K. K. SHAH JARODWALA MANINAGAR SCIENCE COLLEGE, Ahmedabad.

Assignment-II

T. Y. B. Sc. (Sem-V)

MATHEMATICS

MAT-304 (Mathematical Programming)

Q-1 Solve the following LPP by Two Phase Method :

Maximize $Z = 2x_1 + x_2 + 3x_3$

Subject to $x_1 + x_2 + 2x_3 \leq 5$

$2x_1 + 3x_2 + 4x_3 = 12$ and $x_1, x_2, x_3 \geq 0$.

Q-2 Describe the solution of the following LP Problem by solving its dual :

Maximize $Z = 4x_1 + 2x_2$

Subject to $x_1 + x_2 \geq 3$

$x_1 - x_2 \geq 2$ and $x_1, x_2 \geq 0$

Q-3 Use the Dual simplex Method to solve the following LP Problem :

Minimize $Z = 2x_1 + x_2 + x_3$

Subject to $4x_1 + 6x_2 + 3x_3 \leq 8$

$x_1 - 9x_2 + x_3 \leq -3$

$-2x_1 - 3x_2 + 5x_3 \leq -4$ and $x_1, x_2, x_3 \geq 0$.

Q-4 Use the principle of Duality to solve the following LP Problem :

Minimize $Z = 4x_1 + 3x_2 + 6x_3$

Subject to $x_1 + x_3 \geq 2$

$x_2 + x_3 \geq 5$ and $x_1, x_2, x_3 \geq 0$.

Q-5 What is a transportation problem ?

Explain how is it a special case of a Linear Programming Problem by describing its mathematical matrix formulation.

Q-6 Prove that transportation problem has a triangular basis.

Q-7 Use the Least Cost Method and the Vogel's Approximation method to find initial basic feasible solutions of the Transportation Problem :

ORIGINS	**DESTINATIONS**				**Supply**
	D_1	**D_2**	**D_3**	**D_4**	
O_1	**15**	**10**	**17**	**18**	**2**
O_2	**16**	**13**	**12**	**13**	**6**
O_3	**12**	**17**	**20**	**11**	**7**
DEMAND	**3**	**3**	**4**	**5**	

Q-8 What is an assignment problem ?

Explain How is it a special case of the transportation problem.

Also describe the main differences between them.

Q-9 Describe the Hungarian method for solving an Assignment problem.

Q-10 Solve the following Transportation Problem by MODI Method :

Factory	Warehouses				Capacity
	W_1	W_2	W_3	W_4	
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Requirements	5	8	7	14	34

Q-11 Solve the following Transportation Problem by MODI Method :

ORIGINS	DESTINATIONS				Supply
	D1	D2	D3	D4	
O1	10	10	12	16	25
O2	14	12	10	18	35
O3	20	18	14	10	40
DEMAND	25	30	20	25	

Q-12 Solve the following Transportation Problem by MODI Method :

	D_1	D_2	D_3	Supply
O_1	8	13	20	5
O_2	9	9	7	8
O_3	8	10	13	7
O_4	7	12	8	15
Demand	7	9	19	

Q-13 Solve the following Assignment problem by the criterion of minimization :

JOBS	WORKERS			
	A	B	C	D
I	10	24	30	15
II	16	22	28	12
III	12	20	32	10
IV	9	26	34	16

Q-14 Solve the following Assignment problem by the criterion of minimization :

	A	B	C	D
I	20	15	18	21
II	22	15	14	20
III	18	14	14	17
IV	19	16	18	16

Q-15 What is a an unbalanced transportation problem ?
How will you solve it ? Give a brief idea.

Q-16 Describe the main differences between a transportation problem and an assignment problem.

Q-17 Answer the following questions in *Short* :

(i) Define an unbalanced transportation problem.
(ii) Define a loop in a transportation problem.
(iii) Define triangular basis in transportation problem.
(iv) How many basic variables are there in an $m \times n$ transportation problem ?
(v) How many basic variables are there in an $n \times n$ assignment problem?

Q-18 Determine whether the following statements are true or false :

(i) Every TP is an Linear Programming Problem.
(ii) Every transportation problem is an Assignment Problem.
(iii) A transportation problem is a Linear Programming Problem.
(iv) An Assignment Problem is solved by MODI method.
(v) An unbalanced transportation problem has no solution.
(vi) An unbalanced an Assignment Problem has no solution.
(vii) A transportation problem is solved by Hungarian method.

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