

Please write your Exam Roll No.)

Exam Roll No. 0021400414

END TERM EXAMINATION

FOURTH SEMESTER [MCA] MAY-JUNE 2016

Paper Code: MCA-202

Subject: Design and Analysis of Algorithms

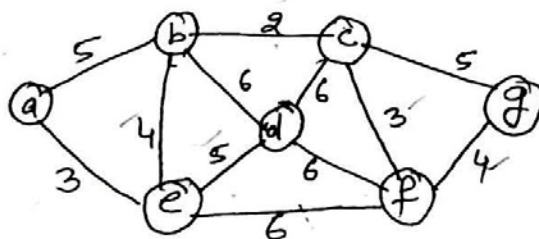
Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions including Q.no.1 which is compulsory.

- Q1 (a) Discuss asymptotic notations in brief. (4x5=20)
 (b) Solve following recurrence relation:
 (i) $T(n) = T(n/2) + T(n/4) + T(n/8) + n$
 (ii) $T(n) = T(\sqrt{n}) + O(\log n)$
 and find asymptotic bounds.
 (c) Sort following array using heap sort and find complexities.
 {5, 18, 3, 7, 20, 8, 1}.
 (d) Describe n-Queen problem. Why it is NP-complete?
 (e) State and provide proof of Cook's theorem.

- Q2 (a) For the following graph find the minimum spanning tree using Krushkal algorithm. (5)



- (b) Explain with an example the Hamiltonian circuit problem. (5)

- Q3 (a) For the following six items, find the solution if the weight limit is 100.

id	Weight	Value	Value/Weight
A	100	40	0.4
B	50	35	0.7
C	40	20	0.5
D	20	4	0.2
E	10	10	1
F	10	6	0.6

Solve the same problem using greedy method? Is the solution optimal? Find Optimal Solution. (5)

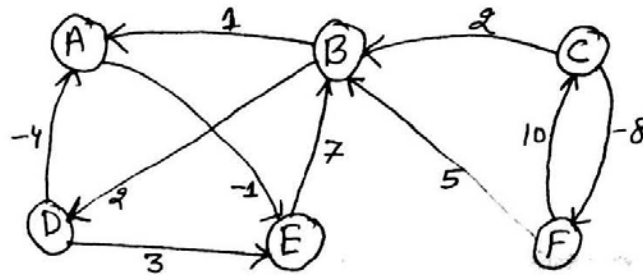
- (b) Define metroids. How they are related to greedy paradigm? (5)

- Q4 (a) Write an algorithm for Floyd-Warshal algorithm and find its time complexity. (5)
 (b) For the following graph, show the values of matrices that result from each iterations. (5)

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- Q5 (a) Write an algorithm for string matching with finite automata and explain. (5)
 (b) For a string $T = "lrrrlrlllr"$. Find the pattern $P = "rl"$ using the automata. (5)
- Q6 (a) What is circuit satisfiability problem? Prove that it is in class NP. (5)
 (b) Explain the Branch-and-Bound technique in brief. (5)
- Q7 (a) Write an algorithm for quick sort and explain its working on following data: (5)
 $\langle 5, 7, 9, 11, 13 \rangle$
 Why worst case time complexity came in this scenario?
 (b) Make a AVL tree for the following insertions: 5, 7, 9, 8, 6, 11, 17. (5)
- Q8 (a) What is the complexity of linear search, binary search and direct search in terms of time? Explain Hashing. (5)
 (b) For the following graph generate BFS and DFS. (5)

