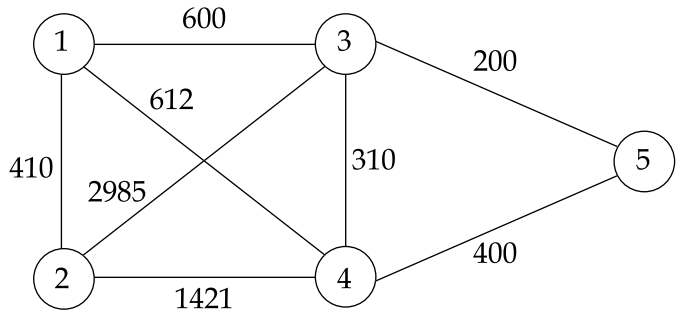
4. (a) What is overloading? Write java code to demonstrate both Constructor and Method overloading.

(b) What is Time complexity and Space complexity of an Algorithm? Write a Merge Sort Algorithm and find its time and space complexity by tracing with an example. **(10+8)**

5. (a) What is Asymptotic Algorithm Analysis? Explain with the help of an example.

(b) Explain the working of the Kruskal's algorithm with example.

(c) Convert the given graph with weighted edges to minimal spanning tree :



(6+6+6)

6. (a) Convert infix notation a+b*(c^d-e)^(f+g*h)-i into postfix notation.

(b) Consider the following stack of characters, where STACK is allocated N = 8 memory cells

Stack: A, C, D, F, K, _, _, _. (_means empty allocated cell)

Describe the stack as the following operations takes place:

(a) pop(Stack, item)

(b) pop(Stack, item)

(c) pop(Stack, item)

(d) push(Stack, R)

(e) push(Stack,L)

(f) push(Stack, S)

(g) push(Stack,P)

(h) pop(Stack, item) **(9+9)**

7. (a) Sort following sequence of data using Merge Sort.

38, 27, 43, 3, 9, 82, 10

(b) What is recursion? Write a program to find the nth Fibonacci number using recursion. **(10+8)**

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