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AR-19

MBA

**MBA 1<sup>ST</sup> SEMESTER EXAMINATIONS (REGULAR), NOV/DEC 2019**

**MB-103 – DECISION SCIENCE**

Time : 3 Hours

Maximum : 100 Marks

**The figures in the right hand margin indicate marks.**

PART – I: (Multiple Choice Questions) 10x1=10 Marks

Q.1. Answer ALL questions

- a. The value of the correlation coefficient r is
  - (i)  $0 \leq r \leq 1$     (ii)  $-1 \leq r \leq 1$     (iii)  $-1 \leq r \leq 0$     (iv)  $-1 < r < 1$
- b. The mean of the squares of the deviations from mean is called \_\_\_\_\_
  - (i) Standard deviation    (ii) variance    (iii) mean deviation    (iv) skewness
- c. A basic feasible solution of  $m \times n$  transportation problem is said to be non degenerate, if the initial basic feasible solution contain exactly ----- number of individual allocations
  - (i)  $m + n$     (ii)  $m + n + 1$     (iii)  $m + n - 1$     (iv)  $m - n$
- d. Graphical method can be used to solve LPP, when the number of variables is
  - (i) Exactly three    (ii) atleast three    (iii) exactly two    (iv) atleast two
- e. The variables that are introduced to convert the constraints of  $\leq$  type in to = type are called
  - (i) Artificial variables    (ii) slack variables
  - (iii) surplus variables    (iv) non basic variables
- f. The decisions that are concerned with external environment of the organization is called
  - (i) Strategic decision    (ii) administrative decision
  - (iii) Operating decision    (iv) none of these
- g. In a transition probability matrix of a Markov chain, the sum of the elements in a row is
  - (i) 0    (ii) -1    (iii) 1    (iv)  $\frac{1}{2}$
- h. With usual notations, for (M / M / 1): ( $\infty$  / FIFO) model the traffic intensity is
  - (i)  $\frac{\mu}{\lambda}$     (ii)  $\frac{\lambda}{\mu}$     (iii)  $\lambda\mu$     (iv)  $\frac{1}{\lambda\mu}$
- i. A saddle point of a pay off matrix is the position of such an element in the pay of matrix which is
  - (i) minimum in its row and maximum in its column
  - (ii) maximum in its row and minimum in its column
  - (iii) maximum in both its row and column
  - (iv) minimum in both its row and column
- j. Let r be the correlation coefficient in a sample of n pairs of observations, S.E(r) and P.E(r) respectively denote the standard error and probable error of correlation coefficient, then the limits with in which the population correlation coefficient vary is \_\_\_\_\_
  - (i)  $r \pm P.E(r)$     (ii)  $r \pm S.E(r)$     (iii)  $P.E(r) \pm S.E(r)$     (iv)  $r \pm \left(\frac{1}{2}\right) S.E(r)$

PART – II(A): (Short Answer Questions)10x2=20 Marks

Q.2. Answer ALL questions

- a. What do you mean by correlation and regression?



- b State any two properties of regression coefficients.
- c Distinguish between feasible solution and basic feasible solution of a LPP.
- d What is meant by balanced problems in case of transportation and assignment problems?
- e How does a traveling salesman problem differ from routine assignment problem?
- f Enumerate the methods to find the initial basic feasible solution for transportation model.
- g Define simulation
- h Define decision tree
- i What is value of the game?
- j Explain kendal’s notation in queueing models.

**PART – II(B): (Short Answer Questions)8x5=40 Marks**

Q .03. Answer Any Eight from the following questions

- a Find the most likely price in Mumbai corresponding to the price of Rs. 70 at Calcutta from the following

	Calcutta	Mumbai
Average price	65	67
Standard deviation	2.5	3.5

Correlation coefficient between the prices of commodities in the two cities is 0,.8.

- b Obtain the rank correlation coefficient for the following data

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

- c Use graphical method to solve the LPP, Minimize $Z = 20 x_1 + 10 x_2$ , subject to the constraints  $x_1 + 2 x_2 \leq 40$ ,  $x_1 + 2 x_2 \geq 30$ ,  $x_1 + 2 x_2 \geq 60$  and  $x_1, x_2 \geq 0$ .
- d A company has a team of four salesmen and four districts where the company wants to start its business. After taking into account the capabilities of salesmen and the nature of districts, the company estimates that the profit per day in hundreds of rupees for each salesman in each district is given below. Find the assignment of salesmen to various districts which will yield maximum profit.

		District			
		1	2	3	4
Salesman	A	16	10	14	11
	B	14	11	15	15
	C	15	15	13	12
	D	13	12	14	12

- e Explain the simplex algorithm to solve LPP.
- f The number of units of an item that are withdrawn from inventory on a day to day basis is a Markov chain process in which the requirements for tomorrow depend on today’s requirements. A one day transition matrix is given below



		Tomorrow		
		5	10	12
Today	5	0.6	0.4	0
	10	0.3	0.3	0.4
	12	0.1	0.3	0.6

- (i) Construct a tree diagram showing inventory requirements on two consecutive days
- (ii) Develop a two day transition matrix.
- g Explain the terms: the expected monetary value and the expected opportunity loss. Also write the steps for calculating expected monetary value.
- h Explain the following terms in decision making under uncertainty
  - (i) Maximin criterion
  - (ii) Minimax criterion
  - (iii) Hurwicz criterion
  - (iv) Baye’s criterion
- i What are the limitations of game theory?
- j Arrivals at a telephone booth are considered to be Poisson with an average time of 10 minutes between one arrival and the next arrival. The length of the phone call is assumed to be distributed exponentially with mean 3 minutes
  - (i) What is the probability that a person arriving at a booth will have to wait?
  - (ii) What is the average length of the queue that form from time to time?
  - (iii) Estimate the fraction of the day the phone will be in use.
- k Two players A and B without showing each other, put on a table, a coin with head or tail up. A wins Rs. 8 when both the coins show head and Re. 1 when both are tails. B wins Rs. 3 when the coins do not match. Given the choice of being matching player (A) or non matching player (B), which one would you choose and what would be your strategy?
- l Find the minimum cost distribution plan using North West corner rule to satisfy demand for cement at three construction sites from available capacities at the three cement plants, given the following transportation cost(in Rs.) per ton of cement moved from plants  $P_1, P_2, P_3$  to site  $S_1, S_2, S_3$

	$S_1$	$S_2$	$S_3$	Capacity ( tons per month)
$P_1$	300	360	425	600
$P_2$	390	340	310	300
$P_3$	255	295	275	1000
Demand ( tons per month )	400	500	800	

**PART – III: Answer any two out of three 15x2=30**

Only Long Answer Type Questions (Answer any Two out of Three)

Q4.a. A department store gives service training to their salesman which is followed by a test. It is considering whether it should terminate the services of any salesman who does not do well in the test. The following data gives the test scores and sales make by 9 salesmen during a certain period.



Test scores	14	19	24	21	26	22	15	20	19
Sales ('00 Rs)	31	36	48	37	50	45	33	41	39

If the firm wants a minimum sales volume of Rs. 3,000, what is the minimum test score that will ensure continuation of service? (8 Marks)

- b. The mean and the variance calculated from a group of 80 observations are 63.2 and 25.93 respectively. If 60 of these observations have mean = 64.8 and S.D. =4, find the mean and S.D. of the remaining 20 observations. (7 Marks)

Q5. An oil corporation has got three refineries P, Q and R and it has to send petrol to four different depots A, B, C and D. The cost of shipping 1 gallon of petrol and the available petrol at the refineries are given in the table. The requirement of the depots and the available petrol at the refineries are also given. Find the minimum cost of shipping after obtaining an initial solution by VAM

		Depot				
		A	B	C	D	Available
Refinery	P	10	12	15	8	130
	Q	11	11	9	10	150
	R	20	9	7	18	170
Required		90	100	140	120	

Q6. Two competitors A and B are competing for the same product. Their different strategies are given in the following pay off matrix

		Company B			
		I	II	III	IV
Company A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Use dominance principle to find the optimal strategies