24362

B. Tech. (CSE) 6th Sem.

Examination – May, 2015

ANALYSIS & DESIGN OF ALGORITHMS

Paper : CSE-306-F

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note :   Attempt *five* questions, selecting *one* question from each section and question number *one* is *compulsory.*

1. (a) Which function grows faster e^n or 2^n ? Justify your answer.   2

     (b) Analyze the various cases for Binary Search's complexity.   2

     (c) Using big-O notation, state time and space complexity of quick-sort.   2

     (d) What is the difference between greedy and dynamic approach ?   2

(e) Can the master method be applied to solve recurrence : 2

$$T(n) = 4T\left(\frac{n}{2}\right) + n^2 \log n \text{ ? Why or why not ?}$$

(f) What are three properties of NP-Complete problem ? 2

(g) Explain any Branch-and-Bound technique. 4

(h) Discuss Hamiltonian cycles with example. 4

SECTION – A

2. (a) Explain strassen's matrix multiplication with example. 10

(b) Write algorithms for Union & Find operations for disjoint sets. 10

3. (a) What is Merge-sort ? Write a recursive algorithm for same and show that its running time is O(n log n). 12

(b) Design a Divide-&-Conquer algorithm for finding minimum and maximum element of 'n' numbers using no more than 3n/2 comparisons. 8

24362-4,850-(P-4)(Q-9)(15)　　(2)

4. (a) Use Dijkstra algorithm to find single source shortest path's for following graph taking vertex 'A' as the source 12
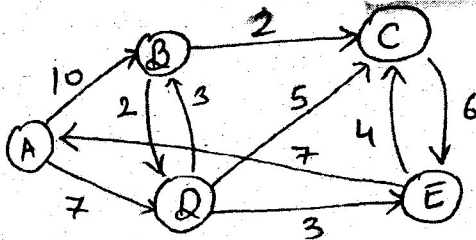
(b) Write Kruskal's algorithm for finding minimum spanning tree of an undirected graph. 8

5. (a) Explain Traveling Salesperson Problem. 8

(b) Set n=7; (p1, p2 ………….., P7) = (3, 5, 20, 18, 1, 6, 30) and (d1, d2, …………. d7) = (1, 3, 4, 3, 2, 1, 2). What is the solution generated by Job sequencing algorithm for given problem ? 12

SECTION – C

6. (a) Discuss how 8-Queen's Problem is solved through Backtracking. 10

(b) Explain LC Branch-&-Bound with example. 10

24362-4,850-(P-4)(Q-9)(15) (3) P. T. O.

7. (a) Write Backtracking algorithm to find chromatic number of a given graph. 10

(b) What is O/1 Knapsack problem ? Solve this problem using Branch-&-Bound method taking suitable example. 10

SECTION – D

8. (a) Giving suitable example prove that travelling Salesperson Problem is NP-hard. 10

(b) Show that clique decision problem is NP-hard. 10

9. Write short notes on :

(a) Difference between deterministic and non-deterministic algorithms. 6

(b) NP-hard and NP-complete problems. 6

(c) Cook's theorem. 8

———————

24362-4,850-(P-4)(Q-9)(15)   (4)