GLOBAL COLLEGE OF MANAGEMENT

Pre-Board Exam-2072
Subject: Business Statistics

Level: BBS - I **F.M:100**
Time: 3Hrs. **P.M.:40**
Candidates are required to give their answer in their own words as far as practicable.
The figures in the margin indicate full marks.

Set A

Group A

Brief Answer Questions. **[10×2=20]**

Attempt **all** questions.

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. Calculate the appropriate measure of dispersion from the following data:

Profit *(000 Rs.)*	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40
No. of companies	9	17	23	30	22	16	9	4

3. Write short notes on "Sampling".
4. In a distribution the difference between the upper quartile and lower quartile is 15 and their sum is 35 and median is 20. Find the coefficient of skewness.
5. The correlation coefficient and its Probable Error (P.E.) in a bi-variate distribution are 0.70 and 0.13 respectively. What sample size might be taken?
6. Find the regression coefficient of X on Y on the basic of the following informations.

$$N = 9, \quad \sum X = 135 \quad \sum Y = 45 \quad \sum X^2 = 2085 \quad \sum Y^2 = 285$$
$$\sum XY = 750$$

7. Find the value of following Determinant.

$$\begin{vmatrix} 3 & 0 & 5 \\ 2 & 9 & 0 \\ -3 & 2 & 5 \end{vmatrix}$$

8. The straight line trend of annual profits *(in 000.Rs.)* of a company from the year 1981 to 1987 is given below.
   $Y_c = 90 + 2.X$
   What is the yearly and monthly increase in profit?
9. 250 electric bulbs were found to be defective in a lot of 1000 electric bulbs. What is the probability that a bulb selected at random from that lot is not defective?
10. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ verify that $A^2 = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$.

Group B

Descriptive Answer Questions. **[5×10=50]**

Attempt **any Five** Questions

11. a. The records of 500 workers of a factory according to the sex and nature of works are given below:

	Male	**Female**	**Total**
Skilled	250	150	400
Un-Skilled	50	50	100
Total	300	200	500

If a worker is choosen at random, what is the probability that the selected Worker is

(a) Female if it is known that she is un-skilled
(b) Skilled, if it is known that he is male?

b. In a certain distribution the first four moments about an arbitrary point were -1.5, 17,-30 and 108. Test the skewness of the distribution and interpret your result.

12. The price of Basmati Rice per kg for the last seven days in two markets M_1 and M_2 are recorded below:

Days	**Sun**	**Mon**	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat.**
Price in M_1 (Rs.)	80	85	90	92.5	92.5	100	100
Price in M_2 (Rs.)	85	85	92.5	95	95	95	107.5

Which market shows greater variation in Price? Why?

13. a. By using Properties of Determinant, Prove that :

$$\begin{vmatrix} 1 & bc & bc.(b+c) \\ 1 & ca & ca.(c+a) \\ 1 & ab & ab.(a+b) \end{vmatrix} = 0$$

b. Explain about the methods of Primary data collection in statistics.

14. a. From the following times series data on consumption of cold drinks of 1000 bottles, construct indices of seasonal variation using simple average method. Also, indicate which quarter is seasonally high?

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1985	90	75	85	70
1986	75	80	78	75
1987	80	75	77	72
1988	85	82	80	81

b. An analysis of monthly income of worker of industries A and B are given below:

	Industry A	Industry B
No. of workers	500	600
AV, monthly income (Rs.)	4200	4000
Standard deviation	9	8

Find the variance of income of all 1100 workers of industry A and B taken together.

15. An enquiry into the budgets of middle class families in certain city gave the following informantions.

	Food	Fuel	Clothing	Rent	Misc.
Expenses	35%	10%	20%	15%	20%
Price in 1990	145	23	65	30	40
Price in 1991	150	25	75	30	45

What is the cost of living index number of 1991 as compared to that 1990. If an employee's salary of Rs 20,000 per month is raised to *Rs.21,000* in 1991, is it adequate? If not what should be the increment in salary in 1991?

16. The three commodities C_1, C_2 and C_3 are purchased and sold by the three persons A, B and C. Rupees x, y and z are the respective prices per unit of commodities C_1, C_2 and C_3. Mr. A purchases 4 units of C_3 and sells 3 units of C_1 and 5 units of C_2. Mr. B purchases 3 units of C_1 and sell2 units of C_2 and 1 unit of C_3. Mr. C purchases 1 units of C_2 and sells 4 units of C_1 and 6 units of C_3. In the purchases sell process, Mr. A suffered a loss of *Rs.1000*, Mr. B earns no profit and Mr. C earns *Rs. 40,000*. Find the prices of these commodities by matrix method.

Group C

Analytical Answer Questions. **[2×15=30]**

Attempt **Any Two** Questions

17. A distribution of past sales of a commodity for ABC enterprises is given below.

Quantity Brought	20	25	50	60
Probabilities	0.10	0.30	0.50	0.10

ABC enterprises buys these for *Rs. 2* and sells for *Rs. 4* per unit and unsold quantity(if any) have zero salvage value and thrown – away.

a. Calculate the expected profit for each alternative.
b. What quality should be brought to maximize expected profit?
c. What is the maximum EMV?
d. Calculate EPPI and EVPI.

18. From the following Bi-variate frequency distribution find out if there exists any relationship between the income and expenditure. Also test for the significance of the result. Compute two regression coefficients. Also estimate the expenditure of a person when his income is *Rs.4000*.

Expenditure *(in Rs.)*	**Income *(in Rs)***				
	0-500	500-1000	1000-1500	1500-2000	2000-2500
0-400	12	16	8	-	-
400-800	2	18	4	5	1
800-1200	-	8	10	2	4
1200-1600	-	1	10	2	1
1600-2000	-	-	1	2	3

19. The following are the weekly production of product 'X' in units of 60 workers in a manufacturing company

23, 48, 51, 64, 82, 19, 33, 50, 39, 72, 57, 49,
64, 48, 52, 39, 25, 77, 88, 35, 41, 72, 62, 49,
32, 54, 67, 46, 55, 52, 57, 53, 69, 59, 63, 51,
56, 75, 44, 82, 75, 85, 68, 55, 52, 45, 40, 57,
20, 42, 75, 55, 40, 54, 56, 62, 16, 50, 51, 46

The management has decided to give bonus of *Rs.50, 100, 150, 200, 250, 300* to each of the workers in the respective output group of 10 or over upto 70 weekly output.

i. Construct the frequency distribution of Bonus.
ii. Describe the characteristics of the frequency distribution as regards to central tendency, dispersion, skewness and kurtosis and draw conclusion.

Best of Luck

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Set B

Group A

Brief Answer Questions. **[10×2=20]**
Attempt **all** questions.

1. The mean of 200 observations was 50. Later on it was discovered that two observations 45 and 54 were wrongly included. Find the mean after removing wrongly included observations.
2. $A=\begin{bmatrix}1 & 2\\ 2 & 4\end{bmatrix}$, $B=\begin{bmatrix}-4 & 6\\ 2 & -3\end{bmatrix}$ prove that $A\cdot B$ is a null matrix.
3. A person travels the 1st km. at 10 km. per hours, the 2nd km at 3 km. per hour and 3rd km at 6 km. per hour. What is his average speed?
4. You are given the following informations of two manufacturing companies.\

	Company A	**Company B**
Mean monthly Income	2600	2750
Standard deviation	10	11

   Which company has greater variability in monthly income?
5. In a frequency distribution, the coefficient of skewness based on quartile is 0.5. If the sum of the lower and upper quartiles is 99 and median is 37. Find the values of lower and upper quartile.
6. Define, briefly about Histogram.
7. A student calculates the value of *'r'* as 0.7 when the sample size *'n'* is 5 and concludes that *'r'* is significant. Is his conclusion correct?
8. The straight line trend equation of sales (*in 000Rs.*) by taking 1984 as the year of origin is given below.
   $Y=108+4X$
   Estimate the sales for the year 1990.
9. A team of scout consists of 7 persons and 4 of them are girls. A team leader is to be selected. What is the probability that a girl would not be selected as a team leader.
10. On the basis of the following information , Calculate the regression coefficient of Y on X .
    $\sum X=135,\quad \sum Y=45,\quad \sum X^2=2085,\quad \sum Y^2=285,\quad N=9,$
    $\sum XY=750.$

Group B

Descriptive Answer Questions.
Attempt Any Five Questions **[5×10=50]**

11. Calculate the pearsonion coefficient of skewness from the following distribution.

Income, less than *(Rs.000)*	20	30	40	50	60	70	80
No. of family	10	25	40	65	80	95	100

    Also draw your conclusion.
12. For a group of 200 students, the mean and standard deviation of marks were found to be 40 and 15 respectively. Later, it was discovered that the marks 43 and 35 were misread as 34 and 53 respectively. Find the correct mean, variance and coefficient of variation corresponding to corrected figures.
13. Mr. A, B and C purchased rice, daal and sugar from the same shop and at the same price. Mr. A purchased 3kg. rice, 1 kg daal and 2 kg sugar for *Rs.64*. Mr. B purchases 5 kg. rice, 2 kg. daal and 1 kg. sugar for *Rs. 83*. Mr. C purchases 4 kg. rice, 3 kg. daal and 2 kg. sugar for *Rs.99*. Find the price of each of the commodities by using Determinant method.
14. a. Solve graphically for the following:
    Maximize $Z=200x+300y$
    Subject to the constraints:
    $x+2y\le 10,\ 2x+y\le 14 \qquad x,y\ge 0$
    b. Find the Adjoint of the following matrix.
    $\begin{bmatrix}1 & 2 & 3\\ 3 & -2 & 1\\ 4 & 2 & 1\end{bmatrix}$
15. a. Two candidates C_1 and C_2 are competing for the post of Director of a company. The probabilities that the first candidate C_1 and second candidate C_2 will wins are 0.6 and 0.4 respectively. If the first candidate C_1 wins probability of introducing new plan is 0.9 and the corresponding probability if the 2nd candidate C_2 wins is 0.4. If the new planning has been introduced. What is the probability that candidate C_2 is appointed as the director?

b. The first four moments of a certain frequency about mean are 0, 81, -144, 14817 respectively.
   i. Find the standard deviation of the distribution.
   ii. Calculate the skewness and interpret the result.
   iii. Test the normality of the distribution.

16. a. Discuss the methods of secondary data collection.
    b. Calculate the seasonal indices from the following data using the simple average method.

	Quarter			
	I	**II**	**III**	**IV**
1982	72	68	80	70
1983	76	70	82	74
1984	74	66	84	80
1985	76	74	84	78
1986	78	74	86	82

Also indicate which quarter is seasonally high?

Group C

Analytical Answer Questions. **[2×15=30]**

Attempt **Any Two** Questions

17. Calculate the price index number of a group of four commodities by using
    a. Laspeyre's formula
    b. Paasche's formula
    c. Fisher's formula

Commodity	**Base Year**		**Current Year**	
	Price/unit	**Expenditure**	**Price/unit**	**Expenditure**
A	2	40	5	75
B	4	16	8	40
C	1	10	2	24
D	5	25	10	60

Also examine whether time reversal test and factor reversal test are satisfied by Fisher's formula or not. Discuss the features of Laspeyre's, Paasche's and Fisher's method.

18. The weekly production of a certain product in units of 60 workers in a manufacturing company are given below:
46, 51, 50, 16, 62, 56, 54, 40, 55, 75, 42, 20,
57, 40, 45, 52, 55, 68, 85, 75, 82, 44, 75, 56,
51, 63, 59, 69, 53, 57, 52, 55, 46, 67, 54, 32,
42, 62, 72, 41, 35, 88, 77, 25, 39, 52, 48, 64,
49, 57, 72, 39, 50, 33, 19, 82, 64, 51, 48, 23,

The management has decided to give bonus of *Rs.50, 100, 150, 200, 250* and *300* to each of the workers in the respective output group of 10 or over upto 70 weeks output.
    i. Construct the frequency distribution of Bonus.
    ii. Describe the characteristics of the frequency distribution as regards to central tendency, dispersion, skewness and kurtosis and draw conclusion.

19. From the following Bi-Variate frequency distribution, find out if there exists any relationship between the heights of father and son. Also interpret the result. Compute two regression coefficients. Also estimate the height of son whose father's height is 75 inch.

Height of father (inch)	**Height of sons (inch)**				
	62-64	**64-66**	**66-68**	**68-70**	**70-72**
60-62	1	2	-	1	3
62-64	-	1	-	2	1
64-66	2	3	2	1	-
66-68	-	1	1	-	1
68-70	1	2	-	-	-

Best of Luck