End Semester Examination – May, 2017

Program/course:MBA(GM)   **Semester – II**

Subject: Operation Research   **Max. Marks   : 100**

Code   :MBCQ723   **Duration: 3 Hrs**

No. of page/s:4

Note: Simple Calculator is allowed not the scientific (991 function) one. Graph sheets are provided by SRE. Try to maintain the sequence while answering.

Note: All sections are compulsory.

<u>Section – A</u>

1. Explain the following terms and which model of quantitative techniques is suitable for its existence: (answer in 20 word)   (20 marks)
   a) Saddle Point
   b) Average Cost in Replacement Model
   c) Pseudo random number
   d) EMV
   e) Zero sum game
   f) Laplace criterion
   g) Degeneracy in Transportation Model
   h) Dominance Rule
   i) Pivot element
   j) Mixed strategy Verses Pure Strategy

<u>Section – B (4*10=40)</u>

   Attempt any four questions.

2. Old Machines can be bought at Rs. 20,000 each and new ones at Rs. 50,000 each. The old machines produce 7 items per week and new ones 12 items per week, each item being worth Rs. 60, 000. Each machine consume electricity per day of Rs. 20. There are only Rs.
8, 00,000 available to be spent on purchasing the machines and at the most 20 machines can be accommodated in the space. Formulate this problem as an LP model to determine each kind of machine that should be bought to have a maximum profit per week. Use graphical method to get your solution.

3. A businessperson has two independent investments A and B available to him but he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take b, vice versa. The probability of success on A is 0.6, while for B it is 0.4. Both investments require an initial capital outlay of Rs. 10,000 and both return nothing if the venture is unsuccessful. Successful completion of A will return Rs. 20,000 (over cost) and successful completion of B will return Rs. 24,000(over cost) . Draw the decision tree and determine the best strategy.

4. The owner of a small machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each jobs, which are as follows:

Job $\longrightarrow$

Mechanic

$$
\begin{array}{c c c c c c}
 & A & B & C & D & E \\
1 & 62 & 78 & 50 & 111 & 82 \\
2 & 71 & 84 & 61 & 73 & 59 \\
3 & 87 & 92 & 111 & 71 & 81 \\
4 & 48 & 64 & 87 & 77 & 80 \\
\end{array}
$$

By using the assignment method, find the assignment of mechanics to the jobs that will result in maximum profit. Which hob should be declined?

5. Using the principle of dominance, solve the following game.

Player B

$$
\text{Player A} \begin{bmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{bmatrix}
$$

6. One businessperson wants to construct a hotel. He usually build 25, 50 or 100-bed hotel, depending on weather anticipated demand is low, medium, or high. The businessperson has been able to find out net profits, is give in the table below and the prior distribution regarding the state of nature, which is given in the second col. Of the same table.

Event	Probability	A (25 bed)	B (50 bed)	C (100bed)

E	0.2	20,000	-10,000	-10,000
F	0.3	25,000	30,000	-5000
G	0.5	30,000	50,000	60,000

A research firm agrees to conduct a survey for Rs. 8000 and provide him with perfect information regarding the state of nature. Is there a need of research over this cost?

Section – C Case (2X20=40 Marks)

7. The simple Engineering Company has a machine whose purchase price is Rs. 80,000. The expected maintenance costs and resale price in different years are as given here:

Year	1	2	3	4	5	6	7
Maintenance cost	1,000	1,200	1,600	2,400	3,000	3,900	5,000
Resale value (,000)	75	72	70	65	58	50	45

Find the appropriate year of replacement.

8. An automobile production line turns out about 100 cars a day but deviation occurs owing to many causes. The production is more accurately described by the probability distribution given below. use random number table to simulate this problem.

Production/day	Probability	Production/day	Probability
95	0.03	101	0.15
96	0.05	102	0.10
97	0.07	103	0.07
98	0.10	104	0.05
99	0.15	105	0.03
100	0.20		

Finished car transported across the bay at the end of each day by a ferry. If the ferry has space for only 101 cars, what will be the average number of cars waiting to be shipped and what will be the average number of empty space?

Random Number Table:
23, 04, 50, 64, 89, 96, 48, 78, 82, 12