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IVth SEMESTER

MID SEMESTER EXAMINATION

*Roll No.....*

B.Tech.(Computer Engg.)

(March 2018)

Paper Code: COE-208 Title of the subject: Algorithm Design and Analysis

Time: 1:30 Hours Max. Marks: 25

Note: Answer all questions. Write pseudo code for all algorithms asked. Assume suitable missing data, if any.

1. Solve following recurrences using Master's Method

   (i) $T(n) = 3T(n/3) + n/2$

   (ii) $T(n) = 7\,T(n/3) + n^2$

   (iii) $T(n) = 2T(n/2) + n \log n$

   (2+2+2=6)

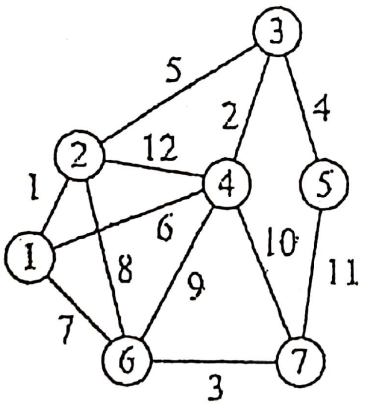
2. Solve following recurrence using recurrence tree method showing complete steps.
   $T(n) = 7T(n/3) + n^2$

   (4)

3. Given an array A which stores 0 and 1, such that each entry containing 0 appears before all those entries containing 1. In other words, it is like {0, 0, 0,..., 0, 0, 1, 1,..., 1 1 1}. Design an algorithm to find out the small index i in the array A such that A[i] = 1 with O(log n) time complexity.

   [5]

4. Apply Prim's MST algorithm on following graph showing construction of MST at each step. Also specify how Prim's MST algorithm uses optimal substructure and greedy choice property.




   [5]

5. Consider following problem of frog willing to reach position n in minimum number of jumps. The frog begins at position 0 in the river. Its goal is to get to position n. There are lilypads at various positions. There is always a lilypad at position 0 and position n. The frog can jump at most r units at a time from one lilypad to another lilypad. Goal is to find the path the frog should take to minimize jumps, assuming a solution exists. Write a greedy algorithm pseudo codes for your solution.

Solve following instance of problem using your greedy algorithm with r = 3.


(5)