

SLOT: D1



VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

REG.NO.:

Programme Name & Branch : B.Tech. Computer Science and Business Systems
Course Code and Course Name : CBS1008 and Operations Research
Faculty Name(s) : Dr. Umakanta Mishra, Dr. D. Anuradha
Class Number(s) : VL2025260104409, VL2025260104412
Date of Examination :
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
- Analyse various OR models like Inventory, Replacement, Queueing, Decision etc and apply them for Optimization
- Understand the concepts of integer linear programming

ANSWER ALL QUESTIONS (5X 10 = 50)

Q. No.	Question	Marks	CO	BL
1	Use Branch and Bound method to solve the IPP $\text{Max } Z = 7x_1 + 9x_2$ $\text{Subject to: } -x_1 + 3x_2 \leq 6, 7x_1 + x_2 \leq 35$ $x_1, x_2 \geq 0 \text{ and are integers.}$	10	3	5
2	3. Use Gomary's cutting plane method to solve the mixed IPP $\text{Max } Z = x_1 + x_2$ $\text{Subject to: } 3x_1 + 2x_2 \leq 5, x_2 \leq 2$ $x_1, x_2 \geq 0 \text{ and } x_1 \text{ is an integer.}$	10	3	5
3	A small paint company manufactures two types of paint, latex and enamel. In production, the company uses 10 hours of labor to produce 100 gallons of latex and 15 hours of labor to produce 100 gallons of enamel. The company has 40 hours of daily labor and 30 hours of overtime labour available each week. Furthermore, if enamel paint is produced, latex paint must also be produced. Each paint generates a profit at the rate of \$1.00 per gallon. The company has the following objectives listed in decreasing priority: • Avoid the use of overtime • Achieve a weekly profit of \$1000 • Produce at least 700 gallons of enamel paint each week. Formulate this problem as a goal programming model.	10	4	5
4	Find the possible solution to achieve the goals by graphical method $\text{Minimize } Z = P_1d_1^- + 2P_2d_2^- + P_2d_3^- + P_3d_1^+$ $\text{subject to; } x_1 + x_2 + d_1^- - d_1^+ = 450; x_1 + d_2^- = 250; x_2 + d_3^- = 350$ $x_1, x_2, d_1^-, d_2^-, d_3^-, d_1^+ \geq 0$	10	4	4
5	Consider the Markov chain with three states, $S = \{1, 2, 3\}$ that has the following transition matrix $P = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{3} & 0 & \frac{2}{3} \\ \frac{1}{2} & \frac{1}{2} & 0 \end{bmatrix}$ a) Draw the state transition diagram for this chain. b) If we know $P(X_1=1) = P(X_1=2) = 1/4$, find $P(X_1=3, X_2=2, X_3=1)$.	10	4	4