(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 7113   **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

MBA.

(SEM. II) EVEN THEORY EXAMINATION 2012-13

OPERATIONS RESEARCH

Time : 3 Hours   *Total Marks : 100*

Note:–   This question paper is divided into **three** Sections, attempt each Section.

SECTION–A

1.   Attempt any **four** of the following :   **(4×5=20)**

    (a)   "Linear Programming is one of the most frequently and successfully used operation research techniques to managerial and business decisions". Elucidate. ·

    (b)   What are the techniques used to solve decision-making problems under uncertainty ?

    (c)   How PERT and CPM techniques are useful in managerial decision-making ?

    (d)   What is the role of Operation Research in Decision-Making ?

    (e)   Show that assignment model is a special case of transportation problem.

(f) What are some limitations of use of OR model in business decision making ?

SECTION–B

2. Attempt any **two** of the following : (2×15=30)

(a) Solve the following L.P.P :

$$\text{Max } Z = 100x + 60y + 40z$$

Subject to :

$$x + y + z \leq 100$$
$$10x + 4y + 5z \leq 600$$
$$2x + 2y + 6z \leq 300$$
$$x, y, z \geq 0$$

(b) A small project consists of the following jobs whose precedence relationship is given below :

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration (days)	15	15	3	5	8	12	1	14	3	14

(i) Draw an arrow diagram representing the project.

(ii) Find the critical path and total durations.

(iii) Calculate the floats.

(c) Find an optimal solution to the following Transportation Problem :

Sources	Destination			Supply
	x	y	z	
A	2	7	4	50
B	3	3	7	70
C	5	4	1	80
D	1	6	2	140
Demand	70	90	180	340

SECTION–C

3. Attempt any **one** of the following :

(a) A wholesaler of sports goods has an opportunity to buy 5,000 pairs of skiis that have been declared surplus by the government. The wholesaler will pay Rs. 50 per pair and can obtain Rs. 100 a pair by selling skiis to retailers. The price is well-established, but the wholesaler is in doubt as to just how many pairs he will be able to sell. Any skiis left over, he can sell to discount outlets at Rs. 20 a pair. After

a careful consideration of the historical data, (wholesaler assigns probabilities to the demand as follow :

Retailer's Demand	Probability
1,000 pairs	0.6
3,000 pairs	0.3
5,000 pairs	0.1

(i) Compute the conditional monetary and expected monetary values.

(ii) Compute the expected profit with a perfect predicting device.

(iii) Compute the EVPI. (6.5)

OR

The maintenance Cost and Resale value per year of machine whose purchase price is Rs. 7,000 is given below :

Year	1	2	3	4
Maintenance cost (in Rs)	900	1200	1600	2100
Resale value (in Rs)	4000	2000	1200	600

When (uld the machine be replaced ? (6.5)

(b) Describe the meaning of EMV and EVPI. (6)

4. Solve the following using two-phase method : (12.5)

$$\text{Max } Z = 30x + 40y + 35z$$
s.t
$$3x + 4y + 2z \leq 90$$
$$2x + y + 2z \leq 54$$
$$x + 3y + 2z \leq 93$$
$$x, y, z \geq 0$$

OR

Explain initial solution of a transportation problem with a suitable example. (12.5)

5. For the two two-person-zero-sum game, find the optimal strategies for the two players and value of the game : (12.5)

		Player B		
		B_1	B_2	B_3
Player A	A1	5	9	3
	A2	6	−12	−11
	A3	8	16	10

If the saddle point exists, determine it using the principle of dominance.

OR

A Foreign MNC bank is considering opening a drive-in window for customer service. Management estimate that customer will arrive for service at the rate of 12 per hour. The Teller, whom it is considering to staff the widow, can serve customers at the rate of one every three minutes. Assume Poisson arrivals and exponential service, find :

(i)   Utillisation of Teller

(ii) Average number in the system

(iii) Average waiting time in the line, and

(iv) Average waiting time in the system.   **(12.5)**

6. A book binder has one printing press, one binding machine and manuscripts of a number of different books. The time required in minutes to perform the printing and binding operation for each book are known. He wish to determine the order in which the books should be processed in order to minimize the total time required to turn out all the books.   **(12.5)**

Book	1	2	3	4	5	6
Printing Time (in mins)	30	120	50	20	60	110
Binding Time (in mins)	80	100	90	60	30	10

OR

Explain the following :

(i)   Define dummy activity with the help of suitable example.

(ii) Determine crashing on the basis of network diagram.
          (12.5)