ASSIGNMENT

Semester V (MINOR)

2025-26

Course: Operations Research (3MH501IC24)

Submission deadline: 05.10.2025

Total marks: 14

(If submitted late, marks will be deducted from the obtained marks)

- **Submit your assignment through LMS**

Answer all the questions

Q1 An Air Force is experimenting with three types of bombs P, Q and R in which three kinds of explosives, viz., A, B and C will be used. Taking the various factors into account, it has been decided to use the maximum 600 kg of explosive A, at least 480 kg of explosive B and exactly 540 kg of explosive C. Bomb P requires 3, 2, 2 kg, bomb Q requires 1, 4, 3 kg and bomb R requires 4, 2, 3 kg of explosives A, B and C respectively. Bomb P is estimated to give the equivalent of a 2 tons explosion, bomb Q, a 3 tons explosion and bomb R, a 4 tons explosion respectively. Formulate the problem as an LPP to maximize the explosion impact.

Q2 Solve the following LPP by graphical method:

Maximize $Z = 2x_1 + 5x_2$

subject to

$x_1 + x_2 \geq 2,$

$x_1 + x_2 \leq 5,$

$x_1 + 6x_2 \geq 6,$

$x_1, x_2 \geq 0.$

Q3 Solve the following LPP by simplex method:

$$\text{Max } Z = 30x_1 + 40x_2 + 20x_3$$

$$\text{subject to} \quad 10x_1 + 12x_2 + 7x_3 \leq 10{,}000$$

$$7x_1 + 10x_2 + 8x_3 \leq 8{,}000$$

$$x_1 + x_2 + x_3 \leq 1{,}000$$

$$\text{and} \quad x_1, x_2, x_3 \geq 0$$

Q4 Solve the following LPP by 2-phase method:
Minimize $Z = 600x_1 + 500x_2$
subject to:
$2x_1 + x_2 \geq 80,$
$x_1 + 2x_2 \geq 60,$
$x_1, x_2 \geq 0.$

Q5 The following table shows the profit (in 1000 rupees) earned from transporting one unit of an item from each source to each destination. Availability of sources and the demands at destinations are also indicated. Find the optimal transportation schedule and the optimum profit.

		Destination					
		D1	D2	D3	D4	D5	Availability
Source	S1	12	15	14	18	20	50
	S2	25	15	20	12	8	30
	S3	12	14	16	20	15	10
	S4	15	22	25	24	30	20
	Demand	25	20	28	27	10	

Q6 The cell entries in the following AP are revenue earned (in Rupee) when each person is assigned to each task. Find the optimal assignment.

		Tasks				
		I	II	III	IV	V
Persons	P	102	110	145	125	90
	Q	80	95	120	110	80
	R	78	105	100	88	92
	S	50	58	46	65	70

Q7 Seven jobs will be processed through 2 machines M1 and M2 in the order M2-M1. The processing times (in hours) are given below. Find the optimum sequence which will minimize the elapsed time. Also, find the idle time of each machine.

	J1	J2	J3	J4	J5	J6	J7
M1	12	10	13	12	30	10	10
M2	17	8	13	15	32	8	11

Q8 Write in 200 words about some applications of OR in your branch of engineering.