

B.Sc.(IT) Semester - 2 (CBCS) Examination**March/April – 2026 (New Course)****Foundation of Mathematics and Statistics (CORE)****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que.1(A) Answer following Questions (03)
- (1) Define the determinant of a 2×2 matrix.
 - (2) What is the condition of linear equations to have a unique solution using Cramer's rule?
 - (3) Write the general form of a 3×3 matrix.
- Que.1(B) Answer Any Two (06)
- (1) Find the determinant of the following 3×3 matrix: $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$
 - (2) Prove that the determinant of a matrix is zero if two rows or two columns are identical.
 - (3) Solve the system of equations using Cramer's rule: $x+2y=5$, $3x-y=5$
 - (4) Prove for determinants:
If two rows (or columns) of a determinant are interchanged, the determinant changes its sign.
- Que.1(C) Answer Any One (05)
- (1) Solve the following of equations using Cramer's rule:
 $2x+3y-z=1$, $3x-y+2z=7$, $x+2y+z=4$
 - (2) Explain properties of determinants.
- Que.2(A) Answer following Questions (03)
- (1) Define a Row matrix.
 - (2) What is Transpose matrix?
 - (3) How is matrix addition defined?
- Que.2(B) Answer Any Two (06)
- (1) Find the product of two matrices: $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$
 - (2) Explain the method of finding the inverse of a 2×2 matrix.
 - (3) Explain diagonal matrix, unit matrix and null matrix with example.
 - (4) Explain Inverse of matrix.
- Que.2(C) Answer Any One (05)
- (1) Explain Addition, subtraction and multiplication of matrix.
 - (2) Explain Adjoint of matrix with example.
- Que.3(A) Answer following Questions (03)
- (1) Write the coordinates of the origin.
 - (2) Define set.
 - (3) State the formula for distance between two points (x_1, y_1) and (x_2, y_2) .
- Que.3(B) Answer Any Two (06)
- (1) Find the distance between points A(2, 3) and B(6, 7).
 - (2) Find the area of triangle whose vertices are (0,0), (4,0) and (0,3).
 - (3) If $A = \{1,2\}$ and $B = \{a, b\}$, find $A \times B$ and $B \times A$.
 - (4) Explain section formula with example.

Que.3(C) Answer Any One (05)

- (1) Explain De'Morgan's laws with logical proof.
- (2) Explain operations on sets and its properties.

Que.4(A) Answer following Questions (03)

- (1) Define Mean
- (2) Write the formula for mean of ungrouped data.
- (3) Write the formula for range.

Que.4(B) Answer Any Two (06)

- (1) Find the mean of the data: 2, 4, 6, 8, 10.
- (2) Find the mode of the data: 4, 6, 8, 6, 9, 6, 10.
- (3) Find the lower quartile (Q_1) of the data: 3, 5, 7, 9, 11, 13, 15.
- (4) Find the median of the grouped data:

Class	Frequency
0-10	5
10-20	9
20-30	6

Que.4(C) Answer Any One (05)

- (1) Find the standard deviation of the data: 2, 4, 6, 8.
- (2) Find the mean of the following grouped data:

Class	Frequency
0-10	5
10-20	10
20-30	15
30-40	20
40-50	30

Que.5(A) Answer following Questions (03)

- (1) Define an arithmetic progression (AP).
- (2) What is the general form of the n^{th} term of a geometric progression?
- (3) Write the formula for the sum of the first n terms of an arithmetic progression.

Que.5(B) Answer Any Two (06)

- (1) Find the 10^{th} term of the arithmetic progression: 3, 7, 11, 15, ...
- (2) Find the sum of the first 6 terms of the geometric progression: 2, 6, 18, 54, ...
- (3) Find the n^{th} term of the geometric progression 5, 15, 45, 135, ...
- (4) the sum of the first 20 terms of the arithmetic progression: 7, 10, 13, 16, ...

Que.5(C) Answer Any One (05)

- (1) Explain relation between AM, GM and HM.
- (2) Explain Harmonic Progression.
