

OR02

Roll No.

Total No. Of Printed Pages : 05

Total No. Of Questions : 7

Maximum Marks : 60

Duration (hrs.) : 3

Note : Solve any five out of given seven questions. Each Question is of 12 marks ($12 \times 5 = 60$ marks). Draw neat and clean diagram as per need of question.

(Marks 12)

- Q) 1) Define LPP . Also write one important limitation of Graphical Method in LPP solving.
Solve the given LPP using Simplex Method :

$$\text{Max } Z = 3 X_1 + 2 X_2$$

subject to ,

$$X_1 + X_2 \leq 4$$

$$X_1 - X_2 \leq 2 \quad \text{and} \quad X_1, X_2 \geq 0$$

Q) 2)

(Marks 06)

- (a) Use the graphical method to solve the following LP Problem :

$$\text{Max } Z = X_1 + X_2 / 2$$

Subject to ,

$$3X_1 + 2X_2 \leq 12$$

$$5X_1 = 10$$

$$X_1 + X_2 \geq 8$$

$$- X_1 + X_2 \geq 4 \quad \text{and} \quad X_1, X_2 \geq 0$$

- (b) Find dual of given LP Problem

(Marks 06)

$$\text{Min } Z_x = 2X_1 + 3X_2 + 4X_3$$

Subject to,

$$2X_1 + 3X_2 + 5X_3 \geq 2$$

$$3X_1 + X_2 + 7X_3 = 3$$

$$X_1 + 4X_2 + 6X_3 \leq 5 \quad \text{and} \quad X_1, X_2 \geq 0 ; X_3 \text{ is unrestricted.}$$

(Marks 12)

Q) 3) The projects x , y and z requires truck loads of 45 , 50 and 20 , respectively per week . The availabilities in plants A , B and C are 40 , 40 and 40 truck loads respectively per week . The cost of transportation per unit of truck load from plant to project is given below :

		Project		
		X	Y	Z
P l a n t s	A	5	20	5
	B	10	30	8
	C	10	20	12

Obtain an optimal solution by **MODI** method to minimize the total cost of transportation .

(Marks 12)

Q) 4) Assign the jobs (J1 , J2 , J3 , J4) to the employees (A , B , C , D) such that the profit is maximum

Jobs / Employee	A	B	C	D
J1	62	78	50	101
J2	71	84	61	73
J3	87	92	111	71
J4	48	64	87	77

3

Q) 5)

(Marks 06)

(a) Solve the following 2 x 3 game graphically

		Player P2		
		Y1	Y2	Y3
Player P1	X1	1	3	11
	X2	8	5	2

(Marks 06)

(b) Using dominance principle , solve the following game problem :

		Player B			
		B1	B2	B3	B4
Player A	A1	2	-2	4	1
	A2	6	1	12	3
	A3	-3	2	0	6
	A4	2	-3	7	7

: 4 :

(Marks 12)

Q) 6) The time and cost estimates of the different activities constituting a project are given as :

Activity	Normal Time			Normal Cost (Rs.)	Crash Time	Crash Cost
	to	tp	tm			
1-2	1	5	3	15,000	1	19,000
2-3	1	7	4	18,000	3	24,000
2-4	1	5	3	14,000	2	16,000
2-5	5	11	8	15,000	7	16,000
3-6	2	6	4	13,000	2	15,000
4-6	5	7	6	12,000	4	13,000
5-7	4	6	5	20,000	4	24,000
6-7	1	5	3	17,000	1	20,000

The normal delivery time is 16 weeks for a constant price of Rs. 1,24,000 . Based on the probability for each of the following specified delivery time , recommend the delivery schedule that the Patel Machinery Co. should follow :

Contract Delivery Time (Weeks)	Contract Amount (Rs.)
15	1, 42, 500
14	1, 45, 000
13	1, 50, 000
12	1, 52, 500

(Marks 12)

Q) 7) A road transport company has one reservation clerk on duty at a time . He handles information of bus schedules and makes reservations . Customers arrive at a rate of 8 per hour and the clerk can service 12 customers on an average per hour. After stating your assumptions, answer the following :

- (a) What is the average number of customers waiting for the service of the clerk.
- (b) What is the average time a customer has to wait for the service .
- (c) The management is contemplating to install a computer system to handle the information and reservations. This is expected to reduce the service time from 5 to 3 minutes. Calculate changed waiting time for the customers in the system after installation of computer .