

**MGM’s College of Engineering and Technology Kamothe, Navi Mumbai Department of Computer Engineering**

**Assignment-3**

**Course Code: CSC402 Course Name: Analysis of Algorithms Class: SE/IV AY: 2024-2025 Date of Issue: 18/02/2025 Last Date of Submission- 28/02/2025**

| **Q.**  **No** | **Question** | **Module** | **Bloom’s Taxano**  **my level** | **Perfor**  **mance**  **Indicat**  **or(PI)** | **CO** |
| --- | --- | --- | --- | --- | --- |
| **Q1. Fill in the blanks** | |  |  |  |  |
| a) | Bellmann Ford Algorithm can be applied for \_\_\_\_\_\_\_\_\_\_\_\_\_ | M4 | L1 | 1.4.1 | CO4 |
| b) | Floyd Warshall’s Algorithm is used for solving \_\_\_\_\_\_\_\_\_\_\_\_ | M4 | L1 | 1.4.1 | CO4 |
| c) | If a problem can be solved by combining optimal solutions to non overlapping problems, the strategy is called\_\_\_\_\_\_\_\_\_\_\_\_ | M3 | L1 | 1.4.1 | CO3 |
| **Q2. Choose Correct Options** | |  |  |  |  |
| a) | Time complexity of fractional knapsack problem is \_\_\_\_\_\_\_\_\_\_\_\_ a) O(n log n)  b) O(n)  c) O(n2)  d) O(nW) | M3 | L2 | 1.4.1 | CO3 |
| b) | If an optimal solution can be created for a problem by constructing optimal solutions for its subproblems, the problem possesses \_\_\_\_\_\_\_ property.  a) Overlapping subproblems  b) Optimal substructure  c) Memoization  d) Greedy | M4 | L2 | 1.4.1 | CO3 |
| c) | Which of the following problems should be solved using dynamic programming?  a) Mergesort  b) Binary search  c) Longest common subsequence  d) Quicksort | M4 | L2 | 1.4.1 | CO4 |
| d) | When a top-down approach of dynamic programming is applied to a problem, it usually \_\_\_\_\_\_\_\_\_\_\_\_\_  a) Decreases both, the time complexity and the space complexity  b) Decreases the time complexity and increases the space complexity  c) Increases the time complexity and decreases the space | M4 | L2 | 1.4.1 | CO4 |

|  | complexity  d) Increases both, the time complexity and the space complexity |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| e) | Which of the following is/are property/properties of a dynamic programming problem?  a) Optimal substructure  b) Overlapping subproblems  c) Greedy approach  d) Both optimal substructure and overlapping subproblems | M4 | L2 | 1.4.1 | CO4 |
| **Q3. State whether the following statements are true or false (Give Reasons)** | |  |  |  |  |
| a) | When dynamic programming is applied to a problem, it takes far less time as compared to other methods that don’t take advantage of overlapping subproblems. | M4 | L1 | 1.4.1 | CO4 |
| b) | A greedy algorithm can be used to solve all the dynamic programming problems. | M3 | L1 | 1.4.1 | CO3 |
| c) | Fractional knapsack problem can be solved in time O(n). | M3 | L1 | 1.4.1 | CO3 |
| **Q4. Name the following or define or design the following** | |  |  |  |  |
| a) | What is dynamic programming? | M4 | L2 | 1.4.1 | CO4 |
| b) | How does a greedy algorithm construct the solution? | M3 | L2 | 1.4.1 | CO3 |
| c) | What is greedy algorithm? | M3 | L2 | 1.4.1 | CO3 |
| **Q5. Answer the following questions in brief (20 to 30 words)** | |  |  |  |  |
| a) | What are the characteristics of dynamic programming? | M4 | L4 | 1.4.1 | CO4 |
| b) | Explain 0/1 knapsack Problem. | M4 | L2 | 1.4.1 | CO4 |
| c) | Explain Multistage graphs. | M4 | L2 | 1.4.1 | CO4 |
| **Q6. Answer the following questions in brief (50 to 70 words)** | |  |  |  |  |
| a) | Obtain the solution to knapscak problem by Greedy method n=7,m=15 (p1,p2.....p7) = (10,5,15,7,6,18,3), (w1,w2,.....,w7) = (2,3, 5,7,1,4,1). | M3 | L3 | 1.4.1 | CO3 |
| b) | Apply Dijkstra’s algorithm on given graph | M3 | L2 | 1.4.1 | CO3 |
| c) | Apply Floyd Warshall algorithm to given graph | M4 | L3 | 1.4.1 | CO4 |

| **Q7. Think and Answer** | |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a) | What are the differences between the dynamic programming and greedy approach? | M3&4 | L4 | 1.4.1 | CO3  &4 |
| b) | Explain Travelling Salesperson problem with example | M4 | L4 | 1.4.1 | CO4 |
| c) | Explain Assembly-line scheduling with example |  |  |  |  |
| **Q8**. **My Ideas** | |  |  |  |  |
| a) | Determine an LCS of for following strings  String 1- s t o n e  String 2-l o n g e s t | M4 | L4 | 1.4.1 | CO4 |
| b) | Apply Single source shortest path: Bellman Ford Algorithm to given graph | M4 | L4 | 1.4.1 | CO4 |