

B.Sc.(IT) Semester - 2 (CBCS) Examination**March/April– 2019 (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.

Q.1 [A] Attempt the following**[03]**

1. Define: - Square Matrix.
2. What is the Determinant of $A = \begin{bmatrix} 3 & -7 \\ 2 & -1 \end{bmatrix}$?
3. How many elements in 3×3 determinants?

[B] Answer the following: (Any Two)**[06]**

1. Write any one Property of determinants.
2. Prove that $\begin{vmatrix} 1 & a & b \\ 1 & a+b & b \\ 1 & a & a+b \end{vmatrix} = ab$.
3. Find the Value of k if $\begin{vmatrix} 4 & 5 & -7 \\ -2 & k & 6 \\ 1 & k & 1 \end{vmatrix} = 43$.
4. Solve the Following Equations Using Cramer's Rule $6x - 5y = -23, 3x + 3y + 16$.

[C] Answer the following: (Any One)**[05]**

1. Solve for x, y & z by using Cramer's Rule $x + y + z = 5$,
 $2x - 3y - 4z = -11, 3x + 2y - z = -6$.
2. Prove that $\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = (x - y)(y - z)(z - x)(x + y + z)$.

Q.2 [A] Attempt the following**[03]**

1. Define: - Diagonal Matrix.
2. Define: - Symmetric Matrix.
3. In a Matrix $(AB)^{-1} = \dots\dots\dots$

[B] Answer the following: (Any Two)**[06]**

1. If $A = \begin{bmatrix} 2 & 1 \\ 0 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}, C = \begin{bmatrix} 2 & 4 \\ 1 & 4 \end{bmatrix}$ Verify that $A(B + C) = AB + AC$
2. Find A^{-1} where $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 2 & 0 \\ -1 & 3 & -2 \end{bmatrix}$.
3. For the Matrix $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 5 & 6 \\ -3 & 2 \end{bmatrix}$ Prove that $(AB)^{-1} = B^{-1}A^{-1}$.
4. If $A = [p \quad q \quad r \quad s]$ and $B = \begin{bmatrix} p^{-1} \\ q^{-1} \\ r^{-1} \\ s^{-1} \end{bmatrix}$ show that $AB \neq BA$.

[C] Answer the following: (Any One)**[05]**

1. Prove that the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & -3 & 0 \\ 1 & 1 & -1 \end{bmatrix}$ satisfies the relation $A^3 + 4A^2 - A = 12I_3$.
2. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then Prove that $A^2 - 4A - 5I = 0$ hence Find A^{-1} .

Q.3 [A] Attempt the following**[03]**

1. Define:-Symmetric Difference Set.
2. Write Down the power set of $A = \{1,2,3\}$.
3. Write Area formula For Triangle.

[B] Answer the following: (Any Two)**[06]**

1. State & Prove De-Morgan's Law.
2. If $A = \{x/|x^2 - 1| \leq 10, x \in \mathbb{Z}\}$, $B = \{x/|x - 1| < 2, x \in \mathbb{N}\}$, $C = \{x/|x| \leq 1, x \in \mathbb{Z}\}$ then prove that $A \times (B \cap C) = (A \times B) \cap (A \cap C)$.
3. Find the ratio in Which The point $C(-1, -1)$ Divides the join of points A and $B(7,7)$
4. Find the Area of Triangle Whose Vertices are $((,)), (,))$.

[C] Answer the following: (Any One)**[05]**

1. In a Group of 70 people, 45 speak Gujarati language and 33 Speak English Language and 10 Speak Neither Gujarati nor English, How Many People Can speak both English as well as Gujarati language? How Many Can Speak only English Language?
2. Prove that $(3,2), (5,4), (3,6), (1,4)$ are the Vertices of a Square.

Q.4 [A] Attempt the following**[03]**

1. Define: Range
2. The Median of the data 15, 18, 16, 19, 20.
3. Define: Quartile Deviation.

[B] Answer the following: (Any Two)**[06]**

1. Calculate mean, median, mode from the following data:

X	116	121	125	127	129	130	130
---	-----	-----	-----	-----	-----	-----	-----

2. Explain Advantages and Disadvantages of Median.
3. Calculate the quartile deviation and coefficient of quartile deviation for the following data

X	55-60	60-65	65-70	70-75	75-80
f	10	18	14	16	12

4. Calculate the Standard deviation & Variance from the given data

X	1	2	3	4	5	6	7	8	9
f	92	49	52	82	102	60	35	24	4

[C] Answer the following: (Any One)**[05]**

1. Calculate Range, Coefficient of range, Quartile deviation, Coefficient of Quartile deviation of following data

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	11	16	19	12	7	6	4

2. Find the asked missing Frequency for 400 Frequency if Median of Frequency distribution is 38.

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	42	38	?	54	?	36	32

Q.5 [A] Attempt the following**[03]**

1. Write an equation Sum of n^{th} term A.P.
2. Which term of G.P. $\frac{1}{27}, \frac{1}{9}, \frac{1}{3}, \dots$ is 81?
3. Define: Sequence.

[B] Answer the following: (Any Two)**[06]**

1. In usual Notation prove that $S_n = \frac{n}{2}(2a + (n - 1)d)$.
2. If $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in A.P. prove that a^2, b^2, c^2 are in A.P.
3. Prove that $\frac{1}{3125}$ is a 8th term of the series 25, 5, 1,.....
4. The Second & Forth term of G.P. are 18 and 72 respectively, Find the sum of its First 10 terms.

[C] Answer the following: (Any One)**[05]**

1. Obtain the sum of the series up to 'n' term $6 + 66 + 666 + \dots$ up to n^{th} term.
2. The sum of three number in a G.P. is 28 and their product is 512, Find the numbers.
