

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

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Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 4

Name of Subject: Data Structures

Subject Code: PCCS-106

Paper ID: 16216

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) State the advantages of representing stacks using linked lists rather than arrays.
- b) Write the postorder of the tree having
Inorder: D,B,F,E,G,A,C,I,H,J
Preorder: A,B,D,E,F,G,C,H,I,J
- c) Demonstrate the concept of rehashing and double hashing.
- d) Explain the application of heap in priority queue.
- e) Point out which data structure is used to implement DFS and why?
- f) Can you traverse a singly linked list in backward direction? Justify your answer.

Part – B

[Marks: 04 each]

- Q2. List the various types of queues and the operations that can be performed on each type of queue. Discuss the applications of queues.
- Q3. Compare and contrast linear and non linear data structure.
- Q4. Make use of infix to postfix conversion algorithm and convert the following arithmetic infix expression into an equivalent postfix expression.
(2-3+4)*(5+6*7)

- Q5. Do merge and quicksort are stable sorts. Justify your answer with an example.
- Q6. Construct a B Tree of order 5 from the given elements.
 10,2,7,9,15,20,25,1,3,6,4,50,60,70,80
- Q7. Suppose we have built a (balanced) AVL tree by inserting the keys 12,7,9,17,14 in this order. Suppose we insert 16 into the tree, answer the following questions along with an explanation of each.
- the imbalanced node to be repaired in the tree contains key _____
 - the balance factor of this key is _____
 - the required rotation is the _____ rotation.

Part – C

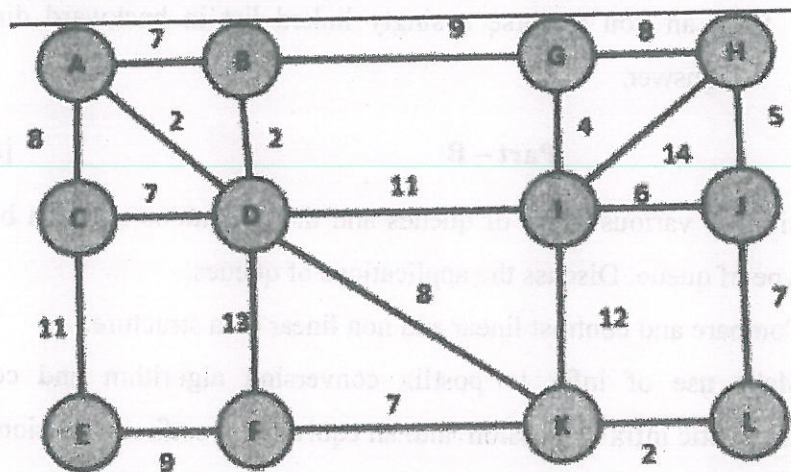
[Marks: 12 each]

- Q8. Define singly linked list. What are the various operations that can be performed on singly linked list? Write an algorithm to insert a node after a given node in a linked list.

OR

Write an algorithm for the following

- to delete an element from a stack using linked representation.
 - to traverse a doubly linked list in backward direction.
- Q9. Build a Minimum Spanning Tree using Prim's Algorithm on the following graph step by step. Also, write the algorithm.



OR

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Explain how Dijkstra's algorithm would find the shortest path from node B (in figure below) to all other nodes indicating: the estimated shortest distance to a vertex, whether a node's shortest distance is known, the predecessor of the vertex on the shortest path from B. Also, describe all the nodes on the shortest path from B to F.

