

**B.Sc.(IT) Semester - 2 (CBCS) Examination****June/July-2022 [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. What is Determinant of  $A = \begin{bmatrix} 2 & 3 \\ 6 & 7 \end{bmatrix}$ ?
2. If any two rows of a Determinant are interchanged value of new determinant is.....
3. What is Determinant of unit (Identity) matrix?

Q.1(B) Answer the following: (any two) (06)

1. Write any one Property of determinants.
2. Find the Determinant of  $A = \begin{bmatrix} 1 & 2 & 7 \\ 5 & 0 & 2 \\ 3 & -4 & 6 \end{bmatrix}$
3. Prove that  $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$
4. Solve the Following Equations Using Cramer's Rule  $2x+5y=9$ ,  $3x-y=5$ .

Q.1(C) Answer the following: (any one) (05)

1. Solve for x, y & z by using Cramer's Rule  $2x+3y-z=9$ ,  $x+y+z=9$ ,  $3x-y-z=1$ .
2. Prove that  $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$ .

Q.2(A) Attempt the following (03)

1. Define:- Upper Triangular Matrix.
2. Define:- Transpose of Matrix.
3. In a Matrix  $(A^{-1})^{-1} = \dots\dots\dots$

Q.2(B) Answer the following: (any two) (06)

1. If  $A = \begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} -2 & 0 \\ 1 & -3 \end{bmatrix}$ ,  $C = \begin{bmatrix} 3 & 1 \\ 2 & 7 \end{bmatrix}$  Verify that  $A(B+C) = AB+AC$ .
2. Find  $A^{-1}$  where  $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$ .
3. For the Matrix  $AB = \begin{bmatrix} 2 & 4 \\ 3 & 5 \end{bmatrix}$ ,  $ABC = \begin{bmatrix} 2 & -1 \\ 3 & 0 \end{bmatrix}$  then Find 'C'.
4. Find 'x' if  $[x \ 4 \ -1] \cdot \begin{bmatrix} 2 & 1 & 0 \\ 1 & 0 & 2 \\ 0 & 2 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ 4 \\ -4 \end{bmatrix} = 0$ .

Q.2(C) Answer the following: (any one) (05)

1. For the matrix  $A = \begin{bmatrix} 1 & 4 & 0 \\ -1 & 2 & 2 \\ 0 & 0 & 2 \end{bmatrix}$  Verify that  $(\text{Adj}A)^{-1} = \text{Ad}(A)^{-1}$ .
2. If  $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & 3 \end{bmatrix}$  then prove that  $A^3 - 13A + 12I = 0$  hence Find  $A^{-1}$ .

Q.3(A) Attempt the following. (03)

1. Define:- Intersection of a Set.
2. Write Down the power set of  $A = \{a, b, c\}$ .
3. Write equation for Internal Division Formula.

Q.3(B) Answer the following: (any two) (06)

1. Prove that  $(A \cap B)' = A' \cup B'$ .
2. If  $A = \{x/x \leq 9, x \in \mathbb{N}\}$ ,  $B = \{y/3 \leq y \leq 7, y \in \mathbb{N}, \text{ odd no.}\}$ ,  $C = \{Z/1 \leq Z \leq 7, Z \in \mathbb{N}, \text{ even no.}\}$  then prove that  $A - (B \cup C) = (A-B) \cap (A-C)$ .
3. Find the Coordinate of the points which divides the join of points (2, 1) and (4, 5) internally in the ratio 2:3.
4. Find the area of Triangle Whose Vertices are (5, 7), (-3, 4), (2, 3).

Q.3(C) Answer the following: (any one) (05)

1. Show that points (2, 3), (4, 7), & (6, 6), are the vertices of a Right-Angled Triangle.
2. In a Group of 100 people, 65 likes to play cricket, 40 likes to play tennis, 55 likes to play volleyball all of them like to play at least one of three games if 25 likes to play both cricket and tennis, 24 like to play both tennis and volleyball and 22 like to play both cricket and volleyball then (A) How many like to play all the 3 games? (B) How many like to play Cricket only?

Q.4(A) Attempt the following. (03)

1. Define: Mode.
2. The Median of the data 25, 28, 26, 29, 35, 30 is .....
3. Write an equation of coefficient of variance.

Q.4(B) Answer the following: (any two) (06)

1. Explain Advantages and Disadvantages of Mean.
2. Calculate mean, median, mode from the following data:

|   |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|
| X | 59 | 62 | 67 | 69 | 73 | 75 | 81 |
|---|----|----|----|----|----|----|----|

3. Calculate the quartile deviation and coefficient of quartile deviation for the following data.

|   |   |    |    |    |   |
|---|---|----|----|----|---|
| X | 1 | 3  | 5  | 7  | 9 |
| f | 3 | 12 | 18 | 12 | 5 |

4. Calculate the standard deviation & variance from the given data.

|   |       |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|-------|
| X | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 | 45-50 |
| f | 170   | 110   | 80    | 45    | 40    | 35    |

Q.4(C) Answer the following: (any one) (05)

1. If the median of the following frequency distribution is 46, find the missing frequency if the total frequency is 230.

|           |       |       |       |       |       |       |       |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Class     | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
| Frequency | 12    | 30    | F1    | 65    | F2    | 25    | 18    |

2. Calculate Range, Coefficient of range, Quartile deviation, Coefficient of Quartile deviation, Standard deviation of following data.

|           |      |       |       |       |       |       |       |
|-----------|------|-------|-------|-------|-------|-------|-------|
| Class     | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| Frequency | 5    | 7     | 8     | 11    | 9     | 4     | 3     |

Q.5(A) Attempt the following. (03)

1. Write an equation  $n^{\text{th}}$  term A.P.
2. Which term of G.P. 2,  $\sqrt{2}$ , 4, ..... is 64?
3. Define: Harmonic Progression.

Q.5(B) Answer the following: (any two) (06)

1. In usual Notation prove that  $S_n = \frac{a(r^n - 1)}{r - 1}$  for  $r > 1$ .
2. The 7<sup>th</sup> term of an H.P. is 1/10 and 12<sup>th</sup> term is 1/25 find the 20<sup>th</sup> term.
3. How many terms of the Series 93+90+87+.....amount to 975.
4. If the third term of a G.P. is 3 and its 6<sup>th</sup> term is 81, find the sum of its first 9 terms.

Q.5(C) Answer the following: (any one) (05)

1. Obtain the sum of the series up to 'n' term  $1+11+111+.....$  up to  $n^{\text{th}}$  term.
2. The sum of three Consecutive terms in A.P. is 18 and their product is 192, Find the three terms.

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