

SARDAR PATEL UNIVERSITY
B. B. A. (ISM) (Regular) IInd SEMESTER EXAMINATION
2016
Friday, 21st October
2.00 p.m. to 4.00 p.m.
UM02CBBS07 - Quantitative Techniques

Total Marks : 60

- Notes :** (1) Graph papers & Log table will be provided on request.
 (2) Figures to the right indicate full marks.

Q.1

[a] What is linear programming problem? Write its mathematical form. **[3]**

[b] Solve the following LPP by using graphical method **[6]**

$$\text{Maximize } Z = 4x_1 + 10x_2$$

$$\text{Subject to } 2x_1 + x_2 \leq 50$$

$$2x_1 + 5x_2 \leq 100$$

$$2x_1 + 3x_2 \leq 90; \quad x_1 \geq 0, x_2 \geq 0$$

[c] Solve the following L.L.P by the Simplex Method. **[6]**

$$\text{Max } Z = 3x_1 + 2x_2 + 5x_3$$

$$\text{Subject to } x_1 + 2x_2 + x_3 \leq 430,$$

$$3x_1 + 2x_3 \leq 460,$$

$$x_1 + 4x_2 \leq 420, \quad x_1, x_2, x_3 \geq 0$$

OR

Q.1

[a] Explain Graphical method of LPP. **[3]**

[b] Solve the following LPP by graphical method. **[6]**

$$\text{Min } Z = 10x_1 + 5x_2$$

$$\text{Subject to } 3x_1 + 5x_2 \leq 150,$$

$$5x_1 + 4x_2 \geq 100$$

$$x_1 \leq 30,$$

$$x_2 \leq 15, \quad x_1, x_2 \geq 0$$

(P.T.O.)

- [c] Using Simplex Method, Solve the following L.L.P. [6]

$$\text{Maximize } Z = 5x_1 + 7x_2$$

$$\text{Subject to } 4x_1 + 5x_2 \leq 220,$$

$$3x_1 + 5x_2 \leq 180,$$

$$2x_1 + 3x_2 \leq 165, \quad x_1, x_2 \geq 0$$

Q.2

- [a] What is Assignment problem? Give example. [3]

- [b] Determine IBFS of the following TP using NWCM. [6]

	D ₁	D ₂	D ₃	Supply
O ₁	6	8	4	15
O ₂	4	9	8	10
O ₃	1	2	6	05
Demand	05	10	15	

- [c] Find the Initial Basic Feasible Solution of the following TP by Least cost method. [6]

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	6	3	5	4	22
O ₂	5	9	2	7	15
O ₃	5	7	8	6	08
Demand	07	12	17	09	

OR

Q.2

- [a] What is unbalanced transportation problem? How to resolve it? [3]

- [b] Suggest an optimal assignment policy of four workers to four work stations that minimizes the total working cost (in Rs.). The cost of employing different workers at different work stations is given below. [6]

		Worker			
		I	II	III	IV
Work Station	A	0	7	14	21
	B	12	17	22	27
	C	12	17	22	27
	D	18	22	26	30

[c] Obtain Initial Basic Feasible Solution of the following TP by VAM.

[6]

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	5	3	6	2	19
O ₂	4	7	9	1	37
O ₃	3	4	7	5	34
Demand	16	18	31	25	

Q.3

[a] Explain different types of Game.

[5]

[b] Solve the following Game by rule of dominance for the player A.

[5]

		Player B			
		I	II	III	IV
Player A	I	-5	3	1	20
	II	5	5	4	6
	III	-4	2	0	-5

[c] Solve the following game Graphically.

[5]

		Player B		
		I	II	III
Player A	I	1	3	11
	II	8	5	2

OR

Q.3

[a] Explain the principle of dominance to reduce the size of the game.

[5]

[b] The payoff matrix of a game is given. Find (i) Saddle Point (ii) optimum strategy for player A and B (iii) Value of the Game.

[5]

		Player B				
		I	II	III	IV	V
Player A	I	-2	0	0	5	3
	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	IV	5	3	-4	2	6

(P.T-0)

[c] Solve the following Game Graphically.

[5]

		Player B			
		A1	A2	A3	A4
Player A	B1	2	2	3	4
	B2	4	3	2	6

Q.4

[a] What do you understand by Statistical Quality Control? [3]

[b] Twenty tape recorders were examined for quality control test. The number of defects for each tape recorder are given below: [6]

2 4 3 1 5 1 3 6 7 3 1 4 2 3 1 6 4 1 1 2
 Draw c-chart. What conclusions do you draw from it.

[c] The following data refers to the visual defects found during the inspection of first 10 samples of size 50 each from a lot of two-wheelers manufactured by an automobile company. [6]

Sample Number	1	2	3	4	5	6	7	8	9	10
Number Defectives	4	3	2	3	4	4	4	1	3	2

Draw the p-chart to find if the fraction defectives are under control.

Q.4

[a] Explain the term 'chance causes' and 'assignable causes' of variation as use [3] quality control.

[b] Draw \bar{X} chart from the following information and write your conclusion. [6]

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	11.2	11.8	10.8	11.6	11.0	9.6	10.4	9.6	10.6	10.0
Range	7	4	8	5	7	4	8	4	7	9

($n=5, A_2=0.58$)

[c] Draw Control Chart for the Number of defects per unit observed in 18 days production are as under, [6]

5 4 8 2 3 4 7 8 2 5 1 5 8 4 5 7 6 4

@@@@@@@@

— X —

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