

**2023/TDC(CBCS)/EVEN/SEM/
COMDSC-202T/397**

TDC (CBCS) Even Semester Exam., 2023

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*

SECTION—A

Answer any *twenty* questions : $1 \times 20 = 20$

1. Find the minor of 1 in the determinant

$$\begin{vmatrix} 2 & -3 & 5 \\ 5 & 2 & -7 \\ -4 & 2 & 1 \end{vmatrix}$$

2. What is triangular matrix?

3. If $f(x) = 2x^2 + 3x + 2$, find $f(0)$.

4. Evaluate :

$$\lim_{x \rightarrow 2} \frac{2x^2 - 8}{x - 2}$$

5. Distinguish between $\lim_{x \rightarrow a} f(x)$ and $f(a)$.

6. Find the derivatives w.r.t. x of \sqrt{x} .

7. Define demand function.

8. Define continuity of $f(x)$ at $x = a$.

9. If $y = 2x$, find $\frac{d^2y}{dx^2}$.

10. Define extreme values.

11. Define arithmetic mean.

12. Calculate the mode of

4, 3, 2, 5, 3, 4, 5, 1, 7, 3, 2, 1

13. What is positive skewness?

14. What is the range of correlation coefficient?

15. What is index number?

16. What is least square method of measuring trend?

17. What is meant by dispersion?

18. Fill up the blank :

$$(GM)^2 = AM \times \underline{GM}$$

19. Calculate the AM of

32, 36, 35, 37, 39, 41, 43

20. Write one example of linear correlation.

21. State the formula of Laspeyre's index.

22. What is deflating of index number?

23. Differentiate between correlation and regression.

24. Calculate the range of

47, 50, 49, 70, 63, 55, 81

25. Find GM of 3, 9, 27.

SECTION—B

Answer any *five* questions : 2×5=10

26. If

$$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 4 \\ -1 & 1 \end{bmatrix}$$

find BA .

27. If

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$

show that $A^2 - 3I = 2A$.

28. What is meant by 'central tendency'?

29. Compute correlation coefficient :

$$n = 25, \Sigma x = 125, \Sigma y = 100,$$

$$\Sigma x^2 = 650, \Sigma y^2 = 460, \Sigma xy = 508$$

30. Write two uses of index numbers.

31. What do you understand by 'time series analysis'?

32. Mention two merits of arithmetic mean.

33. Find the median of 10, 6, 15, 2, 3.

34. Explain secular trend.
35. The average weekly pocket money of 5 students in rupees are as follows :

45, 50, 70, 30, 55

Calculate harmonic mean.

SECTION—C

Answer any five questions :

8×5=40

36. (a) If

$$A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix}$$

show that $A^2 - 3A + 2I = 0$.

- (b) Find the adjoint and inverse of

$$\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

4+4=8

37. (a) If

$$A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & -1 & 4 \end{bmatrix}$$

find AA^T and $A^T A$.

(b) Solve the following systems of equations matrix method :

$$2x + 4y + z = 5$$

$$x + y + z = 6$$

$$2x + 3y + z = 6$$

$$3+5=8$$

38. (a) Find $\frac{dy}{dx}$ (any two) :

$$2+2=4$$

(i) $y = x \log x$

(ii) $y = x^3 + y^3 - 3axy$

(iii) $y = (x + 6)^3 dx$

(b) For what values of x , the function $x^3 - 9x^2 + 24x - 12$ is a maximum or a minimum?

$$4$$

39. (a) Evaluate :

$$\lim_{x \rightarrow 0} \frac{2 - \sqrt{4 - x^2}}{x^2}$$

(b) 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 $x = 4$.

$$4+4=8$$

40. (a) From the following table, find mode :

Age (in years) : 20-25 25-30 30-35 35-40 40-45

No. of persons : 50 70 100 180 150

(b) Mention two merits and demerits of median. 4+4=8

41. (a) Find the standard deviation from the following data :

5, 8, 7, 11, 9, 10, 8, 2, 4, 6

(b) Find out the mean deviation about median of the following :

31, 35, 29, 63, 55, 72, 37 4+4=8

42. (a) Obtain the lines of regression :

x : -10 -5 0 5 10

y : 5 9 7 11 13

(b) Write two properties of correlation coefficients. 6+2=8

43. (a) Fit a linear trend by the method of least squares :

Year : 2015 2016 2017 2018 2019 2020

Production

(in crores) : 7 10 12 14 17 24

(b) What are the uses of time series? 5+3=8

44. (a) Write a short note on time reversal test and factor reversal test.

(b) What is cost living index number? $6+2=8$

45. For the variables X and Y , the two lines of regression are given by $3x + 2y - 25 = 0$ and $6x + y - 30 = 0$.

(a) Identify the lines of regression of X on Y and Y on X .

(b) Find the correlation coefficient between X and Y . $4+4=8$

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42. (a) Obtain the lines of regression:
 x : 10, 15, 20, 25, 30
 y : 13, 11, 7, 9, 5

(b) Write two properties of correlation coefficients. $6+2=8$

43. (a) Fit a linear trend by the method of least squares:
Year : 2015, 2016, 2017, 2018, 2019, 2020
Production (in crores) : 7, 10, 12, 14, 17, 24

(b) What are the uses of time series? $2+3=8$