SECTION—C

IX. (a) Solve graphically :

Minimize $Z = 2500x_1 + 3500x_2$

Subject to constraints

$$50x_1 + 60x_2 \geq 2500$$

$$100x_1 + 60x_2 \geq 3000$$

$$100x_1 + 200x_2 \geq 7000$$

$x_1, x_2 \geq 0$

(b) Give short note on infeasible solution.

(c) What do you mean by basic feasible solution of LPP ?

(d) What do you mean by standard form of a LPP ?

(e) Find the initial basic feasible solution of the following transportation problem by Matrix Minima method :

Factory ↓ / Warehouse →	W_1	W_2	W_3	W_4	Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Requirement	5	8	7	14	Total = 34

(f) Write a short note on North-West method for finding initial Basic Feasible Solution of Transportation Problem.

(g) Write a short note on assignment problems with restriction.

(h) Are assignment problems special case of transportation problems ? Comment. 8×2=16

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PC 11455-NH

BS/2111

LINEAR PROGRAMMING—II

Semester—III

Time Allowed : 3 Hours] [Maximum Marks : 40

Note :— The candidates are required to attempt ***two*** questions each from Sections A and B. Section C will be compulsory.

SECTION—A

I. Solve the following LPP by removing degeneracy :

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

Subject to constraints

$$2x_2 + 3x_3 \leq 18$$

$$2x_2 + 5x_3 \leq 18$$

$$3x_1 + 2x_2 + 4x_3 \leq 25$$

$x_1, x_2, x_3 \geq 0$ 6

II. Solve the following LPP :

Minimize $Z = 4x_1 + 2x_2$

Subject to constraints

$$3x_1 + x_2 \geq 27$$

$$-x_1 - x_2 \leq 21$$

$$x_1 + 2x_2 \geq 30$$

Where x_1, x_2 are unrestricted in sign. 6

III. Prove that there is one-one correspondence between Basic Feasible Solutions and Extreme Points of set of feasible solutions of Linear Programming Problem. 6

IV. Show the following LPP has multiple optimal solutions :

Maximize $Z = 2x_1 + 3x_2$

Subject to constraints

$$6x_1 + 9x_2 \leq 100$$
$$2x_2 + 5x_3 \leq 18$$
$$2x_1 + x_2 \leq 20$$
$$x_1, x_2 \geq 0$$

Hence find all the optimal solutions. 6

SECTION—B

V. Solve the following transportation problem to minimize the total cost. Here the cell entries represent unit costs :

Factory ↓ / Warehouse →	W_1	W_2	W_3	W_4	W_5	Capacity
F_1	4	3	1	2	6	40
F_2	5	2	3	4	5	30
F_3	3	5	6	3	2	20
F_4	2	4	4	5	3	10
Requirement	30	30	15	20	5	Total = 100

6

VI. Solve the following Assignment Problem for maximizing the total output :

		Jobs			
		I	II	III	IV
Machines	A	42	35	28	21
	B	30	25	20	15
	C	30	25	20	15
	D	24	20	16	12

6

VII. A company has four machines to do three jobs. Each job can be assigned to one and only one machine. The cost of each job for each machine is given in the following table :

Jobs	Machines			
	W	X	Y	Z
A	18	24	28	32
B	8	13	17	19
C	10	15	19	22

What are the job assignments which will minimize the cost ? 6

VIII. A company has four factories F_1, F_2, F_3, F_4 manufacturing the same product. Production and raw material costs differ from factory to factory and are given in the following table in the first two rows. The transportation costs from factories to the sale depots S_1, S_2, S_3 are also given. The last two columns in the table give price and the total requirement at each depot. The production capacity of each factory is given in the last row.

	F_1	F_2	F_3	F_4	Demand	Sales price/unit
Total Production cost/unit	25	27	26	22		
S_1	3	9	5	4	80	34
S_2	1	7	4	5	120	32
S_3	5	8	3	6	150	31
Production capacity	10	150	50	100		

Determine the most profitable distribution schedule and the corresponding profit.

The surplus production should be taken to yield zero profit. 6