

Final Assessment Test – May 2024



Course: **BCSE204L - Design and Analysis of Algorithms**

Class NBR(s): **0765/0776/0817/0825/0829/0831/0839**

/0874/0877/0884/0890/0901/0906/0912/0917/0923 Slot: **A1+TA1**

/0925/0927/0929/0931/0933/0939/6134

Time: **Three Hours**

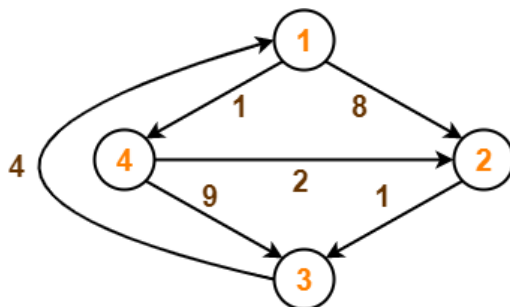
Max. Marks: **100**

- **KEEPING MOBILE PHONE/ELECTRONIC DEVICES EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

Answer any **TEN** Questions

(10 X 10 = 100 Marks)

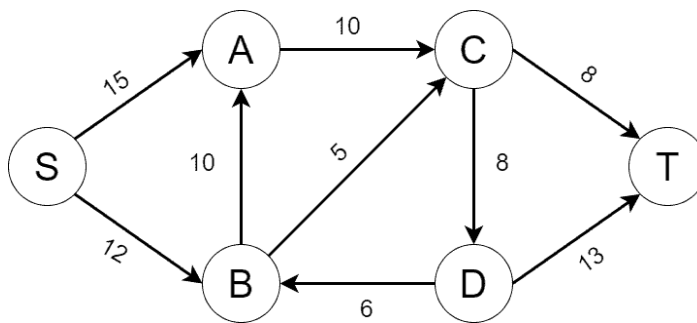
1. Design an algorithm for sum of all elements of a matrix using 2D Array and analyze its time complexity. How to prove the correctness of matrix using Induction method. **BL3 CO1**
2. Outline important factors of Dynamic Programming and perform Matrix chain multiplication for {4, 10, 3, 12, 20, and 7}. The matrices have size 4 x 10, 10 x 3, 3 x 12, 12 x 20, 20 x 7. Compute $M[i,j]$, $0 \leq i, j \leq 5$. Consider $M[i, i] = 0$ for all i . **BL2 CO2**
3. a) Interpret steps of KMP_next array and the Knuth-Morris-Pratt (KMP) algorithm. Compute the KMP_next array of the Text as ABCDDAEFG and pattern as CDD. **[5] BL5 CO3**
- b) Classify between KMP and Rabin-karp algorithm works with strength and weakness of Complexity. **[5] BL2 CO3**
4. Perform step-by-step process of find the shortest path distance between every pair of vertices using Floyd warshall algorithm, from the directed weighted graph. **BL3 CO3**



5. Relate Graham's Scan and Jarvis March Algorithm steps and how to choose the best practices for computational Convex Hull. Illustrate with an example. **BL2 CO3**
6. Narrate how Randomized Quick Sort algorithm differs from Normal Quick Sort. Write an algorithm and solve the randomized quick sort algorithm with an example. **BL1 CO4**
7. Compare and Contrast the following terms used in computational complexity such as N, NP and NP-complete problems. Discuss its features with real time examples. **BL2 CO5**

8. Write a Edmonds-Karp's algorithm, and compute the maximum flow in the network N and analyze its complexity.

BL3 CO3



9. Explain N-Queens algorithm and explain with 4 x 4 chessboard and number the rows and column of the chessboard 1 through 4 in a State space Tree using Backtracking (step-by-step checkerboard). Also derive Time complexity of N Queen using backtracking?

BL5 CO2

10. Define Greedy Knapsack? Find an optimal solution to the knapsack problem $n=7, M=15, (p_1, p_2, p_3, p_4, p_5, p_6, p_7) = (10, 5, 15, 7, 6, 18, 3), (w_1, w_2, w_3, w_4, w_5, w_6, w_7) = (2, 3, 5, 7, 1, 4, 1)$.

BL1 CO2

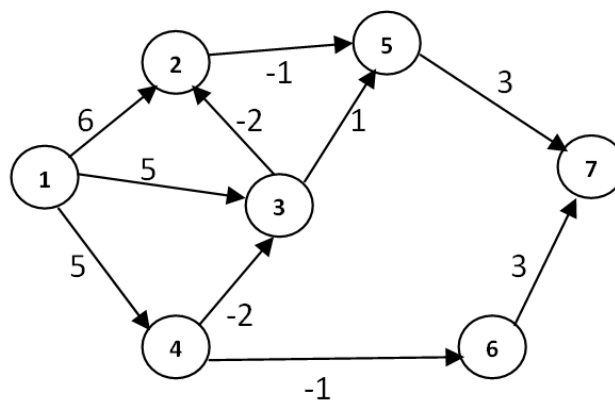
11. Solve the following tasks with their deadlines and profits. Schedule the tasks in such a way that they produce maximum profit after being executed

BL6 CO2

S. No.	1	2	3	4	5
Jobs	J1	J2	J3	J4	J5
Deadlines	2	2	1	3	4
Profits	20	60	40	100	80

12. Solve a Bellman ford single source shortest path computations and analyze its complexity. Consider starting vertex as "1" destination vertex as "7".

BL3 CO3



⇔⇔⇔F/E/TX⇔⇔⇔