(Please write your Exam Roll No.) *Exam Roll No.* 076.....

END TERM EXAMINATION

FOURTH SEMESTER [MCA] MAY-JUNE 2014

Paper Code: MCA-202	***Subject: Design Algorithms & Analysis (Batch 2010 Onwards)***
Time: 3 Hours	***Maximum Marks: 60***

Note: Attempt all questions including Q.no.1 which is compulsory. Internal choices are indicated.

Q1 (a) Show that the number of vertices with odd degree in a graph is always even.

(b) Solve following recurrence relation:-
$T(n) = 2T(n/2) + n$

(c) Prove that Asymptotic notation Big-Theta (θ) represents an equivalence relation.

(d) Differentiate in between BFS and DFS.

(e) Illustrate the overlapping of subproblems through an example, while applying dynamic programming.

(f) Define the term Greedy Choice.

(g) Can we apply the Bellman-Ford algorithm for a graph with negative weights?

(h) A problem P is polynomially reducible to the problem Q. Problem Q is known as a computationally intractable problem. What can be inferred about the hardness of problem P?

(i) Will Either Kruskal's or Prim's Algorithm work correctly on graphs that have negative edge weights?

(j) Is there any necessary and sufficient condition to prove the existence of a Hamiltonian circuit in a given undirected graph? **(2x10=20)**

Unit-I

Q2 (a) Give recursive implementation of a function to compute factorial of a number and analyze its complexity. **(5)**

(b) Develop the recurrence relation for the worst case of Quick Sort procedure and analyze its complexity. **(5)**

OR

Write short notes on the following:- **(5x2=10)**

(a) Substitution Method

(b) Iterative Method

A B C D E F G H I J K L
M N O P Q R S T

Unit-II

Q3 Find the smallest and largest number of keys that a heap of height h can contain. **(10)**

OR

Sort the Following lists by heap sort by, using an array representation of the heap. Is heap Sort a stable algorithm?

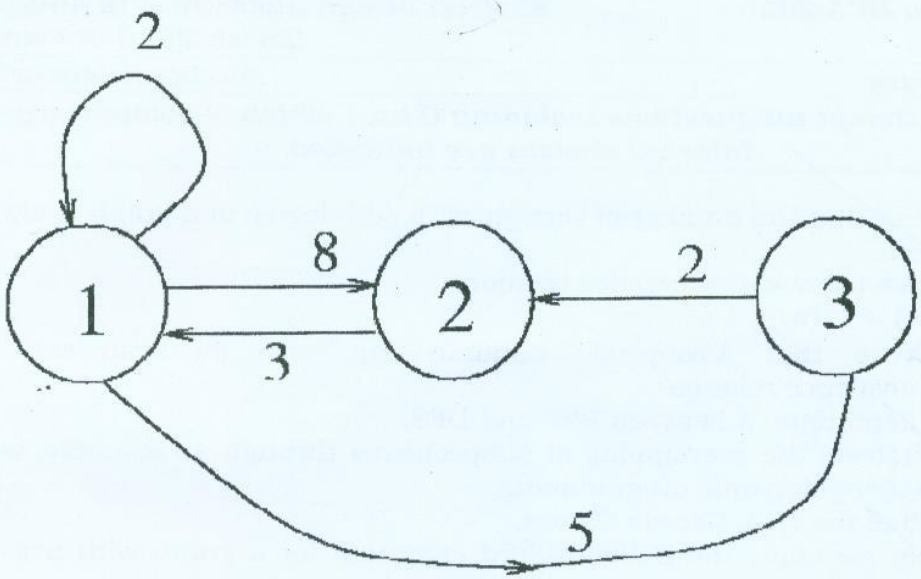
(a) 1,2,3,4,5 (in increasing order)

(b) S,O,R,T,I,N,G (in Alphabetical Order) **(10)**

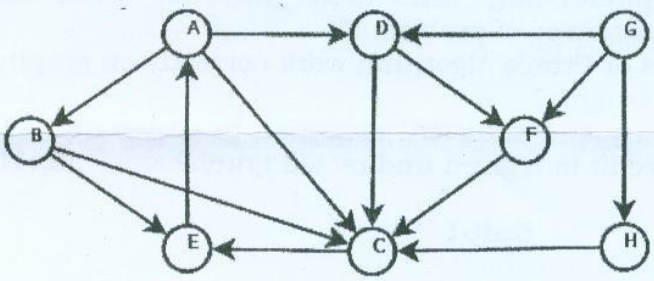
P.T.O.

Unit-III

Q4 (a) Execute Floyd algorithm on following Problem instance:- **(5)**



(b) Conduct Depth first Search of following problem instance:- **(5)**



OR

Illustrate the execution of the KMP algorithm for the Given Text T= "aaabaadaabaa" and pattern P= "aabaa". **(10)**

Unit-IV

Q5 Prove that CNF Satisfiability is a NP Complete problem. **(10)**

OR

Define the following terms **(Any Two)**:- **(5x2=10)**
(a) Branch and Bound mechanism
(b) Undecidable problems
(c) Polynomial time verification

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