REG.NO.:

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORAMTION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2025-2026

SLOT: A2+TA2

Programme Name & Branch : BTECH - Computer Science and Engineering (AI and Data Engineering), BTECH - Computer Science and Engineering (Cyber Security)
Course Code and Course Name : BCSE204L - Design and Analysis of Algorithms
Faculty Name(s) : Dr. Angulakshmi M, Dr. Kuruva Lakshmanna, and Dr. Yusuf Akhtar
Class Number(s) : VL2025260503584, 3560, and 3586
Exam Duration : 90 minutes **Maximum Marks:** 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes: (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
  2. Demonstrate the major algorithm design paradigms.
  3. Explain major graph algorithms, string matching and geometric algorithms along with their analysis.

Q. No	Question	M	CO	BL
1.	Given: **Item** | **Profit** | **Weight** 1 | 40 | 2 2 | 30 | 5 3 | 50 | 10 4 | 10 | 5 Knapsack capacity = **16** 1. Construct the state-space tree. 2. Solve using Branch & Bound 3. Identify the maximum profit.	10	CO2	BL3
2.	Let: Text: T="3141592653589793" Pattern: P="2653" Assume: Base d=10 and Prime q=13 (Hint: H = (digit0 * d^(m-1) + digit1 * d^(m-2) + ... + digit_{m-1}) mod q) 1. Compute the initial hash values for the pattern and first window. 2. Show rolling hash computation for next three shifts. 3. Identify spurious hits (if any). 4. Explain why Rabin–Karp performs well for multiple pattern matching. 5. Analyze average and worst-case time complexity.	10	CO3	BL3

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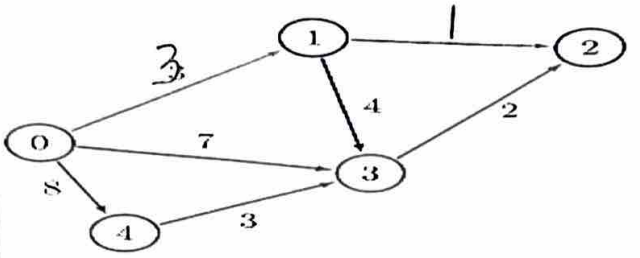
3.	Given flow network: Vertices: {S, A, B, C, D, T} Edges with capacities: S→A (10), S→C (10), A→B (4), A→C (2), A→D (8), B→T (10), C→D (9), D→B (6), D→T (10) 1. Apply Ford–Fulkerson manually. 2. Show each augmenting path chosen. 3. Update residual capacities after each augmentation. 4. Compute final maximum flow. 5. Explain why result may depend on path selection.	10	CO3	BL3
4.	Given weighted directed graph:  1. Apply Floyd–Warshall algorithm step-by-step. 2. Show intermediate matrices after each k. 3. Detect whether a negative cycle exists using diagonal entries. 4. Derive time and space complexity.	10	CO3	BL3
5.	Given 6 line segments in a plane: S1: (1,1) → (5,5) S2: (1,5) → (5,1) S3: (2,1) → (2,6) S4: (3,0) → (3,7) S5: (0,3) → (6,3) S6: (4,4) → (7,7) 1. Using brute force method, determine all intersecting pairs. 2. Count total comparisons performed. 3. Explain why brute force becomes inefficient for large datasets. 4. Derive worst-case complexity. 5. Suggest an improved approach.	10	CO3	BL2

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