

**MBA (INTERNATIONAL BUSINESS) DEGREE II SEMESTER  
EXAMINATION MAY 2012**

**SMI 2208 MANAGEMENT SCIENCE**

Time : 3 Hours

Maximum Marks : 50

(5 × 10 = 50)

- I. A. A newsboy buys papers for ₹4 and sells them for ₹7 each. Unsold papers can be returned at ₹1 per copy. Daily demand has the following distribution:

Number of Customers	23	24	25	26	27	28	29	30	31	32
Probability	0.01	0.03	0.06	0.10	0.20	0.25	0.15	0.10	0.05	0.05

If each day's demand is independent of the previous day's, how many papers should be order each day.

**OR**

- B. Convert the following two person zero sum game into a linear programming problem and solve it.

		Player B	
		0	2
Player A	3	-1	3
	4	4	-2

- II. A. Johnson Company has two products –Deluxe and Royal. To produce one unit of Deluxe, 2 units of material A, 4 units of material B, and 2 units of material C are required. To produce one unit of Royal, 3 units of material A, 2 units of material B and one unit of material C are required. Not more than 16 units of material A can be used and at least 16 units of material B must be used. The use of material C should be equal to 16. The contribution per unit of Deluxe and Royal are ₹6 and ₹8 respectively. You are required to formulate the mathematical model and solve it for maximum contribution by graphical method.

**OR**

- B. Solve the following problem by branch and bound method:  
Maximise  $Z = 2x_1 + 3x_2$   
Subject to

$$6x_1 + 3x_2 \leq 18$$

$$2x_1 + 5x_2 \leq 10$$

$$x_1, x_2 \text{ are non-negative integers}$$



- III. A. A dairy farm has two milk plants with daily milk production of size million litres and nine million litres. Each day the farm must fulfill the needs of its three distribution centers which have milk requirements of 7,5, and 3 million litres respectively. Cost of shipping one million litres of milk from each plant to each distribution centre is given (in hundreds of rupees) below. Determine the optimum shipping schedule.

		Distribution Centres			Supply
		X	Y	Z	
Plant	A	2	3	11	6
	B	1	9	6	9
	Demand	7	5	3	

**OR**

- B. The owner of a small machine shop has four mechanics available to assign jobs for the day. The expected profit (in rupees) for each mechanic on each job is tabulated below:

		Jobs				
		A	B	C	D	E
Mechanics	1	62	78	50	111	82
	2	71	84	61	73	59
	3	87	92	111	71	81
	4	48	64	87	77	80

Find the optimum allocation of jobs to mechanics. Which job should be declined?

(P.T.O)

- IV. A. Three different operations are performed on each of the following five jobs in the same sequence. The time taken in hours for different operations for different jobs is as follows:

Job	Operation A	Operation B	Operation C
1	35	30	15
2	115	25	40
3	45	35	55
4	55	28	100
5	85	15	65

Determine the order in which the jobs should be processed, in order to minimize the total elapsed time for completing all the jobs.

**OR**

- B. A librarian in a small neighbourhood library finds that, on the average, 15 people per hour need service or information from her during a typical day. The arrival of people at the librarian's desk follows a Poisson distribution. The librarian can accommodate one customer every three minutes using a near-exponential service pattern. The population of customers is assumed to be infinite, the size of the library is considered infinite, and the librarian operated on first-come-first-served basis. Under these conditions, determine the following information regarding the library's operation:

- What queuing model should be used?
- Calculate all the system-performance parameters for this model.

- V. A. A small project consists of seven activities, whose time estimates (in weeks) are given in the following table:

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Optimistic time	1	1	2	1	2	2	3
Normal time	1	4	2	1	5	5	6
Pessimistic time	7	7	8	1	14	8	15

- Draw the network and determine the project duration and critical path.
- Determine the floats and slacks for each activity.
- What is the probability that the project is completed three days earlier than expected?
- What is the probability that the project is completed three days later than expected?
- If the target time is 18 weeks, what is the probability of not meeting the target?

**OR**

- B. A company manufactures 30 items per day. The sale of these items depends upon demand which has the following distribution:

Sales (units)	Probability
27	0.10
28	0.15
29	0.20
30	0.35
31	0.15
32	0.05

The production cost and selling price of each unit are ₹40 and ₹50 respectively. Any unsold product is to be disposed off at a loss of ₹15 per unit. There is a penalty of ₹5 per unit if the demand is not met.

Using the following random numbers estimate total profit/loss for the company for the next 10 days: 10,99,65,99,95,01,79,11,16,20.

If the company decides to produce 29 items per day, what is the advantage or disadvantage to the company?

\*\*\*