

Reg. No. : .....

Code No. : 32087 E      Sub. Code : CMCO 41

B.Com. (CBCS) DEGREE EXAMINATION,  
APRIL 2023.

Fourth Semester

Commerce — Core

QUANTITATIVE TECHNIQUES

(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 answers :

1. The straight line given by the equation  $x=11$  is
  - (a) Parallel to  $X$  axis
  - (b) Parallel to  $Y$  axis
  - (c) Passing through the origin
  - (d) Passing through the point (0,11)

2. The point of intersection of  $3x - y = 4$  and  $x + y = 8$  is
- (a) (5,3)                      (b) (2,4)  
(c) (3,5)                      (d) (4,4)
3. For any two matrices A and B, we have
- (a)  $AB = BA$                       (b)  $AB \neq BA$   
(c)  $AB = O$                       (d) None of the above
4. If A is a square matrix such that  $A^2 = A$ , then  $(I - A)^3 + A$  is equal to
- (a) I                                      (b) 0  
(c)  $I - A$                               (d)  $I + A$
5. What is the standard deviation measure?
- (a) It measures how much a data set is spread from its mean  
(b) It measures how much a data set is spread from another data set  
(c) It indicates how closely related two or more sets are in terms of their respective means, medians, and quintiles  
(d) All the above

6. What does it mean when the central tendency is stated as the mean of samples?
- (a) It means that the sample size is  $n$ , and the sample mean represents a set of data points taken from this sample with replacement  
(b) It means that the sample size is  $n$ , averaged to determine central tendency  
(c) Both (a) and (b)  
(d) None of the above
7. Which of the following statements is true for correlation analysis?
- (a) It is a bivariate analysis  
(b) It is a multivariate analysis  
(c) It is a univariate analysis  
(d) Both (a) and (c)
8. The independent variable is used to explain the dependent variable in
- (a) Linear regression analysis  
(b) Multiple regression analysis  
(c) Non-linear regression analysis  
(d) None of the above

9. Fisher's method of calculating the index number is based on the \_\_\_\_\_
- (a) Geometric mean  
 (b) Arithmetic mean  
 (c) Harmonic mean  
 (d) None of the above
10. Commodities that show considerable price fluctuations can be measured by a \_\_\_\_\_
- (a) Value index      (b) Price index  
 (c) Quantity index      (d) None of the above

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Find the equation of the line if the line passes through (1, 2) and slope = 7.
- Or
- (b) Find the value of "a" for which the straight lines  $3x+4y=13$ ;  $2x-7y=-1$  and  $ax-y-14=0$  are concurrent.

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12. (a) If  $A = \begin{bmatrix} 2 & 0 & 1 \\ -1 & 1 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} -1 & 1 & 0 \\ 0 & 1 & -2 \\ 1 & 1 & 1 \end{bmatrix}$ , then find  $(AB)$ .

Or

- (b) Find the inverse of  $\begin{bmatrix} 1 & 3 & -5 \\ 2 & -1 & 5 \\ 2 & 0 & -1 \end{bmatrix}$ .
13. (a) The following table gives the daily income of ten workers in a factory. Find the arithmetic mean

Workers	A	B	C	D	E
Daily income (in Rs.)	120	150	180	200	250
Workers	F	G	H	I	J
Daily income (in Rs.)	300	220	350	370	260

Or

- (b) Calculation the mean of the following distribution:
- |                |       |       |       |
|----------------|-------|-------|-------|
| Class interval | 0-10  | 10-20 | 20-30 |
| Frequency      | 8     | 5     | 12    |
| Class interval | 30-40 | 40-50 | 50-60 |
| Frequency      | 35    | 24    | 16    |

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14. (a) Find the coefficient of correlation between X and Y series from the data :

X	10	12	8	15	20	25	40
Y	15	10	6	25	16	12	8

Or

- (b) The following table shows the sales and advertisement expenditure of a firm

Sales Advertisement Expenditure  
(Rs. Crores)

Mean	40	6
SD	10	1.5

Coefficient of correlation  $r = 0.9$ . Estimate the likely sales for a proposed advertisement expenditure of Rs. 10 crores.

15. (a) From the data given below, construct the index number for the year 2016 on the base of 2011 by simple aggregative method :

Commodities	Unit	Price (in Rs.)	
		2011	2016
Wheat	Quintal	200	250
Rice	Quintal	300	400
Pulses	Quintal	400	500
Milk	Litre	2	3
Clothing	Meter	4	5

Or

- (b) Construct index numbers by (aggregative method) based on the price of 2011 from the following figures :

Items	A	B	C	D	E	F
Prices (2011)	200	60	350	100	60	80
Price (2019)	240	90	600	110	62	90

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Find the distance between two points A and B such that the coordinates of A and B are (5, -3) and (2, 1).

Or

- (b) Determine the slope of the line, that passes through the point A (5, -3), and it meets y-axis at 7.

17. (a) If  $3A - B = \begin{bmatrix} 5 & 0 \\ 1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$  then find the value of matrix A.

Or

- (b) Find the value of  $x - y$ , if  $2 \begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$ .

18. (a) Following information pertains to the daily income of 150 families. Calculate the arithmetic mean.

Income (in Rs.)	More than 75	More than 85	More than 95	More than 105
Number of families	150	140	115	95

Income (in Rs.)	More than 115	More than 125	More than 135	More than 145
Number of families	70	60	40	25

Or

- (b) The median of the following observation 11, 12, 14  $(X-2)$ ,  $(X+4)$ ,  $(X+9)$ , 32, 38, 47 arranged in ascending order is 24. Find the value of X and hence find the mean.
19. (a) The data on price and quantity purchased relating to a commodity for 10 months are given below: Calculate coefficient of correlation between price and quantity.
- |                |    |    |    |    |    |
|----------------|----|----|----|----|----|
| Price (Rs.):   | 10 | 14 | 12 | 11 | 9  |
| Quantity (Kg.) | 25 | 20 | 30 | 32 | 35 |
| Price (Rs.):   | 7  | 15 | 16 | 18 | 20 |
| Quantity (Kg.) | 40 | 19 | 16 | 12 | 10 |

Or

- (b) When advertisement expenditure is 10 crores i.e.,  $Y=10$  then sales  $X=6(10)+4=64$  which implies sales is 64.

For 5 pairs of observations the following results are obtained

$$\Sigma X=15, \Sigma Y=25, \Sigma x^2=55, \Sigma y^2=135, \Sigma XY=83$$

Find the equation of the lines of regression and estimate the value of X on the first line when  $Y = 12$  and value of Y on the second line if  $X = 8$ .

20. (a) Calculate weighted average of price relative index number of prices for 2019 on the basis of 2011 from the following data :

Commodity	Price (in Rs.)		
	2011	2011	2019
A	20	20	35
B	12	15	18
C	8	10	11
D	4	5	5
E	6	4	5

Or

(b) The following data relate to the prices and quantities of 4 commodities in the years 2011-12 and 2019-20. Construct the index numbers of price for the year 2019-20 by using 2011-12 the base year by :

- (i) Laspeyre's method
- (ii) Paasche's method,
- (iii) Fisher's ideal method:

Commodity	2011-12		2019-20	
	Price (in Rs.) $p_0$	Quantity $q_0$	Price (in Rs.) $p_1$	Quantity $q_1$
A	5	100	6	150
B	4	80	5	100
C	2.5	60	5	72
D	12	30	9	33