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**SARDAR PATEL UNIVERSITY**  
**BBA (II Sem.) Examination**  
**Wednesday, 26 February 2014**  
**2.30 - 4.30 pm**  
**UM02CBBS07 - Quantitative Techniques**

**Total Marks: 60**

**Note :** (1) Figures to the right indicate full marks.  
(2) Log table and graph paper will be provided on request.

**Q.1**

(a) Derive mathematical form of a general linear programming problem. **05**

(b) Solve the following linear programming problem by using simplex method. **05**  
Maximise  $Z = 3X_1 + 2X_2$   
Subject to  $2X_1 + X_2 \leq 10$   
 $X_1 + 3X_2 \leq 6$   
 $X_1, X_2 \geq 0$

(c) Solve the following linear programming problem by using graphical method. **05**  
Minimise  $Z = x + y$   
Subject to  $5x + 10y \leq 50$   
 $x + y \geq 2$   
 $y \leq 4$   
 $x, y \geq 0$

**OR**

**Q.1**

(a) Define following terms: **04**

**I** Feasible solution.

**II** Constraints.

**III** Objective function.

**IV** Slack variable.

(b) Solve the following linear programming problem by using graphical method. **05**

Maximise  $Z = 5x + 7y$   
Subject to  $4x + 5y \leq 200$   
 $3x + 5y \leq 180$   
 $x, y \geq 0$

(c) Solve the following linear programming problem by using simplex method. **06**

Maximise  $Z = 5X_1 + 7X_2$   
Subject to  $4X_1 + 5X_2 \leq 200$   
 $3X_1 + 5X_2 \leq 180$   
 $2X_1 + 3X_2 \leq 165$   
 $X_1, X_2 \geq 0$

Q.2

(a) What is Transportation Problem ? Also derive the mathematical formulation of Transportation Problem. 05

(b) Solve the following minimal assignment problem. 05

		Job				
		1	2	3	4	5
Man	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

(c) Solve the following Transportation Problem Matrix Minima method. 05

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	Supply
O <sub>1</sub>	42	48	38	37	140
O <sub>2</sub>	40	49	52	51	130
O <sub>3</sub>	39	38	40	43	170
Demand	80	90	110	160	

OR

Q.2

(a) Solve the following Transportation Problem by VAM method. 05

	I	II	III	IV	a <sub>j</sub>
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
b <sub>j</sub>	200	225	275	250	

(b) Solve the following Transportation Problem by North West corner method. 05

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	Supply
O <sub>1</sub>	4	5	7	9	10	20
O <sub>2</sub>	3	1	2	6	9	30
O <sub>3</sub>	8	12	15	30	4	17
O <sub>4</sub>	3	2	10	13	17	13
Demand	40	8	7	19	6	80

(c) Solve the following minimal assignment problem. 05

		Job				
		1	2	3	4	5
Man	A	7	9	3	3	2
	B	6	1	6	6	5
	C	3	4	9	10	7
	D	1	5	2	2	4
	E	6	6	9	4	2

**Q.3**  
**(a)** What are the limitations of Game theory? 05

**(b)** Solve the following game using Graphical method. 05

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

**(c)** Solve the following game using dominance principle. 05

		Player B			
		I	II	III	IV
Player A	I	3	5	9	6
	II	5	6	7	8
	III	8	7	8	7
	IV	4	2	5	3

OR

**Q.3**  
**(a)** Explain types of Game. 05

**(b)** Solve the following game using dominance principle. 05

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

**(c)** Solve the following game graphically whose payoff matrix for the Player A is 05

		Player B	
		I	II
Player A	I	2	4
	II	2	3
	III	3	2
	IV	-2	6

**Q.4**  
**(a)** Write a note on variations due to assignable causes. 05

**(b)** Draw  $\bar{X}$  and R charts for the following data and state your conclusions. 10

Sample No.	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	12.8	13.1	13.5	12.9	13.2	14.1	12.1	15.5	13.9	14.2
R	2.1	3.1	3.9	2.1	1.9	3.0	2.5	2.8	2.5	2.0

OR

- Q.4
- (a) Write the difference between Variable charts and Attribute charts. 05
- (b) The number of defects noticed in 20 clothes are given below. 05  
1,4,3,2,5,4,6,7,2,3,2,5,7,6,4,5,2,1,3,8.  
Decide whether the process is in a state of statistical control or not?
- (c) Samples of 400 bottles were taken daily for 15 days from a pharmaceutical company. The number of defective seals in these bottles are given below. 05  
Draw P chart for the data .

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Defective seals	28	18	40	42	32	62	50	10	30	22	80	62	76	56	30

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