

2023

STATISTICS

Full Marks : 100

Pass Marks : 33

Time : Three hours

Attempt all Questions.

The figures in the right margin indicate full marks for the questions.

For Question Nos. 1, 2, 3 and 4 choose the correct answer and rewrite.

1. The number of ways in which 6 books can be divided among 3 students so that each gets 2 books is – 1
(A) 60 (B) 70
(C) 80 (D) 90
2. The average of 5 numbers 7, 9, x , 5 and 4 is 7. The missing number x is – 1
(A) 8 (B) 10
(C) 12 (D) 13
3. The regression line of y on x is $3x - 4y + 8 = 0$. The regression coefficient of y on x is – 1
(A) $\frac{3}{4}$ (B) $-\frac{3}{4}$
(C) $\frac{4}{3}$ (D) $-\frac{4}{3}$

P.T.O.

4. Simple random sample can be drawn with the help of – 1
 (A) random number table (B) Chit method
 (C) roulette wheel (D) all the above
5. In how many ways can 4 men and 5 women be seated in a round table? 1
6. For a symmetrical distribution, $\mu_4 = 16$ and $\mu_2 = 2$. Identify the type of Kurtosis. 1
7. Define positive correlation. 1
8. If one of the regression coefficient is negative, identify the sign of the correlation coefficient. 1
9. Draw the scatter diagram of bivariate distribution when the correlation is perfect and positive. 1
10. Draw the regression lines in which the correlation is positive with high degree of correlation but not perfect. 1
11. Laspeyrc's price index number is written as $p_{of} La = \frac{\sum p_{ij} q_{ij}}{\sum p_{oj} q_{ij}} \times 100$ where p_{ij} , p_{oj} , q_{ij} and q_{oj} are the prices and quantities of current and base years. 1
 Is the formula correct , if not correct, rewrite the correct formula.
12. "For calculation of index number, the base period should be too distant from the given period". Rewrite the above statement in correct form. 1

13. The trend equation of the straight line of a time series in which the value (Ut) corresponding to the time (t) is given by – 1

$$Ut = 650 + 34x \text{ where } x = \frac{t-30}{2}.$$

Express the equation of the value in terms of t.

14. Find the number of possible samples that a sample of size 3 is drawn from the population of size 6 by simple random sampling. 1

15. Define union and intersection of two sets. 2

16. If ${}^n P_2 = 90$, find n. 2

17. Find the median of the following items : 2

6, 24, 18, 14, 10, 20, 8

18. Draw the shape of negatively skewed distribution. Indicate the relative positions of mean, median and mode. 2

19. The regression coefficient of y on x is 0.8 and correlation coefficient is 0.6. Estimate the regression coefficient of x on y. 2

20. Define an index number. 2

21. Given the data :

Commodity	Price		Quantity	
	P_i	P_o	q_i	q_o
A	4	3	10	8
B	x	4	6	4

Find x, if Laspeyre's price index number is 130.

22. Compute value index number from the following data :

Commodity	Price		Quantity	
	2020	2015	2020	2015
A	3	2	6	4
B	4	3	5	3
C	2	2	4	2

23. The following table of ten random numbers of two digits each is provided to the field investigator.

29	66	39	97	79
41	95	15	13	72

How should we use this table to make a random selection of 4 plots out of 40.

24. Show that the distribution laws hold for the following sets : 4
 $A = \{ 1, 3, 4, 5, 8 \}$, $B = \{ 3, 5, 7, 9 \}$, $C = \{ 1, 4, 3, 10 \}$
25. Find the maximum and minimum values of the function $f(x)$
 where $f(x) = x^3 - 9x^2 + 24x - 12$. 4
26. State the characteristics to be satisfied by an ideal measures of central tendency. 4
27. The scores x and y of the two batsman and their sum of scores by two batsman A and B in 9 consecutive matches are 360 and 297. The variances of corresponding scores are 784 and 441. Which of the batsman is more consistent ? 4
28. Calculate the coefficient of correlation between x and y from the following data : 4
- | | | | | | |
|-------|---|---|---|---|----|
| $x :$ | 1 | 3 | 4 | 5 | 7 |
| $y :$ | 2 | 6 | 7 | 9 | 11 |
29. The regression equations of a bivariate distribution are $8x - 10y + 60 = 0$
 and $40x - 18y = 200$.
 Identify the two regression equations and estimate 4
- (i) y when $x = 40$
 (ii) x when $y = 30$.
30. What is meant by a time series ? Explain the cyclic variation in a time series. 4
31. The production (Ut) of the sugar factory corresponding to time (t) for 7 years from 2013 to 2019, the following values are obtained.
 $\sum Ut = 630$, $\sum x = 0$, $\sum xUt = 150$, $\sum x^2 = 50$ where $x = t - 2016$.
 Fit the straight line of the time series data. 4

32. Find the maximum area of the rectangle inscribed in a circle of radius r . 6
33. Find the mean deviation from the median from the following data : 6

Variate	Frequency
10 – 15	8
15 – 20	12
20 – 25	20
25 – 30	11
30 – 35	9

34. Calculate Fisher's price index number from the following data : 6

Article	Year			
	2018		2019	
	Price	Quantity	Price	Quantity
I	5	5	6.5	4
II	7.5	6	8.8	10
III	9.6	4	7.7	6

35. Calculate the cost of living index number from the following data : 6

Items :

	Food	Clothing	Education	Rent	Fuel and light	Misc.
Price (Rs.): Base yr.	35	18	24	18	14	27
Current yr.	47	22	28	24	12	31
Weight :	30	20	20	10	10	10

The income of Mr. X is Rs. 25,000 in base year and Rs. 28,000 in current year.

State the standard of living of Mr. X in current year as compare to base year.

36. Fit the exponent curve $Y = ab^x$ or $U = A + Bx$ where $U = \log Y$, $A = \log a$, $B = \log b$ to the following data :

X	:	3	4	5	6	7
Y	:	1.8	2.5	3.6	4.7	6.6
logY	:	0.255	0.398	0.556	0.672	0.819

given Antilog 0.14 = 1.38, Antilog 1.89 = 0.69 6

37. What is a sample survey ? Explain sampling errors and non-sampling errors. 6
