PA-1239

[5925]-261

S.E. (Computer Engineering)
DATA STRUCTURES AND ALGORITHMS
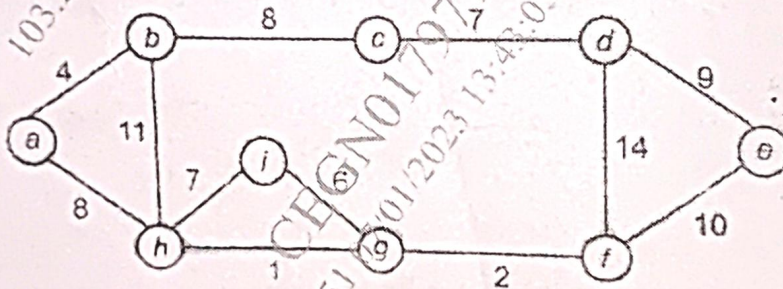(2019 Pattern) (Semester-IV) (210252)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

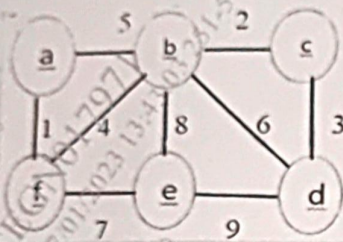**Q1) a)** Find minimum spanning tree of the following graph using kruskals algorithm. [6]

b) Write algorithm for Breadth First Traversal of the graph. Also write its complexity. [6]

c) Write Kruskal's algorithm for minimum spanning trees and explain with example. [6]
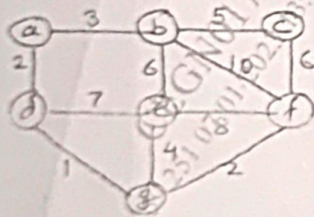
OR

Q2) a) Apply Prim's Algorithm to construct Minimum Spanning Tree, for below drawn graph: Starting vertex is 'a'. [6]

b) Develop pseudo code with one example to traverse a graph using BFS. [6]

c) Find the shortest path from a to f, in the following graph using Dijkstra's Algorithm. [6]

Q3) a) What is OBST? List binary search tree with 3 words (w1, w2, w3) = (do, if, stop) words occurs with probabilities (P1, P2, p3) = (0.4, 0.5, 0.1) find expected access time in each case. [6]

b) Build AVL tree for given sequence of data. Show balance factor of all nodes and name the rotation used for balancing the tree 40,60,80,50,45,47,44,42,75,46,41. [6]

c) Write short notes on: [5]
   i) Red Black tree
   ii) Splay tree

OR

Q4) a) Construct OBST for given data using dynamic programming approach. Explain stepwise. [6]

Index	0	1	2	3
Data	10	20	30	40
Frequency	4	2	6	3

b) Demonstrate Deletion Operation in AVL with example. [6]

c) Explain following terms w.r.t. height balance tree LL, RR, LR, RL. [5]

Q5) a) Construct B-tree of order 4 by inserting the following data one at a time. 20, 10, 30, 15, 12, 40, 50 [6]

b) Write an algorithm to insert a node in B Tree. [6]

c) Construct the B+ Tree of order 4 for the following data: 1, 4, 7, 10, 17, 21, 31, 25, 19, 20, 28, 42. [6]

OR

Q6) a) Build B+ tree of order 3 for the following:
1, 42, 38, 21, 31, 10, 17, 7, 31, 25, 20, 18. [6]

b) Write an algorithm to delete a node from B+tree. [6]

c) Insert the keys to a 5-way B-tree:
3, 7, 9, 23, 45, 1, 5, 14, 25, 24, 13, 11, 08, 19, 04, 31, 35, 56 [6]

Q7) a) Write short notes on: [6]
   i) Factors affecting the file organization
   ii) Indexed sequential files
   iii) Indexing techniques

b) Compare sequential indexed sequential and direct access files. [6]

c) Explain any 4 modes of opening the file in C or C++. [5]

OR

Q8) a) Explain following operations carried out on sequential files. [6]
   i) Add
   ii) Delete
   iii) Search

b) Explain any 3 operations carried out on sequentail file and its pseudo code. [6]

c) A file of employees records, has 'employee-no' as primary key and the 'department code' and the 'designation code' as the secondary keys. Write a procedure to answer the following query – 'Which employees from systems department are above designation level 4? [5]