Reg. No. : ....

Name : ....

Third Semester B.A. Degree Examination, March 2022

First Degree Programme under CBCSS

Statistics

Complementary Course for Economics

ST 1331.4 – STATISTICS III

(2019 & 2020 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. Define scatter diagram.

2. Give the formula for Karl Pearson's correlation coefficient.

3. What is coefficient of alienation?

4. Define simple linear regression.

5. What you mean by an attributes?

6. Define ultimate class with example.

7. What you mean by index numbers?

8. Define splicing.

9. Discuss the classical definition of probability.

10. What is the relation between mean and variance of a binomial distribution with parameters n and p.

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions. Each question carries **2** marks.

11. Define bivariate data and give an example.

12. Give a comparison between positive correlation, negative correlation and zero correlation.

13. Derive the range of Karl Pearson's correlation coefficient.

14. Give the formula for regression line of y on x and x on y.

15. Discuss the reason for existing two regression lines.

16. Give a comparison between coefficient of correlation and coefficient of determination.

17. Define consistency of a data.

18. Explain coefficient of colligation.

19. Distinguish between correlation and association.

20. Differentiate simple and weighted index numbers.

21. Explain base shifting.

22. Explain circular test.

23. Why Fisher's index number is called "ideal" index number.

24. Distinguish between mutually exclusive and exhaustive an events.

25. Distinguish between probability mass function and probability density function.

26. Define normal distribution.

$(8 \times 2 = 16 \text{ Marks})$

SECTION – C

Answer **any six** questions. Each question carries **4** marks.

27. Prove or disprove two independent variables are uncorrelated. What about its converse.

28. What are the important important assumptions under Karl Pearson's correlation coefficient?

29. Derive the angle between two regression lines.

30. What are the important properties of regression coefficients.

31. From the following data calculate price index numbers for 2005 with 1995 as base by: (a) Laspeyre's, (b) Paasche's, (c) Marshall-Edgeworth and (d) Fisher's formulae:

Table 1 :

Commodity	1995		2005	
	Price	Quantity	Price	Quantity
A	20	8	40	6
B	50	10	60	5
C	40	15	50	15
D	20	20	20	25

32. Explain the concept of consumer price index number in connection with Indian scenario.

33. Briefly explain time reversal test and factor reversal test.

34. State and prove addition theorem of probability for two events.

35. Derive the mean and the variance binomial distribution with parameters n and p.

36. Explain frequency definition of probability. What are its limitations?

37. Examine the consistency of the following data.

    N = 1000, (A) = 600, (B) = 500 and (AB) = 50.

38. From the following data find out the missing frequency.

    N = 1000, (A) = 300, (B) = 600 and (AB) = 100.

<div align="right">(6 × 4 = 24 Marks)</div>

SECTION – D

Answer **any two** questions. Each question carries **15** marks.

39. (a) Prove or disprove correlation coefficient is independent of change or origin and scale.

    (b) The ranks of 16 students in economics and statistics are as follows, two numbers within brackets denote the ranks of the students in economics and statistics:

    (1, 1), (2, 10), (3, 3), (4, 4), (5, 5) (6, 7), (7, 2), (8, 6), (9, 8), (10, 11), (11, 15), (12, 9), (13, 14), (14, 12), (15, 16), (16, 13)

    Calculate the rank correlation coefficient for proficiencies of this group in economics and statistics.

40. Obtain the equations of two line of regression for the following data. Also obtain the estimate of X for $Y = 70$.

    x : 65 66 67 67 68 69 70 72

    y : 67 68 65 68 72 72 69 71

41. (a) Distinguish between fixed base index numbers and average base index numbers.

   (b) Explain the whole sale price index numbers.

   (c) Distinguish between probability mass function (pmf) and probability density function (pdf).

42. (a) Explain Yule's coefficient of association.

   (b) Find whether A and B are independent, positively associated or negatively associated in each of the following.

   (i) N = 1000, (A) = 470 (B) = 620 and (AB) = 320.

   (ii) (A) = 490, (AB) = 294, (α) = 570, and (αB) = 380.

43. Compute price index and quantity index numbers for the year 2005 with 2000 as base year, using (a) Laspeyre's method, (b) Paasche's method and (c) Fisher's method.

Table 2

Commodity	Quantity (units)		Expenditure (Rs.)	
	2000	2005	2000	2005
A	100	150	500	900
B	80	100	320	500
C	60	72	150	360
D	30	33	360	297

44. (a) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each other.

(b) A random variable X has the following probability function :

x :	0	1	2	3	4	5	6	7
$p(x)$:	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

(i) Fink k, (ii) Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$ and (iii) $P(X \geq a) > \dfrac{1}{2}$, find the minimum value of a and (iv) Determine the distribution function of X.

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