(8 Pages)

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Code No. : 30569 E **Sub. Code : ANMA 42**

U.G. (CBCS) DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Mathematics

Non Major Elective — FUNDAMENTALS OF STATISTICS — II

(For those who joined in July 2020 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 be negatively associated, if ————

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

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

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

(d) None of these

2. Class frequencies of type $(\alpha B), (A\beta), (A\beta\gamma), (\alpha\beta C)$... known as ————

(a) positive class frequencies

(b) negative class frequencies

(c) contrary frequencies

(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. Aggregate expenditure method of cost of living index is nothing but the following ————

(a) Marshall index (b) Laspeyere's index

(c) Fisher's index (d) Bowley's index

5. Formula for 'cost of finding index' is ————

(a) $\frac{\Sigma PV}{\Sigma V}$ (b) $\frac{\Sigma V}{\Sigma P}$

(c) $\frac{\Sigma V}{\Sigma PV}$ (d) $\frac{\Sigma P}{\Sigma V}$

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

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

(c) $\frac{\Sigma p_0 q_0}{\Sigma p_1 q1} \times 100$ (d) $\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$

7. Floods and lockouts are example for ————

(a) secular trend (b) seasonal variation

(c) cyclical variation (d) random variation

8. There are ———— models of time series.

(a) 2 (b) 3

(c) 4 (d) 5

9. Number of normal equation to fit a straight line by method of least squares is ————

(a) 1 (b) 3

(c) 2 (d) 4

10. Least square method to fit a trend is ————

(a) most exact

(b) not suitable

(c) full of subjectivity

(d) mathematically wrong

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

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

Or

(b) Show that the relation between Yule's coefficient (Q) and the coefficient of colligation Y is $Q = \frac{2Y}{1+Y^2}$.

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

Or

(b) From the following table construct the index number taking 1990 as base.

Years	1987	1988	1989	1990	1991	1992
Price of rice per kg	5	6	6.5	7	7.5	8

13. (a) Find the cost of living index number for the following data by using family budget method.

Commodity	Price in Rs. 1991	Price in Rs. 1992	Quantity in Quinta's in 1991
Rice	7	7.5	6
Wheat	6	6.75	3.5
Flour	5	5	0.5
Oil	30	32	3
Sugar	8	8.5	1

Or

(b) From the fixed base index numbers given below prepare a chain base index numbers.

Year	1975	1976	1977	1978	1979	1980
Fixed base index number	90	105	102	98	120	125

14. (a) Define time series. Also explain the uses of time series analysis.

Or

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

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

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

Or

(b) Fit a straight line to the following data.

x	0	1	2	3	4
y	2.1	3.5	5.4	7.3	8.2

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) Give n attributes, prove the following

(i) Total number of class frequencies is 3^n

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

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

Or

(b) If $\frac{(A)}{N} = x, \frac{(B)}{N} = 2x, \frac{(C)}{N} = 3x$ and $\frac{(AB)}{N} = \frac{(AC)}{N} = \frac{(BC)}{N} = y$, prove that neither x nor y exceed $\frac{1}{4}$.

17. (a) Calculate (i) Laspeyre's (ii) Paasches (iii) Fishers index numbers of the following data given below. Hence or otherwise find Edgworth and Bowley's index numbers.

Commodities	Base year 1990		Current year 1992	
	Price	Quantity	Price	Quantity
A	2	10	3	12
B	5	16	6.5	11
C	3.5	18	4	16
D	7	21	9	25
E	3	11	3.5	20

Or

(b) Prove that Fishers index number is an ideal index number.

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

Or

(b) Explain, conversion of index number.

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

Or

(b) 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

20. (a) Fit a curve of the form $Y = ab^x$ to the following data.

Year	1951	1952	1953	1954	1955	1956	1957
Production in tons (Y)	201	263	314	395	427	504	612

Or

(b) 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