Savitribai Phule Pune University
(Formerly University of Pune)
Department of Management Sciences (PUMBA)
Executive MBA
2nd Year (Semester –III) External Exam November - 2016

303(D)-Operation Research

Time: 2hrs. Marks: 50

Instructions for students –

- **Attempt any 5 questions:**
- **Each question carries equal Marks:**
- **Assume suitable data wherever required.**
- **Use of calculator is allowed.**

1. Explain the concept of assignment model for decision making in any manufacturing organization with suitable example.

2. ABC Ltd. has forecasted sales of magazines from their shop based on past data as per following:

Sales Quantity	50	51	52	53	54
Probability	0.4	0.2	0.2	0.1	0.1

The cost price of the magazine is expected to be Rs. 50 and selling price is expected to be Rs. 80. Unsold magazine will not have any salvage value. Find the optimum quantity to be purchased using decision matrix (Payoff Matrix).

3. There are three sources (A, B, and C) with supply quantities 60, 40, and 30, respectively, and there are five destinations (D through G), with requirements of 30, 40, 20 and 40. These parameters, along with unit transportation costs for each route, are given in table.

SOURCES/ DESTINATION	**D**	**E**	**F**	**G**
A	16	7	17	14
B	9	11	16	10
C	10	18	6	13

Which source should send the products to which destination? Find the Initial solution with least cost method and compare the same with VAM.

4. The data on inter arrival time of customers and time taken to service the customers at a retail outlet is as per following:

Inter Arrival Time	5Mins.	8Mins.	10Mins.	12Mins.	15Mins.
Number of Customers	35	25	20	15	5

Customer Service Time	4Mins.	6Mins.	8Mins.	10Mins.	12Mins.
Number of customers	40	35	10	10	5

Using the random numbers as follows find the average service time, average waiting time for customers and average idle time for retailer.
Random Numbers for arrival time: 26, 43, 54, 35, 67, 12, 78, 56, 82, 97

Random Numbers for service time: 56, 34, 47, 21, 82, 17, 42, 96, 52, 35

5. For the following linear programming problem find the optimum solution using graphical method.

A toy manufacturer produces bicycles & scooters which must be processed through two machines A & B. Machine A has the maximum of 210 hours available & machine B has maximum of 240 hours available. Manufacturing a scooter requires 4 hours of machine A & 10 hours of machine B. Manufacturing a bicycle requires 6 hours of machine A & 3 hours of machine B. If the profit for a scooter is Rs 80 & for a bicycle is Rs 50,determine the number of scooters & bicycles that should be manufactured to maximize profit.

6. We have seven jobs each of which has to go through the machines M1 and M2 in the order M1M2. Processing time in hours are given as follows:

Jobs	A	B	C	D	E	F	G
Machine M1	3	12	15	6	10	11	9
Machine M2	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimise the total elapsed time T. Also calculate the idle time for both the machines.

7. Using the dominance property obtain the optimal strategies for both the players and determine the value of the game. The pay off matrix for player A is given.

		Player B				
		I	II	III	IV	V
Player A	I	2	4	3	8	4
	II	5	6	3	7	8
	III	6	7	9	8	7
	IV	4	2	8	4	3