QPC: SA19MBA021 AR - 19 Reg. No | | | | | | | | | | |

GIET UNIVERSITY, GUNUPUR – 765022

M. B. A (First Semester – Back Paper) Examinations, April – 2021

MB 103 – DECISION SCIENCE

Time: 3 hrs Maximum: 100 Marks

The figures in the right hand margin indicate marks.

PART – I: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q. 1 Answer *ALL* questions

a. The observation which occurs most frequently in a sample is the
   (i) median (ii) mean deviation
   (iii) standard deviation (iv) mode

b. The following scores were obtained by eleven footballers in a goal-shoot competition: 5, 3, 6, 8, 7, 8, 3, 11, 6, 3, 2, 4. The median score is
   (i) 3 (ii) 6
   (iii) 8 (iv) 11

c. The total of all the observations divided by the number of observations is called:
   (i) Arithmetic mean (ii) Geometric mean
   (iii) Median (iv) Harmonic mean

d. Karl Pearson's coefficient of correlation lies between
   (i) -3 to +3 (ii) 0 to +1
   (iii) – 1 to + 1 (iv) None of these

e. Only one regression line exists between two variables if
   (i) r= +1 only (ii) r=0
   (iii) r is either +1 or – 1 (iv) r= - 1 only

f. While solving a LP model graphically, the area bounded by the constraints is called
   (i) feasible region (ii) infeasible region
   (iii) unbounded solution (iv) None of the options

g. For a maximization problem the objective function coefficient for an artificial variable is
   (i) +M (ii) -M
   (iii) Zero (iv) None of the options

h. The solution to a transportation problem with m rows and n columns is feasible if the number of positive allocations are
   (i) m × n (ii) m+n
   (iii) m+n-1 (iv) m+n+1

i. Decision theory is concerned with
   (i) The amount of information that is available (ii) Criteria for measuring the 'goodness' of a decision
   (iii) Selecting optimal decisions in sequential problems (iv) All of the above

j. What happens when maximin and minimax value of the game are same?
   (i) no solution exists (ii) solution is mixed
   (iii) saddle point exists (iv) none of the above

PART – II (A): (Short Answer Questions) **(2 x 10 = 20 Marks)**

Q.2. Answer ***ALL*** questions

a. Enumerate the characteristics of a good statistical average.

b. Given mean = 70.2 and Mode = 70.5, find Median using empirical relationship among them.

c. Given the following information, find standard deviation: N = 10; $\Sigma x = 50$ and $\Sigma x^2 = 900$.

d. Define positive and negative correlation with example.

e. What is feasible region?
f. What is slack and surplus variable?
g. Define degeneracy in transportation problem.
h. What is balanced assignment problem?
i. What are the basic characteristics of a queuing system?
j. Define transition probability.

PART – II (B): (Short Answer Questions) **(5 x 8 = 40 Marks)**

Q .03. Answer ***ANY EIGHT*** from the following questions

a. Find the quartile deviation of the daily expenses (in Rs) of 7 persons given below:

14, 8, 9, 16, 25, 30, 40

Also find the coefficient of Q.D.

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.

c. Write the advantages and disadvantages of Arithmetic mean.

d. From the following data, find the two regression equations:

X:	1	2	3	4	5	6	7
Y:	2	4	7	6	5	6	5

e. Find the steps of Hungarian assignment algorithm.

f. Obtain the initial solution for the following TP using NWC rule.

	Destination				
Source		A	B	C	supply
	1	2	7	4	5
	2	3	3	1	8
	3	5	4	7	7
	4	1	6	2	14
	Demand	7	9	18	34

g. Solve the following game and determine its value

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} B \\ \begin{pmatrix} 4 & -4 \\ -4 & 4 \end{pmatrix} \end{array}$$

h. Find EMV from the following payoff

State of nature	Probability	Conditional Payoff (Rs)			
		Course of action			
		1	2	3	4
1	0.10	5	-35	-75	-115
2	0.20	5	10	-30	-70
3	0.30	5	10	15	-25
4	0.40	5	10	15	20

i. Describe some methods which are useful for decision making under uncertainty.

j. What is simulation? Explain briefly the Monte Carlo simulation technique.

k. If in a particular single-server system, the arrival rate is 5 per hour and service rate is 8 per hour, find out

(i) The probability that the server is idle (ii) Expected time that a customer is in the queue.

l. A company has to assign four workers A, B, C and D to four jobs W, X, Y and Z. The cost matrix is given below:

		Jobs (cost in Rs)			
		W	X	Y	Z
Worker	A	1000	1200	400	700
	B	600	500	300	800
	C	200	300	400	500
	D	600	700	300	1000

Suggest an optimal assignment schedule the total cost will be minimum.

PART – III: (Long Answer Questions) **(15 x 2 = 30 Marks)**

Answer any **TWO** questions.

4. *a.* Calculate the median and mode for the following statistical distribution:

Mid-Value	:	115	125	135	145	155	165	175	185	195
Frequency	:	7	25	58	122	116	100	44	22	6

b. Calculate the Spearman's coefficient of correlation from the following data.

Rank of X	10	4	2	5	8	5	6	9
Rank of Y	10	6	2	5	8	4	5	9

5. *a.* A company produces two types of leather belts A and B. A is of superior quality and B is of inferior quality. The respective profits are Rs 10 and Rs 5 per belt. The supply of raw material is sufficient for making 850 belts per day. For belt A, a special type of buckle is required and 500 pieces are available per day. There are 700 buckles available for belt B per day. Belt A needs twice as much time as that required for the belt B and the company can produce 500 belts if all of them were of the type A. formulate a LP model for the above problem.

b. Find the initial basic feasible solution for the following transportation problem by VAM

		Destination				
		D1	D2	D3	D4	Supply
Source	O1	11	13	17	14	250
	O2	16	18	14	10	300
	O3	21	24	13	10	400
	Demand	200	225	275	250	950

6. *a.* Three manufactures X, Y and Z are competing with each other. The following matrix gives the transition probabilities that customers will move from one manufacturer to the other in any month. Interpret the matrix in terms of (a) retention and loss, (b) retention and gain.

		To		
		X	Y	Z
From	X	0.7	0.1	0.2
	Y	0.1	0.8	0.1
	Z	0.2	0.1	0.7

b. Solve the game whose pay-off matrix is given by

		Player B		
		B1	B2	B3
Player A	A1	1	3	1
	A2	0	-4	-3
	A3	1	5	-1

--- End of Paper ---