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**24-CS-42**

**M.Sc. IV SEMESTER [MAIN/ATKT] EXAMINATION  
JUNE - JULY 2024**

**COMPUTER SCIENCE**

Paper - II

**[Design and Analysis of Algorithms]**

*[Max. Marks : 75]*

*[Time : 3:00 Hrs.]*

*[Min. Marks : 26]*

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**Note :** Candidate should write his/her Roll Number at the prescribed space on the question paper.  
Student should not write anything on question paper.  
Attempt five questions. Each question carries an internal choice.  
Each question carries **15 marks**.

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- Q. 1 a)** Define an Algorithm. How is an algorithm analyzed. Explain complexity of an algorithm.  
**b)** Explain counting sort algorithm with suitable example.

**OR**

- a)** What divide and conquer technique. Write recursive binary search procedure and analyze its time complexity.  
**b)** Describe about various types of asymptotic notations used in algorithm analysis.

- Q. 2 a)** Explain Dynamic Programming. What is the principle of optimality with example.  
**b)** What is Matrix Chain Multiplication Problem ? Describe solution of matrix chain multiplication problem.

**OR**

- a)** Write the algorithm for 0/1 Knapsack problem with suitable example.  
**b)** Explain Weighted interval scheduling algorithm with example.

- Q. 3 a)** What is Greedy Strategy ? Write some difference between dynamic programming and greedy method.  
**b)** Let total task  $n = 4$  having  $(w_1, w_2, w_3, w_4) = (100, 10, 15, 27)$  weight and  $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$  deadline of completion of task  $A_i$ , find out the optimal schedule.

**OR**

**P.T.O.**

- a) Explain fraction knapsack problem find an optimal solution for following knapsack in stance  $n = 3$ ,  $(w_1, w_2, w_3) = (2, 3, 3)$ ,  $(p_1, p_2, p_3) = (1, 2, 4)$  and  $w = 6$
- b) Explain greedy algorithm for activity selection problem with example.

- Q. 4 a)** Write Prim's algorithm to get minimum cost spanning tree and give its complexity with example.
- b)** What is Bellman ford algorithms provide pseudo code of the algorithm and derive its complexity.

**OR**

- a) Write the Kruskal's algorithm for obtaining minimum spanning tree calculate its time in best and worst case.
- b) What is DFS and BFS Algorithm. Explain difference between DFS and BFS algorithm.

- Q. 5 a)** Discuss the relationship between class P, NP, NP-complete and NP hard problem with suitable example of each class.
- b)** What is Polynomial time algorithm. Explain difference between deterministic and non - deterministic algorithm.

**OR**

- a) Explain approximation algorithm for some NP-complete problem with example.
- b) Define NP-completeness and reducibility of NP-hard problems. Explain difference between both of them with suitable example.

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