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**Faculty of Technology and Engineering**

**Chandubhai S Patel Institute of Technology**

**Department of Artificial Intelligence and Machine Learning**

**Performa for PRACTICAL – 5**

Roll no.: Date:    /    /

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| Academic Year | : | 2024-25 | Semester | : | 4 |
| Course code | : | AIML207 | Course name | : | Design and Analysis of Algorithms |

**AIM:**

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| **5. Greedy Approach** | |
| 5.1 | There is an online media platform that sells advertisement slots during a popular live-streaming event. Each ad slot has a certain duration in seconds, and advertisers are willing to pay different amounts for these slots. However, you have a limited total ad duration available for the event, and you want to maximize the revenue generated by selling these slots.  To maximize revenue, you can sell entire ad slots or fractions of a slot (e.g., selling half of a 10-second slot). Your task is to select the ad slots in such a way that the total revenue is maximized without exceeding the available time. |
| 5.2 | A city is installing an emergency response system. The city has multiple hospitals, fire stations, and police stations that need to be reached as quickly as possible during emergencies. Each road in the city has a specific travel time, and during emergencies, it's crucial to send the fastest available response team to the incident location.  Your job is to find the shortest travel time from any emergency station (hospital, fire station, or police station) to a specific incident location, ensuring the response is as quick as possible.  You are given the locations of all emergency stations and the incident site, and you need to compute the shortest time for any emergency station to reach the incident. |
| 5.3 | A telecom company tasked with connecting several cities using fiber optic cables. Each pair of cities can be connected by a cable, but the cost of laying the cable between two cities varies depending on the distance and terrain. The goal is to connect all the cities with the minimum total cost. The network should not form any cycles. The list of possible connections between cities cannot be represented as an adjacency matrix due to memory constraints (this would be inefficient for sparse graphs). Return the total minimum cost required to connect all cities, or -1 if it is not possible to connect all cities. |

**5.1 Analysis of the Problem**

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| **Approach** | **Time**  **Complexity** | **Space Complexity** | **Observation** |
|  |  |  | This is fractional knapsack  Solved using greedy approach |

**5.2 Analysis of the Problem**

|  |  |  |  |
| --- | --- | --- | --- |
| **Approach** | **Time**  **Complexity** | **Space Complexity** | **Observation** |
|  |  |  | This is  Diskstra algorithm solved  Solve using greedy approach |

**5.3 Analysis of the Problem**

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| **Approach** | **Time**  **Complexity** | **Space Complexity** | **Observation** |
|  |  |  | Minimum spamming tree  Using prim’s algorithm  Greedy approach |

**Answer the following Questions:**

1. Why does Greedy Approach guarantee optimal performance for advertisement problem?
2. What factors should be considered when selecting the appropriate shortest path algorithm using Greedy Approach?
3. Compare Kruskal’s Algorithm and Prim’s Algorithm. Which one is more suitable for sparse and dense graphs?
4. Why is disjoin set data structure applied in Kruskal’s Algorithm?

**Conclusion:**

**Grade / Marks Sign of Lab Teacher with Date**