

**MASTER OF BUSINESS ADMINISTRATION
(RETAIL SERVICES) (MBARS)**

00985 **Term-End Examination**
December, 2014

MRS-009 : OPERATIONS RESEARCH

Time : 3 hours

Maximum Marks : 100

Note : Answer any **four** questions. All questions carry equal marks.

1. (a) What is Linear Programming ? What are the main limitations of linear programming ? 10+2=12
- (b) A person has two iron mines. The production capacities of the mines are different. The iron-ore can be classified into good, mediocre and bad varieties after certain process. The owner has decided to supply 12 or more tons of good iron, 8 or more tons of mediocre iron and 24 or more tons of bad iron per week.

The daily expense of first mine is ₹ 2,000 and that of second mine is ₹ 1,600. The daily production of each type of iron is given below :

		Daily Production		
Mine	Good	Mediocre	Bad	
1	6	2	4	
2	2	2	12	

To meet the supply most economically, find the number of days for which the production in the mines should be carried out by LPP method.

$$10+3=13$$

2. (a) Solve the following transportation problem by using the three methods you know. Which method is superior ?

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		Destinations				
Origins	D ₁	D ₂	D ₃	D ₄	Supply	
O ₁	11	6	15	3	16	
O ₂	7	8	4	13	18	
O ₃	22	17	8	31	24	
Demand	11	15	17	15	58	

(b) Define the following terms : 10

- (i) Constraints
- (ii) Objective function
- (iii) Solution
- (iv) Feasible solution
- (v) Decision variables

3. Use the Simplex Method to solve the LP problem : 25

$$\text{Maximize } z = 5,00,000 x_1 + 1,00,000 x_2$$

subject to the constraints

- (1) $50,000 x_1 + 20,000 x_2 \leq 2,00,000$
- (2) $x_1 \geq 3$
- (3) $x_2 \leq 5$ and $x_1, x_2 \geq 0$

4. Solve the following Goal Programming problem : 25

Minimize

$$z = P_1 d_1^- + P_2 d_4^+ + 5P_3 d_2^- + 3P_3 d_3^- + P_4 d_1^+$$

Subject to the constraints

- (1) $x_1 + x_2 + d_1^- - d_1^+ = 80$
 - (2) $x_1 + d_2^- = 70$
 - (3) $x_2 + d_3^- = 45$
 - (4) $x_1 + x_2 + d_4^- - d_4^+ = 90$
- and $x_j, d_i^-, d_i^+ \geq 0 \quad i = 1, 2, 3, 4; j = 1, 2.$

5. (a) A manager of a company has four subordinates and four different jobs. From past experience he knows the time (in minutes) each of the persons would take to complete different jobs. How should he assign different jobs to different persons so that the total time is minimum ?

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	Jobs			
Persons	P	Q	R	S
A	12	15	18	8
B	13	10	9	14
C	10	12	15	13
D	7	8	9	14

- (b) A market survey is made on two brands of breakfast foods A and B. Every time a customer purchases, he may buy the same brand or switch to another brand. The Transition Matrix is given below :

From	To	
	A	B
A	0.8	0.2
B	0.6	0.4

At present it is estimated that 60% of the people buy brand A and 40% buy brand B. Determine the market shares of brand A and brand B in the steady state.

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6. (a) Explain the service system of Queuing System.
- (b) Explain the types of Decision-Making Environments.

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