

Reg. No. : .....

Code No. : 10440 E      Sub. Code : CNMA 42

U.G. (CBCS) DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Mathematics

Non-Major Elective — FUNDAMENTALS OF  
STATISTICS — II

(For those who joined in July 2021-2022)

Time : Three hours

Maximum : 75 marks

SECTION A — ( $10 \times 1 = 10$  marks)

Answer ALL questions.

Choose the correct answer.

1. If the number of attributes is ' $n$ ', the total number of classes is \_\_\_\_\_.  
(a)  $2^n$                       (b)  $3^n$   
(c)  $n^2$                       (d) None of these
2. \_\_\_\_\_ are called frequencies of the first order.  
(a)  $(A), (B), (\alpha), (\beta)$   
(b)  $(AB), (A\beta), (\alpha\beta), (\alpha B)$   
(c)  $N$   
(d) None of these

- (b) Fit a second degree parabola by taking  $x_i$  as the independent variable.

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





3. Fisher's index is the \_\_\_\_\_ of Laspeyre's and Paasche's index numbers.
- (a) arithmetic mean (b) median  
(c) geometric mean (d) mode
4. Among Index numbers, \_\_\_\_\_ index considered to be ideal.
- (a) Laspeyre's (b) Bowley's  
(c) Fisher's (d) Kelly's
5. What is the formula for cost of living index number (family budget method)?
- (a)  $I_{01} = \frac{\sum p_v}{\sum v}$  (b)  $I_{01} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$   
(c)  $I_{01} = \frac{\sum p_0 q_0}{\sum p_1 q_1} \times 100$  (d)  $I_{01} = \frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$
6. Which of the following methods is used to calculate the consumer price index?
- (a) Laspeyres's formula  
(b) Fisher's formula  
(c) Palgrave's formula  
(d) None of the above

7. Cyclic fluctuations are caused by
- (a) Strikes and Lock-outs  
(b) Floods  
(c) War  
(d) None of the above
8. In time series seasonal variations can occur within a period of \_\_\_\_\_.
- (a) 4 years (b) 3 years  
(c) 1 year (d) nine years
9. If  $d_i = y_i - f(x_i)$ , then the principle of least squares is
- (a)  $\sum d_i$  minimum (b)  $\sum d_i$  maximum  
(c)  $\sum d_i^2$  minimum (d)  $\sum d_i^2$  maximum
10. Number of normal equation to fit a straight line by least squares is \_\_\_\_\_.
- (a) 2 (b) 3  
(c) 4 (d) 5





SECTION B — (5 × 5 = 25 marks)

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

11. (a) In a very hotly fought battle 70% of the soldiers atleast lost an eye 75% atleast lost an ear, 80% atleast an arm and 85% atleast los a leg. How many atleast must have lost all the four?

Or

- (b) For two attributes  $A$  and  $B$ , we have  $(AB)=8$ ,  $(A)=18$ ;  $(\alpha\beta)=5$  and  $N=35$ . Calculate the coefficient of association.

12. (a) From the following average prices of the 3 groups of commodities given in rupees per unit find fixed base index number with 1988 as the base year.

Commodity	1988	1989	1990	1991	1992
A	2	3	4	5	6
B	8	10	12	15	18
C	4	5	8	10	12

Or

Page 4 Code No. : 10440 E

- (b) Find the missing price in the following data if the ratio between Laspeyre's and Paasche's index numbers in 25 : 24.

Commodities	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	1	15	2	15
B	2	15	—	30

13. (a) An Enquiry into the budgets of the middle class families in a city in India gave the following information.

	Food	Rent	Clothing	Fuel	Misc.
Weights	35%	15%	25%	10%	20%
Prices 1991	1500	300	450	70	500
Prices 1992	1650	325	500	90	550

What changes in cost of living index of 1992 as compared with that of 1991 are seen?

Or

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

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

Page 5 Code No. : 10440 E





14. (a) (i) Using three year moving averages, determine the trend.

(ii) Also determine the short fluctuations.

Year	1986	1987	1988	1989	1990	1991	1992	1993
Production in lakhs of tonnes	21	22	23	25	24	22	25	26

Or

- (b) From the data given below calculate seasons indices assume that the trend is absent.

Year	I Quarter	II Quarter	III Quarter	IV Quarter
1990	40	35	38	40
1991	42	37	39	38
1992	41	35	38	40
1993	45	36	36	41
1994	44	38	38	42

15. (a) 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

Or

- (b) Explain the method of fitting the curve  $y = ka^{bx}$  ( $a, k > 0$ ) obtaining the normal equations by the method of least squares.

### SECTION C — (5 × 8 = 40 marks)

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

16. (a) Given  $N = 1200$ ;  $(ABC) = 600$ ;  $(\alpha\beta\gamma) = 50$ ;  $(\gamma) = 270$ ;  $(A\beta) = 36$ ;  $(B\gamma) = 204$ ;  $(A) - (\alpha) = 192$ ;  $(B) - (\beta) = 620$ . Find the remaining class frequencies.

Or

- (b) Show that for  $n$  Attributes  $A_1, A_2, \dots, A_n$ ,  
 $(A_1, A_2, \dots, A_n) \geq (A_1) + (A_2) + \dots + (A_n) - (n-1)N$ ,  
 where  $N$  is the total number of Attributes.

17. (a) From the following data, construct Fisher's index number and show that it satisfies the 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) Calculate (i) Laspeyres's (ii) Paasche's (iii) Fisher's index numbers for the following data given below. Also find Edgeworth 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

18. (a) Find the cost of living index number for 1992 on the base of 1991 on the basis from the following data using (i) family budget method (ii) aggregate expenditure method.

Commodity	Price in Rs.		Quantity in Quintals in 1991
	1991	1992	
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

Page 8 Code No. : 10440 E

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

Year	2003	2004	2005	2006	2007
Chain base index numbers	80	110	120	90	140

19. (a) Explain about the components of a time series.

Or

- (b) Use the method of least squares and fit a straight line trend to the following data given from 82 to 92. Hence estimate the trend value for 1993.

Year	82	83	84	85	86	87	88	89	90	91	92
Production in quintals	45	46	44	47	42	41	39	42	45	40	48

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

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

Or

Page 9 Code No. : 10440 E

