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Total No. of Questions : 09] **[Total No. of Pages : 02**

B.Tech. (Sem. – 5th)

DESIGN AND ANALYSIS OF ALGORITHMS

SUBJECT CODE : CS - 307

Paper ID : [A0467]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) ***(10 × 2 = 20)***

a) Define time and space complexity.

b) List different notions of complexity of an algorithm.

c) State Knapsack problem using branch and bound technique.

d) What is string matching algorithm?

e) List the uses of graph coloring.

f) What do you mean by dynamic programming?

g) Differentiate between NP – hard and NP- complete problem.

h) What are the conditions under which backtracking can be used?

i) Write the worst case and best case running time of merge sort.

j) List the various steps used in designing an algorithm.

Section - B

(4 × 5 = 20)

Q2) Consider a set of elements {12, 34, 56, 73, 24, 11, 34, 56, 78, 91, 34, 91, 45}. Sketch the heapsort algorithm and use it to sort this set. Obtain a derivation for the time complexity of heapsort, both the worst case and average case behaviour.

Q3) What is Greedy Method? State and write algorithm for Knapsack problem using greedy Method.

Q4) Differentiate between greedy and dynamic programming method of problem solving.

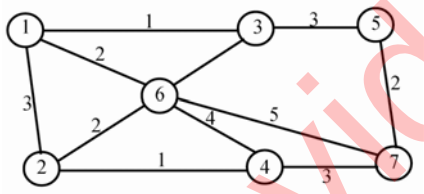
Q5) Write a non-recursive procedure for preorder traversal of a tree.

Q6) Draw the state space tree for m coloring when n = 3 and m = 3.

Section - C

(2 × 10 = 20)

Q7) Write algorithm for Kruskal's minimum spanning tree. Apply it on following graph step by step.



Q8) Find an optimal solution to the Knapsack instance n = 7, M = 15 (P1, P2 P3 ….P7) = (10, 5, 15, 7, 6, 18, 3) and (w1, w2 …. W7) = (2, 3, 5, 7, 1, 4, 1).

Q9) Explain in detail how the technique of backtracking can be applied to solve 8 queen's problem. Present an algorithm for this and explain.