(8 pages)

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U.G. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Mathematics

Non Major Elective – FUNDAMENTALS OF
STATISTICS – II

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Attributes A and B are said to negative associate, if

    (a) $(AB) > \dfrac{(A) \times (B)}{N}$

    (b) $(AB) = \dfrac{(A) \times (B)}{N}$

    (c) $(AB) < \dfrac{(A)(B)}{N}$

    (d) None of these

2. Class frequencies of types $(\alpha), (\beta), (\alpha\beta), (\alpha\beta\gamma)$ ——————— known as

    (a) Positive   (b) Negative

    (c) Contrary   (d) None of these

3. Arithmetic mean of Paasche and Laspeyre Index numbers in

    (a) Bowley index number

    (b) Fisher index number

    (c) Marshall Edgeworth index number

    (d) Kelly index number

4. Which one of the following is number the using Aggregate expenditure method of cost of living index

    (a) Marshall Edge worth index

    (b) Laspeyeres index

    (c) Fishers index

    (d) Bowley's index

5. Cost of living index number I_{01} is ———————

    (a) $\dfrac{\Sigma p_0 q_0}{\Sigma p_1 q_1} 100$ (b) $\dfrac{\Sigma p_1 q_1}{\Sigma q_1 p_0} 100$

    (c) $\dfrac{\Sigma p_0 q_0}{\Sigma p_1 q_1} 100$ (d) $\dfrac{\Sigma p_1 q_0}{\Sigma p_0 q_0} 100$

6. $\dfrac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100 =$ _____

(a) I_{01} (b) I_{00}

(c) I_{11} (d) All the above

7. Lockouts in an example for _____

(a) Secular Trend

(b) Seasonal variation

(c) Cyclical variation

(d) Random variation

8. There are _____ models in time series

(a) 2   (b) 3

(c) 4   (d) 5

9. Least square method to fit a trend is

(a) Most exact

(b) Not suitable

(c) Full of subjectivity

(d) Mathematically wrong

10. Principle of least square method is suitable for

(a) Pie diagram   (b) Histogram

(c) Curve fitting   (d) None of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

11. (a) In a class test in which 135 candidates were examine for proficiency in physics and chemistry, it was discovered that 75 students failed in physics, 90 failed in chemistry and 50 failed in both. Find the magnitude of association and state if there is any association between failing in physics and chemistry.

Or

(b) If $(AB) = 975$, $(\alpha B) = 100$, $(A\beta) = 25$, $(\alpha\beta) = 950$ find (A), (B), (α), (β) and (N).

12. (a) Define factor reversal and time reversal test.

Or

(b) Construct the index number for 1991 and 1992 from the data given below, 1990 as the base year.

Commodity	Price in Rupees per quintal		
	1990	1991	1992
Rice	700	750	825
Wheat	540	575	600
Ragi	300	325	310
Cholam	250	280	295
Flour	320	330	335
Ravai	325	350	360

13. (a) Prepare fixed base index number, from the chain base index number given below.

Year	1985	1986	1987	1988	1989	1990	1991
Chain base index number	105	108	110	107	115	120	125

Or

(b) From the following fixed base index number, prepare chain based index number.

Year	1966	1967	1968	1969	1970	1971
Index	94	98	102	95	98	100

14. (a) What are various components of time series?

Or

(b) Draw a trend line by the method of semi-averages.

Year	1987	1988	1989	1990	1991	1992	1993
production (in tonnes)	90	110	130	150	100	150	200

15. (a) Explain the method of fitting the curve $Y = a e^{bx}$.

Or

(b) Fit a second degree parabola for

x	0	1	2	3	4
y	1	5	10	22	38

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

16. (a) Given 'n' attributes, prove the following :

(i) Total number of class frequencies in 3^n.

(ii) Total number of positive class frequencies in 2^n

(iii) Total number of negative class frequencies in $2^n - 1$.

Or

(b) Find the greatest and least values of (ABC) if $(A) = 50$, $(B) = 60$, $(C) = 80$, $(AB) = 35$, $(AC) = 45$ and $(BC) = 42$.

17. (a) From the given data below, find Fishers Index number and show that it satisfies both the factor and time reversal test.

Commodity	A	B	C	D
Base year, price in Rupees	5	6	4	3
Base year, quantity in quintals	50	40	120	30
Current year price in rupees	7	8	5	4
Current year quantity in quintals	60	50	110	35

Or

(b) Is Fishers index number in an ideal index number? Justify.

18. (a) Explain the method of constructing the cost of living index number.

Or

(b) Explain conversion of index number.

19. (a) Fit a straight line trend by using method of least squares.

Year	1990	1991	1992	1993	1994	1995
Production	72	75	74	78	83	82

Or

(b) Explain moving average method to measure trend values. Also state its merits and demerits.

20. (a) Fit a second degree parabola for the following data.

x	1	2	3	4	5	6	7
y	2.3	5.2	9.7	16.5	29.4	35.5	54.4

Or

(b) Fit the curve $y = bx^a$ to the following data.

x	1	2	3	4	5	6
y	1200	900	600	200	110	50

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Nesamony Memorial Christian College, Marthandam