Second Semester MBA Degree Examination, June 2012
Quantitative Techniques for Management

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　　 Max. Marks:100

Note: 1. *Answer any FOUR full questions, from Q.No. 1 to 7.*
　　　　2. *Q.No. 8 is compulsory.*

1 a. Write the characteristics of operations research. **(03 Marks)**
　　b. Explain the interdisciplinary approach of operations research. **(07 Marks)**
　　c. Discuss the application areas of linear programming. **(10 Marks)**

2 a. Write the three basic elements of the general structure of LP model. **(03 Marks)**
　　b. Write the dual to the following LP problem :
　　　　$Max\ Z = x_1 - x_2 + 3x_3$
　　　　Subjected to $x_1 + x_2 + x_3 \leq 10$
　　　　　　　　　　$2x_1 - x_2 - x_3 \leq 2$
　　　　　　　　　　$2x_1 - 2x_2 - 3x_3 \leq 6$ and
　　　　　　　　　　$x_1, x_2, x_3 \geq 0.$ **(07Marks)**
　　c. Use the graphical method to solve the following LP problem :
　　　　Minimize $Z = 20x_1 + 10x_2$
　　　　Subjected to $x_1 + 2x_2 \leq 40$
　　　　　　　　　　$3x_1 + x_2 \geq 30$
　　　　　　　　　　$4x_1 + 3x_2 \geq 60$ and
　　　　　　　　　　$x_1, x_2, \geq 0.$ **(10 Marks)**

3 a. What is a transportation problem? **(03 Marks)**
　　b. A computer centre has three expert programmers. The centre wants three application programmes to be developed. The head of the computer centre, after studying carefully the programmes to be developed, estimates the computer time in minutes required by the experts for the application programmes as follows :

Programmers

		A	B	C
Programmes	1	120	100	80
	2	80	90	110
	3	110	140	120

　　　Assign the programmers to the programmes in such a way that the total computer time is minimum. **(07 Marks)**
　　c. Determine an initial basic feasible solution to the following transportation problem by using VAM method. **(10 Marks)**

Destination

Source		D_1	D_2	D_3	D_4	Supply
	A	11	13	17	14	250
	B	16	18	14	10	300
	C	21	24	13	10	400
	Demand	200	225	275	250	

4 a. Define an event. What is a merge event and a burst event? **(03 Marks)**

b. What is Free float, Total float and Independent float? **(07 Marks)**

c. A small project is composed of seven activities, whose time estimates are listed in the table below :

Activity (i – j)	Estimated Duration (weeks)		
	Optimistic	Most likely	Pessimistic
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

    i) Draw the network diagram of activities in the project.

    ii) Find the expected duration and variance for each activity. What is the expected project length?

    iii) Calculate the variance and standard deviation of the project length. What is the probability that the project will be completed at least 4 weeks earlier than expected time. Given : **(10 Marks)**

Z :	0.67	1.00	1.33	2.00
Prob	0.2514	0.1587	0.0918	0.0228

5 a. What is an optimal strategy in a game? **(03 Marks)**

b. Write down the assumptions of a game, with only two players. **(07 Marks)**

c. Solve the following payoff matrix, determine optimal strategies and the value of game. **(10 Marks)**

$$A \begin{matrix} & B \\ & \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{matrix}$$

6 a. What are the purposes of scheduling? **(03 Marks)**

b. List out the assumptions of scheduling in a sequencing problem. **(07 Marks)**

c. Find the sequence that minimizes the total elapsed time required to complete the following tasks on two machines : **(10 Marks)**

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

7 a. What is Balking, Reneging and Jockeying in queing theory? **(03 Marks)**

b. Write the service process or mechanism of queing model. **(07 Marks)**

c. Patrons arrive at a small post office at the rate of 30 per hour. Service by the clerk on duty takes an average of 1 minute per customer :

    I) Calculate the mean customer time

       i) Spent waiting in line   ii) Spent receiving or waiting for service.

    II) Find the mean number of persons

       i) In line   ii) Receiving or waiting for service. **(10 Marks)**

8 a. What is Monte Carlo simulation technique? **(03 Marks)**
  b. Write down the steps of simulation process. **(07 Marks)**
  c. A Bakery keeps stock of a popular brand of cake. Previous experience shows the daily demand pattern for the item with associate probabilities as given below :

Daily Demand (Number)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

   Use the following sequence of random numbers to simulate the demand for next 10 days.
   Random Numbers : 25, 39, 65, 76, 12, 05, 73, 89, 19, 49.
   Also estimate the daily average demand for the cakes on the basis of simulated data.
                         (10 Marks)

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