

TDC (CBCS) Even Semester Exam., 2024

COMMERCE

(2nd Semester)

Course No. : COMDSC-202T

(Business Mathematics and Statistics)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

UNIT—I

1. Answer any four of the following questions :

1×4=4

- (a) Define matrix.
- (b) Name different types of matrix.
- (c) What is singular matrix?
- (d) Evaluate :

$$\begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$$

(2)

(e) If

$$A = \begin{bmatrix} 1 & 2 & 4 \\ 6 & -2 & 3 \end{bmatrix}$$

find the transpose of A.

2. Answer any one of the following questions : 2

(a) If

$$A = \begin{bmatrix} 0 & 0 \\ 5 & 0 \end{bmatrix}$$

show that $A^2 = 0$.(b) Find x and y , if

$$\begin{bmatrix} 1 & x+y \\ x-y & 0 \end{bmatrix} = \begin{bmatrix} 1 & 7 \\ 1 & 0 \end{bmatrix}$$

3. Answer any one of the following questions : 8

(a) (i) Using matrices, solve the following equation :

$$x + y + z = 6$$

$$x - y + z = 2$$

$$2x + y - z = 1$$

(ii) If

$$A = \begin{bmatrix} 1 & 5 \\ 3 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & -1 \\ 5 & 2 \end{bmatrix}$$

find $2A + 3B$.

4+4=8

(3)

(b) (i) Solve by applying Cramer's rule :

$$2x + 3y = 5$$

$$3x - 2y = 1$$

(ii) Find Adj_A where

$$A = \begin{bmatrix} -1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$$

4+4=8

UNIT—II

4. Answer any four of the following questions :

1×4=4

(a) Define limit of a function.

(b) If $f(x) = 2x^2 + 3x - 7$, then find $f(1)$.(c) Define continuity of $f(x)$ at $x = a$.(d) Find derivatives w.r.t. \sqrt{x} .(e) If $y = 2x$, then find

$$\frac{d^2y}{dx^2}$$

5. Answer any one of the following questions : 2

(a) If $f(x) = x^2$, then find $f\{f(3)\}$.

(b) Find the value of

$$\lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$$

(4)

6. Answer any one of the following questions : 8

(a) (i) Evaluate (any one) : 4

$$(1) \lim_{x \rightarrow 0} \frac{x^2 + 2x - 2}{2x + 3}$$

$$(2) \lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1-2x}}{x}$$

(ii) Find dy/dx (any two) : $2 \times 2 = 4$

$$(1) y = x \log x$$

$$(2) y = e^{4x}$$

$$(3) y = x^2 + 2xy + y^2$$

(b) (i) Find the maximum and minimum value of

$$2x^3 - 15x^2 + 36x + 10 \quad 4$$

(ii) If

$$f(x) = \begin{cases} 4x+3 & \text{for } x \neq 4 \\ 3x+7 & \text{for } x = 4 \end{cases}$$

find whether the function is continuous at $x = 4$. 4

UNIT—III

7. Answer any four of the following questions : $1 \times 4 = 4$

(a) Calculate the geometric mean of 3 and 9.

(5)

(b) What is central tendency?

(c) What is mean?

(d) Define dispersion.

(e) What is the range of variance?

8. Answer any one of the following questions : 2

(a) Write two advantages of SD.

(b) Calculate the median from the following data :

57, 58, 61, 42, 38, 65, 72, 66

9. Answer any one of the following questions : 8

(a) Find the mean and mode of the following distribution : $4+4=8$

Marks	:	20-30	30-40	40-50	50-60	60-70
No. of Students	:	3	5	20	10	5

(b) Calculate standard deviation and variance from the following table : 8

Weight (in kg)	:	50	55	60	65	70
No. of Men	:	30	40	65	50	15

(6)

UNIT—IV

10. Answer any *four* of the following questions :
1×4=4

- (a) What is correlation coefficient?
- (b) Find the value of
 $b_{xy} \times b_{yx}$
- (c) What is the range of correlation coefficient?
- (d) Write down the regression equation of Y on X.
- (e) Write down the use of standard deviation.

11. Answer any *one* of the following questions : 2

- (a) Under what condition two regression lines become identical?
- (b) Distinguish between correlation and regression.

12. Answer any *one* of the following questions : 8

- (a) (i) Find the coefficient of correlation from the following data : 4

X :	1	2	3	4	5
Y :	3	2	5	4	6

- (ii) What do you mean by positive and negative correlations? 4

(7)

(b) (i) Given the Bivariate data :

X :	2	4	5	6	8	11
Y :	18	12	10	8	7	5

- (1) Fit the regression line of Y on X and estimate Y when X=10.
- (2) Calculate Karl Pearson's coefficient of correlation. 4
- (ii) Write down the properties of correlation coefficient. 4

UNIT—V

13. Answer any *four* of the following as directed :
1×4=4

- (a) What is time reversal test?
- (b) What are index numbers?
- (c) Index numbers are known as ____.
- (Fill in the blank)
- (d) Write the formula for ideal index number.
- (e) Write the formula for Paasche's price index number.

14. Answer any *one* of the following questions : 2

- (a) What is cost living index number?
- (b) What are the components of time series?

15. Answer any *one* of the following questions : 8

(a) (i) Fit a straight line trend from the following data :

<i>Year</i>	:	1997	1998	1999	2000	2001
<i>Sales (₹ '000)</i>	:	10	13	15	20	22

Also estimate the sales for the year 2005.

4

(ii) Write down the different steps for the construction of index number.

4

(b) (i) Calculate Fisher's ideal index number from the data given below :

4

<i>Commodities</i>	<i>Base Year</i>		<i>Current Year</i>	
	<i>Price</i> (in ₹)	<i>Quantity</i> (in kg)	<i>Price</i> (in ₹)	<i>Quantity</i> (in kg)
<i>A</i>	10	15	20	14
<i>B</i>	20	20	30	18
<i>C</i>	30	25	25	25
<i>D</i>	40	15	50	12

(ii) (1) Name two tests for ideal index number.

(2) Index numbers are called 'economic barometer'. Justify the comment.

1+3=4

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