

**TRIBHUVAN UNIVERSITY**  
**Faculty Of Management**  
**Office Of The Dean**

**BBS / 4 Years Programme / I year / MGMT**  
**Business Statistics ( MGT 202 )**

**Full Marks :100**  
**Pass Marks : 35**  
**Time : 3 hrs.**

**MODEL QUESTION – 2020**

Candidates are required to give their answers in their own words as far as practicable.  
 The figures in the margin indicate full marks.

**Group – A**

**Brief Answer Questions.**

**Attempt ALL Questions. [ 10 x 2 = 20 ]**

1. The mean of marks in Statistics of 100 students in a class was 72. The mean of marks of 70 boys was 75. Find out the mean marks of girls in the class.
2. The difference between the upper quartile and the lower quartile of a certain frequency distribution is 4 and their sum is 16. Calculate the quartile deviation and its coefficient.
3. In a single throw of two dice, what is the probability of getting the same numbers on both dice ?
4. The personnel director for Nepal Drug Limited recorded the average percentage absentee rates for each quarter for a 4 years period are 55, 67.5, 62.5 and 53, find the seasonal indices.
5. The coefficient of variation of a symmetrical distribution is 9 % and mean of the distribution is 40. Find the value of standard deviation and variance.
6. What do you mean by five number summary? What is its application in statistics ?
7. Reconstruct the following index number by shifting the base year as 2053.

<b>Year</b>	2049	2050	2051	2052	2053	2054	2055
<b>Index Number</b>	100	115	126	134	147	155	163

8. From the following pay- off table, find the best strategy if (i) Maximax criteria is applied (ii) Maximin criteria is applied.

**PAY- OFF TABLE :**

	<b>N<sub>1</sub></b>	<b>N<sub>2</sub></b>	<b>N<sub>3</sub></b>
<b>S<sub>1</sub></b>	200	50	40
<b>S<sub>2</sub></b>	100	60	30
<b>S<sub>3</sub></b>	40	30	10

9. For eight pairs of observations on two variables sales ( X ) and Pricing ( Y ) , the following results were obtained.

$$\sum X = 156, \sum Y = 132, \sum X^2 = 4162, \sum Y^2 = 2434, \sum XY = 2884$$

Find out if there exists any relationship between sales and pricing.

10. Find the adjoint matrix of the matrix given below.

$$\begin{bmatrix} 1 & -2 \\ 3 & 7 \end{bmatrix}$$

**Group – B**  
**Descriptive Answer Questions.**

Attempt any FIVE questions.

[ 5 × 10 = 50 ]

11. The average weekly wages, standard deviations and number of workers of two factories are given below.

	Factory A	Factory B
Average weekly wage	Rs. 4600	Rs.4900
Standard Deviations	Rs.50	Rs.40
Number of workers	100	80

Calculate the mean and variance of weekly wage of all workers taken together. Which factory has greater variability in the distribution of weekly wages?

Justify your result with appropriate Statistical tool.

12. Differentiate between “Census” and “Sampling” method of data collection. Why sampling method is suitable to collect data from large population?
13. (a) Solve the following linear programming problem using graphical method.

$$\text{Maximize } Z = 30x + 50y$$

Subject to constraints:

$$x + y \leq 30$$

$$x + 2y \leq 40$$

$$x, y \geq 0$$

- (b) A manufacturing company has 1,000 employees. 10 % of the employees earn less than Rs. 500 per day , 200 earn between Rs. 500 and Rs. 999 , 30 % earn between Rs. 1000 and Rs. 1,499 , 250 employees earn between Rs. 1,500 and Rs. 1,999 and rest earn Rs. 2,000 and above. Calculate the suitable average wage. Also give the reason for your choice of average.

14. Calculate the index number by using suitable formula for 1985 on the basis of 1980 from the following information :

Year	Product X		Product Y		Product Z	
	Price	Quantity	Price	Quantity	Price	Quantity
1980	4	54	3	10	2	5
1985	10	40	8	8	4	5

15. (a) Prove the following by using properties of determinants.

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a - b)(b - c)(c - a)(a + b + c)$$

- (b) Solve the following equations by using Matrix method.

$$-x + 3y = 5$$

$$2x - 4y = 0$$

16. From the following data compute Bowley’s coefficient of skewness and interpret your result.

Income(00 Rs.)	Below 200	200-400	400-600	600-800	800-1000	1000 & above
No. of families	25	40	80	75	20	16

**Group – C**

**Analytical Answer Questions.**

**Attempt any TWO questions.**

**[ 2 × 15 = 30 ]**

17. The following table represents the annual trend of net profit of two different companies seeking investment for their development project. As an investment advisor, in which company would you suggest to invest money ? Justify your answer by using necessary statistical tools.

Year	Net Profit (in million Rs.)	
	Company - A	Company - B
2007	16	16
2008	32	16
2009	40	22
2010	24	36
2011	40	40
2012	32	44
2013	88	48

18. From the following bi-variate frequency table, find out if there exists any relationship between advertisement expenditure (in 00 Rs.) and sales revenue (in 000 Rs.) and test the significance of the result. Also estimate sales revenue when advertisement expenditure is Rs. 40,000.

Advertisement Expenditure (in 00 Rs.)	Sales Revenue (in 000 Rs.)				
	0 - 50	50 - 100	100 - 150	150 - 200	200 - 250
0 - 40	12	6	8	-	-
40 - 80	2	18	4	5	1
80 - 120	-	8	10	2	4
120 - 160	-	1	10	2	1
160 - 200	-	-	1	2	3

19. Under an employment promotion programme, it is proposed to allow sale of newspapers on the business during peak hours. A newspaper boy has the following probability of selling a magazine.

<b>No. of copies sold</b>	10	11	12	13	14
<b>Probability</b>	0.10	0.15	0.20	0.25	0.30

Cost per copy of magazine is Rs. 30 and sale price per copy is Rs. 50. He cannot return unsold copies where salvage value is zero.

- Calculate the expected monetary value (EMV) for each strategy.
- How many copy should be ordered ?
- Compute expected profit with perfect information (EPPI).
- Also calculate expected value of perfect information (EVPI).

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**Group ‘A’**

**Brief Answer Questions.**

**Attempt All Questions.**

**(10X2=20)**

- 1) The mean of 200 items was 50. Later on it was found that two items were wrongly taken as 92 and 8 instead of 192 and 88. Find the correct mean.
- 2) In a batch of 15 students, 3 students failed in an examination. The marks of passed 12 students were 9, 6, 7, 8, 4, 5, 8, 10, 9, 7, 5, 7. What was the median mark of all 15 students?
- 3) In a moderately skewed frequency distribution, the mean is 10 and its median is 9, if the coefficient of variation is 20%. Find the Pearson's coefficient of skewness of the distribution.
- 4) List out the various methods of collecting primary data and secondary data.
- 5) Calculate the lower and upper quartiles from the following marks distribution:

Marks	Below 25	25-29	30-34	35-39	40-44	Above 44
Students	5	12	22	25	17	9

- 6) If regression coefficient of y on x ( $b_{yx}$ ) = - 0.61 and regression coefficient x on y ( $b_{xy}$ ) = - 0.53, calculate the coefficient of correlation and interpret the result.
- 7) The standard deviation of symmetrical distribution is 5. What must be the value of fourth moment about mean in order that the distribution be mesokurtic ?
- 8) A bag contains 20 balls numbered from 1 to 20. One ball is drawn at random. Find the probability that the number of the drawn ball be multiple of (i) 3 or 7 (ii) 3 or 5.
- 9) Calculate the price index number from the following data by simple aggregative method.

Commodities	A	B	C	D	E
Price in 2075	125	105	260	150	250
price in 2076	125	155	250	160	300

- 10) The following table shows the pay-off matrix related to the demand and strategy of a business person. What should be the decision if he / she uses i) maximax criterion ii) maximin criterion?

Strategy	Demand		
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>
S <sub>1</sub>	300	100	80
S <sub>2</sub>	200	120	60
S <sub>3</sub>	80	60	20

### Group 'B'

#### Descriptive Answer Questions.

Attempt any FIVE Questions..

(5X10=50)

- 11) List the five number summary and prepare a box-and-whisker plot from the following information. Also, comment on the nature of frequency distribution.

Class Size	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	12	25	35	40	50

- 12) Solve the following system of equations by using determinant method.

$$2x+5y-z = -3, \quad 4x+3y+2z = 1 \quad \& \quad x+2y+3z = -5$$

- 13) Calculate Fisher's ideal index number for the following data and show that it satisfies

(i) Time Reversal Test and (ii) Factor Reversal Test.

Commodity	2018		2019	
	Price (Rs)	Quantity(Units)	Price (Rs)	Quantity(Units)
A	8	60	12	58
B	4	110	4	125
C	6	70	8	70
D	12	40	14	38

- 14) Fit straight line trend by the method of least square to the data given below. Also, find the trend values and predict the sales for the year 2022.

Year	2013	2014	2015	2016	2017	2018	2019
Sales(000 units)	15	16	17	16	19	23	25

- 15) A factory manufactures three types of white sheet of papers I, II, and III and distributes them in two markets A and B. The sales of papers during one year are given below:

Markets	Papers		
	I	II	III
A	12,000	5,000	23,000
B	14,000	22,000	13,000

- a) If unit sale prices of papers I, II and III are Rs 5, Rs 4 and Rs 3 respectively, find the total revenue in each market with the help of matrix algebra.

b) If the unit costs of the above papers are Rs 3, Rs 2 and Rs 1 respectively, find the gross profit.

- 16) The following is the net profits of two companies in millions of rupees, find which company shows the greater consistency in the net profit. Justify your answer with statistical evidence.

<b>Company A</b>	18	19	23	19	25	23	27
<b>Company B</b>	17	18	22	23	24	25	25

**Group 'C'**

**Analytical Answer Questions.**

**Attempt any TWO Questions.**

**(2X15=30)**

- 17) A family income and its percentage expenditure on food for 100 families gave the following bivariate frequency distribution. Find out if there exists any relationship between family income and expenditure on food and interpret the result. Also test the significance of the result. Estimate the percentage expenditure on food when family income = Rs 90,000.

<b>Food expenditure (%)</b>	<b>Family income (000Rs)</b>				
	<b>20-40</b>	<b>40-60</b>	<b>60-80</b>	<b>80-100</b>	<b>100-120</b>
<b>15</b>	-	-	-	3	7
<b>20</b>	-	4	9	4	3
<b>25</b>	7	6	12	5	-
<b>30</b>	3	10	19	8	-

- 18) The following distribution shows the frequency distribution of weekly expenditure on foods of students in certain locality of Kathmandu Metropolitan City. Describe the various characteristic features of the frequency distribution. Also, comment the nature of the distribution.

<b>Expenditure (Rs.00)</b>	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110
<b>Number of students</b>	10	15	28	33	40	35	25	14

- 19) What do you mean by linear programming model? A person requires minimum 10, 12 and 12 units of chemicals A, B and C respectively. A liquid product contains 5, 2 and 1 units of A, B and C per jar. A dry product contains 1, 2 and 4 units of A, B and C per carton. If the liquid product costs Rs 30 per jar and dry product costs Rs 20 per carton. Formulate this problem in linear programming model. How many of each product should be purchased in order to minimize the cost to meet the requirements. Also find the minimum cost.