c) Explain NP - hard and NP - complete classes.

d) Prove that Hamiltonian cycle is NP problem.

OR

Write short note on :

i) Set Algorithms

ii) Algebraic Algorithm

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Total No. of Questions : 5] *[Total No. of Printed Pages : 4*

Roll No .....

MCA-404

MCA. IV Semester

Examination, December 2016

Design and Analysis of Algorithms

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) What do you mean by performance analysis of an algorithm? Explain.

b) Explain the importance of asymptotic order in analysis.

c) Prove that :

If $f(n) \in 0(n)$ then $\left[f(n)\right]^2 \in 0\left(n^2\right)$

d) Solve the following recurrence relation -

i) $T(n) = 2T\left(\frac{n}{2}\right) + c \quad T(1) = 1$

ii) $T(n) = T\left(\frac{n}{3}\right) + c \quad T(1) = 1$

OR

Discuss the criteria for analysis of algorithm. Draw a graph of a function log$n$, $n$log$n$, n^2, 2^n for various values of n.

2. a) Define binary search algorithm.
   b) Give the general method for divide and conquer strategy.
   c) Differentiate between depth first and breadth first search algorithm.
   d) Sort the following list using quick sort :

   02, 10, 05, 26, 47, 19, 86, 22, 97, 58, 65.

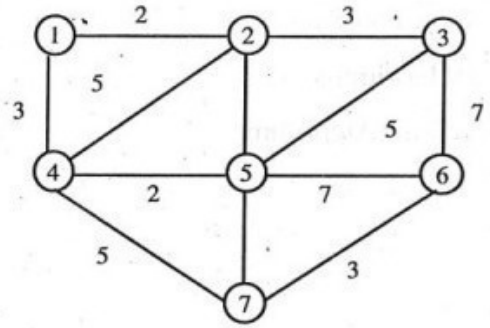
OR

Give an algorithm for Strassen's multiplication. Explain how a divide and conquer strategy is applicable to it? Also analyze your algorithm.

3. a) Write the general characteristics of a greedy algorithm?
   b) Write short note on lower bound theory.
   c) Explain how branch and bound method is used to solve travelling salesman problem.
   d) Draw the portion of stale space tree generated by Lc branch and bound for the following knapsack instance - n = 4, $(p_1, p_2, p_3, p_4) = (10, 12, 14, 20)$
   $(w_1, w_2, w_3, w_4) = (4, 6, 8, 12)$ and $m = 15$

OR

Using Kruskal's algorithm find the minimal spanning tree for the following graph, also evaluate the execution time of kruskal's algorithm.



4. a) Differentiate between divide and conquer and dynamic programming?
   b) Define principle of Optimality?
   c) Explain 8 Queen's problem.
   d) Determine an LCS of [A, B, C, D, B, A, C, D, F] and [C, B, A, F]

OR

Obtain the optimal solution to the knapsack problem n = 3, m = 20 $(p_1, p_2, p_3) = (25, 24, 15)$ and $(w_1, w_2, w_3) = (18, 15, 10)$ using backtracking.

5. a) Differentiate between polynomial and non polynomial time complexity.
   b) Give any one example of P class problem.