

**MBA(INTERNATIONAL BUSINESS) DEGREE III SEMESTER
EXAMINATION DECEMBER 2013**

**SMI 2302 MANAGEMENT SCIENCE
(2012 Admission)**

Time: 3 Hours

Maximum Marks : 50

PART A(Answer *ALL* questions)

(5 x 2 = 10)

- I. Distinguish between min-max and max-min theories.
- II. List and explain the assumption of linear programming.
- III. Distinguish between reneging and balking.
- IV. What is sequencing? How will you extend Johnson's algorithm to 3 machines x n job problem.
- V. What is time/Gantt chart in project management? Give an example.

PART B(Answer *ANY FIVE* questions)

(5 x 4 = 20)

- VI. What is decision tree? Give an example.
- VII. A small manufacturer employs 5 skilled men and 10 semi-skilled men for making a product in two qualities: a deluxe model and an ordinary model. The production of a deluxe model requires 2-hour work by a skilled man and 2-hour work by semi-skilled man. The ordinary model requires 1-hour work by a skilled man and 3-hour work by a semi-skilled man. According to worker's union rules, no man can work more than 8 hours per day. The profit of the deluxe model is Rs.1000 per unit and that of the ordinary model is Rs.800 per unit. Formulate a linear programming model for this manufacturing situation to determine the production volume of each model such that the total profit is maximized.
- VIII. Consider the following two machines and six jobs flow shop problem. Obtain the optimal schedule and the corresponding makespan for this problem.

Job	Machine 1	Machine 2
1	5	7
2	10	8
3	8	13
4	9	7
5	6	11
6	12	10

- IX. How will you simulate the demand of a product if it follows a probability distribution? Explain it with an example.
- X. Discuss the guidelines to construct a project network.
- XI. Find the initial basic feasible solution to the following transportation problem by using the northwest corner cell method.

		To			Availability
		1	2	3	
From	1	2	7	4	8
	2	3	3	1	7
	3	5	4	7	14
	4	1	6	2	
Demand		2	9	18	



- XII. Explain the steps of solving integer programming problem.

PART C
(Answer *ANY TWO* questions)

(2 x 10 = 20)

- XIII. A retail store desires to determine the optimal daily order size for a perishable item. The store buys the perishable item at the rate of Rs.60 per kg and sells at the rate of Rs.90 per kg. If the order size is more than the demand, the excess quantity can be sold at Rs.75 per kg. in a secondary market; otherwise, the opportunity cost for the store is Rs.10 per kg. for the unsatisfied portion of the demand. Based on the past experience, it is found that the demand varies from 50kg. to 200kg. in steps of 50kg. The possible values of the order size are from 100 kg to 300 kg. in steps of 100 kg. Determine the optimal order size which will maximize the daily profit of the store using (a) Laplace criterion (b) maximin criterion.

- XIV. Solve the following LP problem using Simplex method.

Maximize $Z = 5X_1 + 3X_2 + 7X_3$

Subject to

$$X_1 + X_2 + 2X_3 \leq 22$$

$$3X_1 + 2X_2 + X_3 \leq 26$$

$$X_1 + X_2 + X_3 \leq 18$$

$$X_1, X_2 \text{ and } X_3 \geq 0$$

- XV. Vehicles are passing through a toll gate at the rate of 70 per hour. The average time to pass through the gate is 45 seconds. The arrival rate and service rate follow Poisson distribution. There is a complaint that the vehicles wait for long duration. The authorities are willing to install one more gate to reduce the average time to pass through the toll gate to 35 seconds if the idle time of the toll gate is less than 9% and the average queue length at the gate is more than 8 vehicles. Check whether the installation of the second gate is justified.

