H Roll No. .....

TMC–501

M. C. A. (FIFTH SEMESTER)

MID SEMESTER EXAMINATION, 2021-22

DESIGN AND ANALYSIS OF ALGORITHMS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any ***one*** of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Write quick sort algorithm and analyze its time complexity for worst case.

10 Marks (CO1)

(b) Solve the following recurrence relation using Master's theorem : 10 Marks (CO1)

(i) $T(n) = 4T(n/2) + n \log n$

(ii) $T(n) = T(n/2) + n^2$

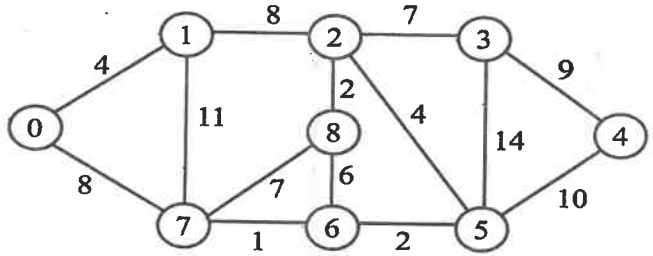
P. T. O.

2. (a) What do you understand by Max Heap ? Create a max heap for the give data items : 10 Marks (CO2)

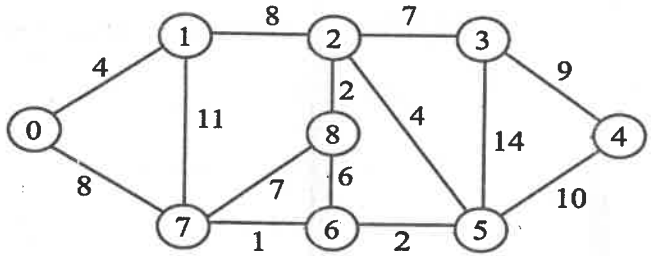
99, 131, 22, 34, 55, 67, 109, 130, 160

(b) Write algorithm to delete a node from the binary search tree. 10 Marks (CO2)

3. (a) Discuss Dijkstra's algorithm and find shortest path tree for the given graph : 10 Marks (CO4)



(b) Explain Prim minimum cost spanning tree algorithm and find MST of the given graph. 10 Marks (CO4)



4. (a) Derive the time complexity of binary search. How many time (maximum) binary search will run if we have a data item set of numbers 0 to 1024 ? 10 Marks (CO1)

(b) Explain radix sort and sort the given items using radix sort : 10 Marks (CO1)

99, 131, 22, 34, 55, 67, 109, 130, 160

5. (a) Write a short note on red black tree. How is rotation done in RB tree ? 10 Marks (CO2)

(b) Write a short note on asymptotic notations and time complexity. 10 Marks (CO1)