**BACHELOR OF TECHNOLOGY (CBCS) (2020-COURSE)**
**INFORMATION TECHNOLOGY**
**B. Tech. Sem - IV :SUMMER : 2023**
**SUBJECT : APPLIED ALGORITHMS**

Day : Wednesday
Date : 31-05-2023

**S-24721-2023**

Time : 10:00 AM-01:00 PM
Max. Marks : 60

**N.B.:**

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat labelled diagrams **WHEREVER** necessary.

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**Q.1** Define the term time and space complexity. Describe different notations used to represent their complexities. **(10)**

**OR**

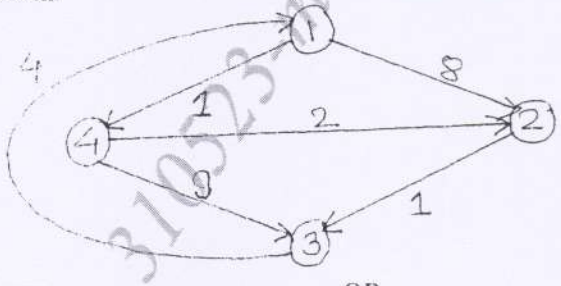
**Q.1** How to solve recurrence relation for complexity analysis of algorithms? **(10)**

**Q.2** Differentiate between greedy algorithm, dynamic algorithm and heuristic problem solving approaches. **(10)**

**OR**

**Q.2** What are the merits and demerits of brute force approach? Write an algorithm for pattern matching using brute force approach. **(10)**

**Q.3** Consider the graph shown below and find the shortest path using Floyd Warshall algorithm. **(10)**




**OR**

**Q.3** What is knapsack problem? How dynamic programming and greedy approaches are used to solve it? Consider following example to solve knapsack problem using both the approaches. Total number of items is 7 and knapsack maximum capacity is 15. **(10)**

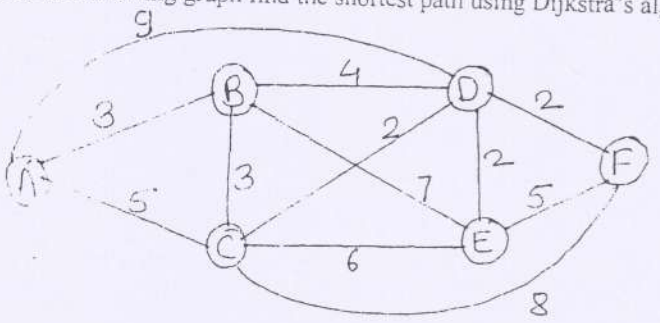
| Objects | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Profit | 10 | 5 | 15 | 7 | 6 | 18 | 3 |
| Weight | 2 | 3 | 5 | 7 | 1 | 4 | 1 |

P. T. O.

Q.4 Write pseudo code for insert operation of B tree. Construct a B-Tree of order 3 by inserting the given numbers. 10, 34, 78, 45, 123, 341, 234, 167, 159, 52, 83. **(10)**

**OR**

Q.4 For the following graph find the shortest path using Dijkstra's algorithm. **(10)**




Q.5 What is the Cook-Levin theorem in Computer Science? Which NP- complete problem is proved by Cook? Elaborate it. **(10)**

**OR**

Q.5 Write the difference between NP completer and NP- hard problems. What are standard NP- complete problems? Discuss different reduction techniques. **(10)**

Q.6 What is Randomized algorithms? How does randomized algorithm solve a problem? Explain with suitable example. **(10)**

**OR**

Q.6 What are the advantages and disadvantages of approximation algorithms? Explain Quantum algorithms with suitable examples. **(10)**

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