UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Operations Research   Semester: II
Program: MBA BA   Time: 03 Hours
Course code: DSQT 7001   Max. Marks: 100
Instructions:

SECTION A

		Marks	CO
Q 1	**Select the most appropriate answer.**	**2 X 10=20**	**CO₁**

I. 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

II. Method(s) which deals with the artificial variable(s)

   (a) Two Phase method
   (b) Big M method
   (c) Both (a) & (b)
   (d) None of these

III. Which of the following is not correct

   (a) The graphic approach to the solution of LPP's cannot handle problems with more than two variables
   (b) A feasible solution to an LPP is one that satisfies at least one of the constraints of the problem
   (c) An optimum solution to an LPP is feasible solution which optimize the objective function
   (d) The feasible region is also termed as the solution space.

IV. Method for soling the Assignment problem is

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

	V.	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		
	VI.	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) $1/(1+r)^2$		
	VII.	The problem of replacement is not concerned about the (a) Items that deteriorate gradually (b) Items that fail suddenly (c) Determination of optimum replacement interval (d) Maintenance of an item wo work out profitability		
	VIII.	What is meant by Pay-off in game theory (a) Outcome of the game when different alternatives are adopted by players (b) Number of players involved in the game (c) Value of the game (d) Strategies used by the players		
	IX.	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		
	X.	Under the Inventory System ABC stands for (a) Always-Better-Control (b) Always-Bid- Control (c) Allow- Better-Construct (d) None of these		
SECTION B				

Q	Attempt any four questions	5 X 4=20	
	2. Explain briefly the concept of simulation along with its application in Business and Production areas.		CO_2
	3. 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?		CO_3
	4. How Operation Research plays an important role in decision making ?		CO_2
	5. An Oil engine manufacturer purchases lubricants at the rate of Rs. 42 per price from a vendor. The requirement of these lubricants is 1800 per year. What should be the order quantity per order, if the cost per placement of an order is Rs. 16 and inventory carrying charge per rupee per year is only 20 Paise.		CO_2
	6. What are the different kind of solutions in Linear Programming Problem ?		CO_1

SECTION-C

Q	Attempt any four questions :	10 X 4 =40	
	7. A machine owner finds from his past record that the costs per year of maintaining a machine, whose purchase price is 6000/- are as given below :		CO_2

Year	1	2	3	4	5	6	7	8
Running Cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale value	3000	1500	750	375	200	200	200	200

When should the machine be replaced and why?

8. A Pharmaceutical company is producing a single product and is selling it through five agencies located in different cities. All of sudden, there is a demand for the product in another five cities not having any agency of company. The company is faced with the problem of deciding on how to assign the existing agencies to dispatch the product nearly cities in such a way that the travelling distance is minimized. The distance between the surplus and deficit cities (in km) is given in the following table : CO_3

	I	II	III	IV	V
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

Determine the optimum assignment schedule using Excel Solver with total minimum distance.

9. What do you understand by Game? Solve the following game :

Playar B

Playar A

	b₁	b₂	b₃	b₄
a₁	5	4	1	0
a₂	4	3	2	-1
a₃	0	-1	4	3
a₄	1	-2	1	2

CO_2

10. What do you understand by transportation problem? Solve the following transportation problem using excel solver and determine the transportation cost.

Destination

	E	F	G	H	Supply
A	21	16	25	13	**11**
B	17	18	14	23	**13**
C	32	17	18	41	**19**
Demand	6	10	12	15	43

Source

CO_2

11. 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.		

SECTION-D

Q	Answer the Question	**20 X 1=20**	
	The marketing department of Everest Company has collected information on the problem of advertising for its products. This relates to the advertising media available, the number of families expected to be reached with each alternative, cost per advertisement, the maximum availability of each medium and the expected exposure of each one (Measured as the relative value of one advertisement on each of the media). The information is given below:		**CO₃**

Advertisement media	No. of families to cover	Cost / ad.	Maximum Availability (No. of times)	Expected Exposure (Unites)
TV (30 sec)	3000	8000	8	80
Radio (15 sec)	7000	3000	30	20
Sunday Edition (1/4 page)	5000	4000	4	50
Magazine (1 page)	2000	3000	2	60

Other information and requirements:

(a) The advertising budget is Rs 70,000
(b) At least 40,000 families should be covered.
(c) At least 2 insertions be given in Sunday Edition of daily but not more than 4 advertisements should be given on the TV

Formulate this as a linear programming problem and solve suing excel solver. The company's objective is to maximize the expected exposure.