VIT
Vellore Institute of Technology
Vellore – 632014, Tamil Nadu, India
DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES
FALL SEMESTER 2024-2025

CONTINUOUS ASSESSMENT TEST – I

Programme Name & Branch: **B. Tech.** Course Code: **CBS1008**
Course Name: **Operations Research** Slot: **E1**
Duration: **90 minutes** Class ids: **VL2024250105127, VL2024250105123**
Faculty: **Dr. Amrit Das, Dr. M. Mubashir Unnissa** Max. Marks: **50**

General instruction(s): *Answer all questions, Graph paper will be provided on request.*

Q. No	Question	Marks
1.	Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of vitamin A per gram, 12 units of vitamin B per gram and costs 20 paise per gram. The daily minimum requirements of vitamin A and B are 100 units and 120 units respectively. Formulate the problem as a LPP model and find the minimum costs of the product mixture by graphical method.	10
2.	Find the optimal solution of the following linear programming problem by simplex method. Minimize $z = x_1 - 3x_2 + 2x_3$ Subject to $3x_1 - x_2 + 2x_3 \leq 7$ $-2x_1 + 4x_2 \leq 12$ $-4x_1 + 3x_2 - 8x_3 \leq 10$ and $x_1, x_2, x_3 \geq 0$	10
3.	Use the Big-M method to find the optimal solution for the following linear programming problem. Maximize $z = 5x_1 - 4x_2 + 3x_3$ Subject to $2x_1 + x_2 - 6x_3 = 20$ $6x_1 + 5x_2 + 10x_3 \leq 20$ $8x_1 - 3x_2 + 6x_3 \leq 50$ and $x_1, x_2, x_3 \geq 0$	10
4.	Find the initial basic feasible solution of the following transportation problem using VAM method and then test the optimality using UV- method to obtain the optimal solution for the transportation problem.	10
5.	Consider the problem of assigning four operators to four machines. The assignment costs in rupees are given here. Operator 1 cannot be assigned to machine III and Operator 3 cannot be assigned to machine IV. Find the optimal cost of assignment using the Hungarian method.	10

	D_1	D_2	D_3	D_4	*Capacities*
O_1	5	4	6	14	15
O_2	2	9	9	6	4
O_3	6	11	7	13	8
Demands	9	7	5	6	

Machines

Operators	I	II	III	IV
1	5	5	-	2
2	7	4	2	3
3	9	3	5	-
4	7	2	6	7

****