322512(22)

B. E. (Fifth Semester) Examination, 2020

(Old Scheme)

(CSE Engg. Branch)

ANALYSIS and DESIGN of ALGORITHMS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note :·Attempt all questions. Part (a) of each question is compulsory and carries 2 marks. Attempt any two parts (b), (c) or (d) each carries 7 marks.

Unit-I

1. (a) Define order of growth.   2

(b) Write asymptotic notations. Explain different asymptotic notations with the help of graphical representation.　7

(c) State Master's theorem. Explain all the three cases with examples.　7

(d) Consider the following recurrence equation :
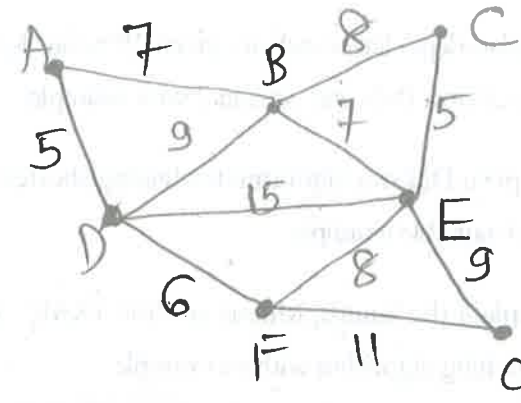
$$T(n) = 2T\left(\left[\frac{n}{2}\right]\right) + n$$

Find the asymtotic complexity using recursion tree method.　7

Unit-II

2. (a) Write the characteristics of dynamic programming.　2

(b) Find an LCS of the following subsequences :

$$X = \{a\ b\ c\ d\ d\ a\ b\}$$

$$Y = \{b\ d\ c\ a\ b\ a\}$$　7

(c) Find an optical parenthesization of a matrix chain whose sequence of dimensions are $\{5, 10, 3, 12, 6\}$.　7

(d) Find the minimum spanning tree for the following graph :　7

Unit-III

3. (a) Define divide and conquer paradigm.　2

(b) Show the operation of merge sort on the following array :

$$\{50,\ 40,\ 20,\ 60,\ 80,\ 45,\ 70,\ 30\}$$　7

(c) Define binary search tree. Write an explain insertion and deletions algorithms for binary search tree.　7

(d) Sort the following array using heap sort :

$$\{25,\ 57,\ 48,\ 37,\ 12,\ 92,\ 86,\ 33\}$$　7

Unit-IV

4. (a) Differentiate between BFS and DFS. 2

(b) Explain depth first search of a graph. Write an algorithm to perform DFS and explain it with example. 7

(c) Explain Dijkstra algorithm for finding shortest path with suitable example. 7

(d) Explain the Knuth, Morris an Pratt (KMP) string matching algorithm with an example. 7

Unit-V

5. (a) Define NP-Hardness. 2

(b) Write short notes on : P, NP and NP-complete problems. 7

(c) Write short notes on Cook's theorem and its implications. 7

(d) Discuss : 3 CNF SAT problem is NP-complete. 7