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

Term-End Examination

June, 2011

MRS-009 : OPERATIONS RESEARCH

Time : 3 hours

Maximum Marks : 100

Note : Attempt any five questions.

All questions carry equal marks.

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| 1. | (a) | Explain the concepts of models in Operations Research. How do we classify them ? | 10 |
| | (b) | Discuss the limitations of Operation Research. | 10 |
| 2. | (a) | What are the assumptions on the condition to be fulfilled for a LP model ? | 10 |
| | (b) | A manufacturer produces two types of product M1 and M2. Each model of type M1 requires 4 hours of grinding and 2 hours of polishing; whereas each model of type M2 requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works 40 hours a week and each polisher work 60 hours a week. The profit on M1 model is 3.00 and on model M2 is 4.00. Whatever is produced in week is sold in the market. Formulate a LP problem in order to maximise the profit. | 10 |

3. Find the maximum value of 20

$$Z = X_1 + 7X_2$$

Subject to constraints

$$X_1 + X_2 \leq 4$$

$$3X_1 + 8X_2 \leq 24$$

$$10X_1 + 7X_2 \leq 35$$

$$X_1, X_2 > 0.$$

4. Use simple method to solve the following LPP. 20

$$\text{Minimize } Z = X_2 - 3X_3 + 4X_5$$

$$\text{Subject to } 3X_2 - X_3 + 2X_5 \leq 7$$

$$-2X_2 + 4X_3 \leq 12$$

$$-4X_2 + 3X_3 + 8X_5 \leq 10$$

$$X_2, X_3, X_5 \geq 0.$$

5. (a) What is Integer programming ? What is the importance and applications of Integer programming ? 10
- (b) Determine an inertial Basic feasible solution of the following Transportation problem using North - West corner rule. 10

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	6	4	1	5	14
O ₂	8	9	2	7	16
O ₃	4	3	6	2	5

6. (a) Explain the significance and applications of an assignment problem. 10
- (b) A Television mechanics found that time spent on his jobs has an exponential distribution with mean of 30 minutes, if he repairs TV sets in the order in which they come in. On the other hand if the arrival of sets in approx. Poisson with an average rate of 10 per eight hour day then, what is the mechanics expected of idle time each day ? 10
7. A 3- state Markov chain $\{X_n, n = 0, 1, \dots\}$ has the transition probability matrix

$$P = \begin{pmatrix} 0.1 & 0.2 & 0.7 \\ 0.2 & 0.2 & 0.6 \\ 0.6 & 0.1 & 0.3 \end{pmatrix}$$

- (a) Compute the two-step transition matrix P^2 20
- (b) What is $\Pr \{X_3 = 1 \mid X_1 = 0\}$
- (c) What is $\Pr \{X_3 = 1 \mid X_0 = 0\}$
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