

OPERATIONS RESEARCH ASSIGNMENT FOR 3RD YEAR CSE, CSE-AI

LAST DATE OF SUBMISSION: MAY 30, 2025

SOLVE ALL PROBLEMS ON A SHEET OF PAPER / COPY.

SCAN AND NAME THE FILE WITH **FULL NAME & ID** (e.g., file should be OSHMITA_0000)

FORMAT MUST BE **PDF**.

1. A farm is engaged in breeding pigs. The pigs are fed on various products grown on the farm. In view of the need to ensure certain nutrient constituents N_1, N_2, N_3 , it is necessary to buy two additional products P_1 and P_2 . One unit of P_1 contains 36 units of N_1 , 3 units of N_2 and 20 units of N_3 . One unit of P_2 contains 6 units of N_1 , 12 units of N_2 and 10 units of N_3 . The minimum requirement of N_1, N_2, N_3 is 108 units, 36 units and 100 units respectively. Product P_1 costs Rs. 20 per unit and P_2 costs Rs. 40 per unit. Formulate this Diet Problem as an LP model and solve it graphically. CO1

2. Find the solution of the given L.P.P. by Graphical method CO1
- $$\begin{cases} \text{Minimize } z = 3x_1 + 2x_2 \\ \text{subject to } 5x_1 + x_2 \geq 10; x_1 + x_2 \geq 6; x_1 + 4x_2 \geq 12; x_1, x_2 \geq 0 \end{cases}$$

3. Find the I.B.F.S. to the following transportation problem using North-West corner method and prove that the optimal solution is non degenerate though the initial solution is degenerate. CO2

	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	9	8	5	7	12
S ₂	4	6	8	7	14
S ₃	5	8	8	5	16
Demand	8	18	13	3	

4. Find the optimal assignments to find the minimum cost for the assignment problem with the following cost matrix. CO3

	A	B	C	D
1	62	78	50	101
2	71	84	61	73
3	87	92	111	71
4	48	64	87	77

5. Solve the following travelling salesman problem CO3

	A	B	C	D	E
A	∞	5	8	4	5
B	5	∞	7	4	5
C	8	7	∞	8	6
D	4	4	8	∞	8
E	5	5	6	8	∞

6. Player I holds a black Ace and a red 8. Player II holds a red 2 and a black 7. The players simultaneously choose a card to play. If the chosen cards are of the same color, Player CO4

I wins. Player II wins if the cards are of different color. The amount won is a number of dollars equal to the number on the winner's card (Ace counts as 1). Set up the payoff function, find the value of the game and the optimal mixed strategies of the players.

7. Solve the game by method of dominance whose pay-off matrix is given below: CO4

	Player B				
Player A		B ₁	B ₂	B ₃	B ₄
	A ₁	2	-2	4	1
	A ₂	6	1	12	3
	A ₃	-3	2	0	6
	A ₄	2	-3	7	1

8. Use graphical method for solving game and find the value of the game. CO4

Player A	Player B				
		B ₁	B ₂	B ₃	B ₄
	A ₁	2	2	3	
	A ₂	4	3	2	

9. An overhead crane of ABC Ltd. moves jobs from one machine to another and must be used every time a machine requires loading or unloading. The demand for service is random. Data taken by recording the elapsed time between service calls followed an exponential distribution having a mean of a call every 24 minutes. In a similar manner, the actual service time of loading or unloading took an average of 8 minutes. What is the average number of units in the system? What is the average number of units in the queue? What will be the average waiting time in the system? What will be the average waiting time in the queue? CO5

10. Find the critical activities for the following network CO6

Activity	A	B	C	D	E	F	G	H	I	J
Immediate predecessors	—	A	A	A	B	C, D	D	B	E, F, G	G
Duration	2	3	4	5	6	3	4	7	2	3