UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Term Examination – May, 2017

Program/course: MBA (Business Analytics) **Semester – II**
Subject: Operation Research **Max. Marks: 100**
Code : MBCQ 735 **Duration : 3 Hrs**
No. of page/s: 4

Section A

1. Select most appropriate answer. **(2x10)**

I. A saddle point exists when

(a) maximin value = maximax value
(b) minimax value = minimin value
(c) minimax value = maximin value
(d) none of the above

II. In North-West corner method the allocations are made

(a) Starting from the left hand side top corner,
(b) Starting from the right hand side top corner
(c) Starting from the lowest cost cell
(d) Starting from the lowest requirement and satisfying first.

III. If r is the % rate then the discount factor of finding the net present value (NPV) of the second year maintenance amount equals

(a) $1/r$
(b) $1/r^2$
(c) $1/(1+r)$
(d) $1/(1+r)^2$

IV. Which of the following methods is used to verify the optimality of the current solution of the transportation problem

(a) Least cost method
(b) Vogel's approximation method
(c) Modified distribution method
(d) All of the above

V. While solving a Linear Programming Problem graphically, the area bounded by the constraints is called

(a) Feasible region
(b) Infeasible region
(c) Unbounded solution
(d) None of the above

VI. We use Slack variable

(a) For $\geq$ constraint.
(b) for $\leq$ constraint .
(c) both (a) and (b)
(d) none of these

VII. Dual of the dual problem of LPP is

(a) Dual Problem
(b) Primal Problem
(c) Not possible to find
(d) None of these

VIII. An Assignment Problem is a special case of m x n Transportation Problem in which

(a) m=n
(b) m=2n
(c) n=2m
(d) None of these

IX. MODI stands for

(a) Modern distribution,
(b) Mendel's distribution method
(c) Modified distribution method
(d) Model index method

X. Method for soling the Assignment problem is

(a) VAM
(b) Hungarian Method
(c) Least Cost Method
(d) None of These

Section B

Attempt all four questions. **(5 x 4)**

2. How Operation Research plays an important role in decision making ?
3. Explain the meaning of Saddle point in game theory with suitable example.
4. Explain briefly the concept of simulation along with its application in Business and Production areas.
5. Consider a modified form of a matching biased problem game problem. The matching player is paid Rs. 8 if the two coins turn both heads and Rs. 1 if the coins turn both tails. The non-matching player is paid Rs. 3 when two coins do not match. Given the choice of being the matching or non-matching player, which one would you choose and what will be your strategies?

Section-C

Answer any three questions. **(10 x 3)**

6. Determine the transportation cost of the following problem using least cost method.

Destination

Source	**E**	**F**	**G**	**H**	**Supply**
A	3	1	7	4	**300**
B	2	6	5	9	**400**
C	8	3	3	2	**500**
Demand	**250**	**350**	**400**	**200**	**1200**

7. Dehradun Bakery house keeps stock of a popular brand of cake. Previous experience indicates the daily demand as given below:

Daily Demand	**Probability**
0	0.01
15	0.15
25	0.20
35	0.50
45	0.12
50	0.02

Consider the following sequences of random numbers: 21, 27,47,54,60,39,43,91,25,20. Using this sequence, simulate the demand for next 10 days. Find out the stock situation if the owner of the bakery house decides to make 30 cakes every day. Also estimate the daily average demand for the cakes on the basis of simulated data.

8. A department has five employees with five jobs to be performed. The time (in hours) each men will take to perform each job is given in the effectiveness matrix

Employees

Jobs

	I	**II**	**III**	**IV**	**V**
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

How should the job to be allocated, one per employee so as to minimize the total man hours? Also calculate the man hours.

9. A firm is considering replacement of a machine whose cost price is Rs. 12200 and the scrape value is Rs. 200. The running cost (maintenance cost) on rupees are found from experience to be as follows :

Year	1	2	3	4	5	6	7	8
Running Cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced and why?

Section-D

Answer the question. **(30 x 1)**

10. Consider the following transportation problem:

Source	**Destination**				**Supply**
	A	**B**	**C**	**D**	
1	15	51	42	33	**23**
2	80	42	26	81	**44**
3	90	40	66	60	**33**
Demand	**23**	**31**	**16**	**30**	**100**

(a) Is the problem balanced? (2)

(b) Find the initial solution using VAM. (15)

(c) Is the solution non-degenerate ? (3)

(d) Check Weather the solution obtained by VAM is optimum or not. If not find the optimum solution using MODI method. (10)