First Semester MBA Degree Examination, Aug./Sept. 2020
Quantitative Methods

Time: 3 hrs.   Max. Marks: 80

Note: *1. Answer any FOUR full questions from Q.No.1 to 7.*
2. Q.No. 8 is compulsory.

1 a. What is binomial distribution? **(02 Marks)**
b. In a bolt factory machines A, B, C manufacturing respectively 25%, 35% and 40% of the total productions. Out of their total output 5%, 4% and 2% respectively are defective bolts. A bolt is drawn at random and is found to be defective. What is the probability that if is manufactured by : i) Machine A   ii) Machine B. **(06 Marks)**
c. The following data relate to the solves obtained by salesperson of a company in an intelligence test of their weekly sales in thousands of rupees.

Salesperson	A	B	C	D	E	F	G	H	I
Test solves	50	60	50	60	80	50	80	40	70
Weekly sales	30	60	40	50	60	30	70	50	60

Obtain the regression line of sales. If the intelligence test solve of a salesperson is 65. What is his expected sale? **(08 Marks)**

2 a. Define Dispersion? **(02 Marks)**
b. A merchant's file of 20 accounts contains 6 delinquent and 14 non-delinquent accounts. An auditor randomly selects 5 of these accounts for examination.
   i) What is the probability that the auditor finds exactly 2-delinguent account?
   ii) Find the expected number of delinquent accounts in the sample selected. **(06 Marks)**
c. What is 'Decision theory'? Explain the steps of decision making process. **(08 Marks)**

3 a. What do you mean by regression analysis? **(02 Marks)**
b. Briefly explain the different types of decision making environment. **(06 Marks)**
c. A survey was conducted to determine the age (years) of 120 automobiles. The results of survey is as follows :

Age of auto	0 – 4	4 – 8	8 – 12	12 – 16	16 – 20
No. of autos	13	29	48	22	8

Find the median age and modal age of autos. Also find the mean age. **(08 Marks)**

4 a. What are decision trees? **(02 Marks)**
b. Calculate standard deviation and coefficient of variation from the following data :
here total number of persons dying is 125

Age under/year	10	20	30	40	50	60	70	80
Number of persons dying	15	30	53	75	100	110	115	125

c. Solve the following Linear programming problem by graphical method.
Minimize $Z = 3x_1 + 5x_2$
subject to constraints $-3x_1 + 4x_2 \leq 12$
$2x_1 + 3x_2 \geq 12$
$2x_1 - x_2 \geq -2$ **(06 Marks)**
and $x_1 \leq 4$; $x_2 \geq 2$; $x_1, x_2 \geq 0$. **(08 Marks)**

5 a. What is a redundant constraint? **(02 Marks)**

b. From the following data calculate the rank correlation coefficient after making adjustment for tied ranks.

x	48	33	40	9	16	16	65	24	16	57
y	13	13	24	6	15	4	20	9	9	19

(06 Marks)

c. Anita electric company produces two products P_1 and P_2. Products are produced and sold on a weekly basis. The weekly production cannot exceed 25 for product P_1 and 35 for product P_2 because of limited available facilities. The company employs total of 60 workers. Product P_1 requires 2 man week of labour, while P_2 requires one man week of labour Profit margin on P_1 is Rs 60 on P_2 is Rs 40. Formulate this problem as an LPP. **(08 Marks)**

6 a. What kind of decision making situation may be analysed using PERT and CPM? **(02 Marks)**

b. Use north west corner method (NWCM) and Least Cost Method (LCM) to find an initial basic feasible solution to the transportation problem.

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

(06 Marks)

c. Draw a network corresponding to the following information :

Activity	$1-2$	$1-3$	$2-6$	$3-4$	$3-5$	$4-6$	$5-6$	$5-7$	$6-7$
Duration	4	6	8	7	4	6	5	19	10

   i)   Draw a network diagram
   ii) Obtain early and late start time and completion time
   iii) Determine the critical path. **(08 Marks)**

7 a. Illustrate merge and burst events in network analysis. **(02 Marks)**

b. Calculate the median for the following distribution

Annual sales Rs (000)	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60
Frequency	4	20	35	55	62	67

Is it possible to calculate the mean? If possible calculate it. **(06 Marks)**

c. Solve the following transportation problem for maximum profit, only, by initial basic feasible solution (Use Vogel's approximation method) **(08 Marks)**

Per unit profit (Rs)

Market

		A	B	C	D
	X	12	18	6	25
Warehouse	Y	8	7	10	18
	Z	14	3	11	20

Available at warehouse		Demand in the market	
x :	200 units	A :	180 units
y :	500 units	B :	320 units
z :	300 units	C :	100 units
		D :	400 units

8   **Compulsory** :

a. Explain the following in brief :
   i)   Multiple regression
   ii) Baye's theorem
   iii) Random variable   **(08 Marks)**

b. A small project is composed of 2 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending   (j) node numbers.

activity	Estimated duration (weeks)		
(i - j)	optimistic (t_c)	Most likely (t_m)	Pessimistic (t_p)
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

   i)   Draw the network diagram
   ii) What is expected project length?
   iii) Calculate variance and standard deviation of the project length.   **(08 Marks)**

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