

JK Lakshmipat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2025
B. Tech. in Computer Science Engineering, Semester-VII

Roll No.....

Course Code: CS1236

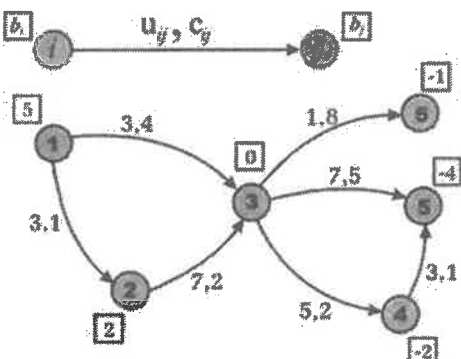
Time: 2 Hours 30 Mins

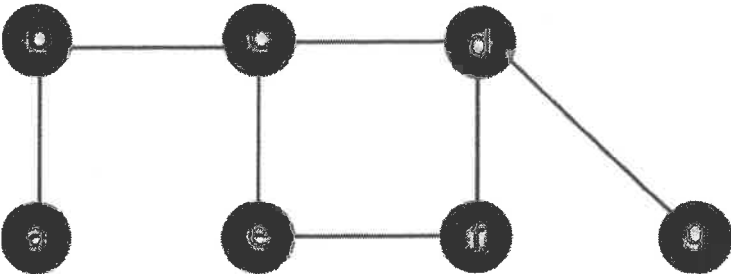
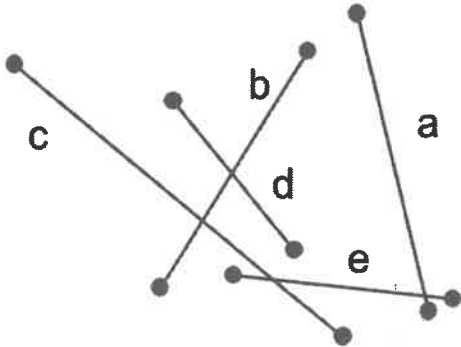
Max. Marks: 30

Course Name: Advanced Data Structures

Instructions to students:

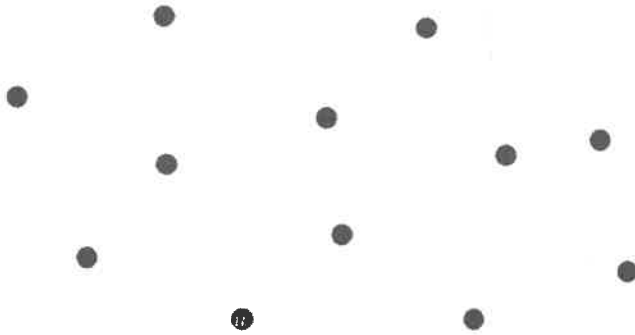
1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Use of Calculators are allowed

Q1.	A. Use minimum cost maximum flow technique to obtain the solution for minimum cost maximum flow for the following graph.  $U_{i,j}$ = capacity of the edge (i,j) $C_{i,j}$ = Cost of the edge (i,j) b_i = balance value for node i. Show the steps clearly. Write the pseudo code and the time complexity. B. What are the maximum number of edges for a bipartite graph with 10 vertices?	04 02 C03
Q2.	A. Given a logic function Q defined as $Q(x_1, x_2, x_3) = (x_1 \text{ and } x_2) \text{ OR } (\text{NOT } x_3)$ Using a decision tree prove that the circuit is satisfiable. B. Apply approximation technique to obtain the minimum vertex cover in the following graph	02 04

	Calculate the performance ratio. Show the steps clearly in both cases – also write the pseudocode. 	CO 1 CO 7
Q3.	A. Why is external sort deployed? define the main phases used for external sort. B. Consider following data for external sort using disk storage. Each block contains 250 records Each run clubs 3 blocks Number of records to be sorted = 4500. Use the following parameters for calculation T_{IO} = overall time including seek, latency and read/write one block T_{IS} = time to internally sort records $n.T_m$ = time to merge n records from input to output buffers. Clearly display the merging sequence (calculating time at each intermediate steps) And compute the total time for external sort in terms of the aforesaid parameters.	02 04 CO 3
Q4.	A. How do you identify intersection between any given two lines using orientation. B. Use plane sweep algorithm to identify number of intersections for the following set of line segments. State the pseudocode clearly with diagrammatic steps. (Use Event Queue and segment list – showing the sequence) 	02 04 CO 6
Q5.	A. Prove that for n bit increment of a binary counter using accounting method (piggy bank method) the amortized cost is at most \$2. We assume whenever we increment a bit (flip $0 \rightarrow 1$), pay the actual cost of \$1, plus put \$1 into a piggy bank. For the flip a $1 \rightarrow 0$, use the money in the bank (or on top of the bit) to pay for the flip.	03

B. Find the convex hull for the following set of points using Graham's Scan Algorithm clearly showing the steps diagrammatically.

03



Mark the points as per your convenience.
State clearly the pseudocode being used.

C02

C06
