

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012309

Roll No.

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M.C.A

Regular Theory Examination (Odd Sem - III), 2016 -17
DESIGN AND ANALYSIS OF ALGORITHMS

Time : 3 Hours

Max. Marks : 100

SECTION -A

1. Attempt all parts. All parts carry equal marks.
(10×2=20)

Write Answer of each part in Short.

- a) Define the following terms:
 - i) Time Efficiency
 - ii) Space Efficiency
- b) What is a Heap ? What are the different types of heaps?
- c) State the operations performed by disjoint subset.
- d) What do you mean by asymptotic notations? Differentiate the Bigoh (O) and theta(θ) notations with suitable examples.

- e) Define greedy technique.
- f) Determine the complexity of the following function
$$f(n) = n^3 + n^2 + 5$$
- g) State the single source shortest path problem.
- h) What is Traveling Salesman Problem (TSP)?
- i) Define P, NP and NP-Complete problems.
- j) List any two approximation algorithms.

SECTION - B

Note: Attempt any FIVE questions from this section.

(5×10=50)

- 2. Explain the Quick Sort algorithm with an example and also draw the tree structure of the recursive calls made. Analyze the efficiency of Quick Sort algorithm.
- 3. Discuss the properties of a Red Black tree. Construct a Red-Black tree for the following set of data 45, 56, 12, 67, 34, 78, 11.
- 4. Write greedy algorithm for discrete knapsack problem.
- 5. Write notes on the following:
 - i) Greedy algorithm
 - ii) Branch and Bound

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6. Differentiate between Backtracking and Branch and Bound approaches Write an algorithm for sum subset problem using back tracking approach.
7. Explain kruskal's algorithm with an example.
8. Write short notes on the following using approximation algorithm with example
 - i) Nearest neighbor,
 - ii) Multifragment heuristic.
9. Discuss NP-complete problem and also explain minimum vector cover problem in context to NP completeness with example.

SECTION - C

Note: Attempt any 2 questions from this section.

(2×15=30)

10. What do you mean by minimum spanning tree? Write an algorithm that always generate a single forest tree and also explain with suitable example.
11.
 - a) What is Dynamic Programming? Explain with suitable illustration.
 - b) You are given a list of words, $W_1, W_2, W_3 \dots W_n$ and their corresponding probabilities of occurrence $P_1, P_2, P_3, \dots, P_n$. The problem is to arrange these words in ___ a binary search tree in a way that minimizes the expected total access time. Suggest

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___ a ___ good ___ algorithm to implement it. Also prove the complexity of the algorithm derived by you.

12. Explain in detail about Prim's algorithm with example and analyze its efficiency.

