

C0-R4.B3 : DATA STRUCTURE THROUGH JAVA**NOTE :**

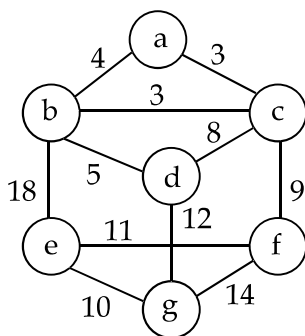
1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time : 3 Hours**Total Marks : 100**

1. (a) Define priority queue and also discuss some of its applications.
 (b) Create binary search tree by inserting the integer keys 15, 2, 5, 14, 16, 12, 6, 1, 8, 3, 7, 9, 17, 19, 18 in that order, starting from an empty tree. Now delete the key 5 and show the modified tree.
 (c) Explain Inheritance in JAVA with example.
 (d) Write Java code for binary search.
 (e) Explain tail recursion with a suitable example.
 (f) Give an example of each, best case and worst case time complexity of Insertion sort. Justify your answer.
 (g) Explain three basic access specifiers in Object Oriented Programming with suitable example. (7x4)

2. (a) What is polymorphism in OOPs ? Explain compile time and run time polymorphism with suitable examples.
 (b) Define heap tree. Show the max heap tree that results after each of the integer keys 20, 35, 9, 26, 49, 78, 2, and 46 are inserted, in that order, into an initially empty heap tree. Further apply the heap sort algorithm on it, to sort the elements. (9+9)

3. (a) Apply Prim's algorithm and compute minimum spanning tree for the graph given below.



- (b) Write algorithm/program to implement two stacks using a single array. (9+9)

4. (a) Ackermann function is a good example of recursion. Using its definition find $A(1, 4)$, where A is Ackermann function.
- (b) Show the AVL tree that results after each of the integer keys 3, 2, 1, 4, 5, 6, 7, 16, 15 and 14 are inserted, in that order, into an initially empty AVL tree. Clearly show the tree that results after each insertion, and make clear any rotations that must be performed.
- (c) Use Radix sort algorithm to sort the following numbers. Show all the intermediate steps.
- (6+6+6)
- 493 812 715 710 195 437 582 340 385
5. (a) Write Dijkstra's algorithm to compute the shortest path for a given graph.
- (b) Explain Abstraction in java with a suitable example.
- (c) Discuss Brute force algorithm to find a pattern in a string with a suitable example.
- (8+5+5)
6. (a) Write JAVA code to reverse a string using STACK structure.
- (b) A binary tree consists of 11 nodes. The inorder and postorder traversal of the tree yields the following sequences of nodes :
- Inorder : A D K L M F G E B H C
- Postorder : K M L D F A E H B C G
- Draw the tree.
- (c) Evaluate the arithmetic expression P written in postfix notation
- P: 8 4 2 + - 5 6 3 / + * 4 \$ 2 + where, \$ stands for exponentiation.
- (7+6+5)
7. (a) Trie is an efficient data structure. Justify this statement with a suitable example.
- (b) Write algorithm to implement singly linked list to perform following operations :
- (i) Insert an element in the beginning
- (ii) Insert an element at end
- (iii) Insert an element at given position
- (iv) Delete an element from a given position
- (9+9)

- o 0 o -