AE-819

M.Sc. (Previous)
Term End Examination, 2016-17

COMPUTER SCIENCE

Analysis and Design of Algorithm

Time : Three Hours]   [*Maximum Marks* : 100
[*Minimum Pass Marks* : 36

Note : Answer any **five** questions. All questions carry equal marks.

1. (*a*) What is the difference between time and space complexity ? Also describe asymptotic notation used for describing the complexity.

   (*b*) With a suitable algorithm explain the problem of finding maximum and minimum element in a set of *n* elements.

(2)

2. (a) Write an algorithm for Quicksort and write its complexity. Also apply Quicksort to the list 5, 3, 1, 9, 8, 2, 4, 7.
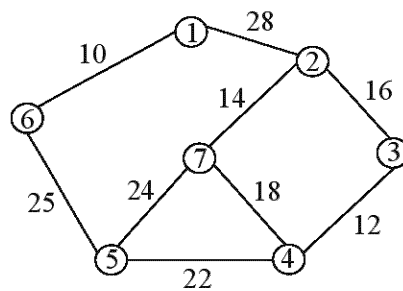
(b) Construct a Huffman code for the following data :

Character : A   B   C   D   E

Probability : 0.4   0.1   0.25   0.2   0.15

(i) Encode the text ABACABAD using generated code.

(ii) Decode the text whose encoding is 10001011100101.

3. (a) What is Data Structure ? Explain the different types of Data Structure.

(b) Solve the following recurrence relation :

(i) $T(n) = 2T\left(\frac{n}{2}\right) + n \log n$

(ii) $T(n) = 2T\left(\frac{n}{3}\right) + T\left(\frac{2n}{3}\right) + C_n$

4. (a) Briefly explain Strassen's matrix multiplication. How it uses divide and conquer method ?

(b) Explain merge sort problem using divide and conquer technique. Give an example.
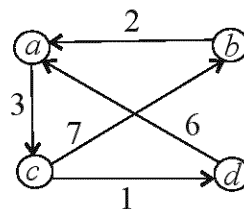
(3)

5. (*a*) Apply Prim's algorithm to find minimum spanning tree in the following graph :

(*b*) Write algorithm for solving Knapsack problem ? Apply the algorithm to the following given data :

Item	Weight	Value
1	18	25
2	15	14
3	10	15
4	20	20

6. (*a*) Apply Floyd's Algorithm to find all pair shortest path for the graph given below.

(4)

(*b*) Explain how dynamic programming is used to solve travelling salesman problem.

7. (*a*) Describe branch and bound method with suitable example.

(*b*) Explain backtracking algorithm with N Queen problem.

8. (*a*) Write complete LC branch and bound algorithm for the job sequencing with deadlines problem.

(*b*) Write an algorthm to compute 0/1 Knapsack problem.

9. (*a*) Define string matching problem and describe any string matching algorithm in detail.

(*b*) Explain the clique decision problem.

10. (*a*) Explain the need for approximation algorithm. How they can be used for NP hard problem ?

(*b*) Explain P, NP and NP complete problem.

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