**HQ-003-2032004**

## B. C. A. (Sem. II) (CBCS)
## (W.E.F. 2019) Examination
April - 2023
## CS-10 : Mathematical &
## Statistical Foundation of
## Computer Science

**Faculty Code : 003**
**Subject Code : 20322004**

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

**Instruction :** Attempt all the questions.

1 (a) Answer the following : 4
   (1) Determinant has a value. (True or False)
   (2) How many elements in a 2 ×2 determinant ?
   (3) If any row or any column of the determinant are interchanged the value of the determinant will_____.
   (4) Determinant is a square matrix. (True of False)

   (b) Answer any one of the following : 2

   (1) If $A = \begin{vmatrix} 3 & a \\ -1 & 3 \end{vmatrix} = 7$ then find a.

   (2) If $A = \begin{vmatrix} 2 & 3 & 1 \\ 5 & 0 & 6 \\ 7 & 4 & 9 \end{vmatrix}$ then find the value of determinant A.

   (c) Answer any **one** of the following : 3
   (1) Solve the following equations using Cramer's method.
       $x-5y=0,\ 3x+y=16$

   (2) If $A = \begin{vmatrix} 11 & 40 & 28 \\ 3 & 12 & 8 \\ p & 2 & 2 \end{vmatrix} = 0$ then find $p$.

(d) Answer any **one** of the following : 5
    (1) Solve the following equations using Cramer's method.
        *2x+3y+z=9, x+2y+3z=8, 3x+y+2z=7*
    (2) Explain any two properties of determinants.

2   (a) Answer the following : 4
    (1) Define Equal matrix.
    (2) Define Identity matrix.
    (3) Define Transpose matrix.
    (4) Define Symmetric matrix.

   (b) Answer any one of the following : 2

    (1)  $A = \begin{bmatrix} 1 & -1 \\ 4 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$ find $2A+B$.

    (2)  $A = \begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ 7 & -3 \end{bmatrix}$ find $3A-2B$.

   (c) Answer any one of the following : 3

    (1)  If $A = \begin{bmatrix} 1 & 2 & 0 \\ 1 & 1 & 0 \\ -1 & 4 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 1 & 4 & 9 \end{bmatrix}$ show that $AB=0$.

    (2)  If $A = \begin{bmatrix} 6 & 4 \\ -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 2 \\ -4 & -3 \end{bmatrix}$ Show that $(AB)^T = B^T A^T$.

   (d) Answer any one of the following : 5

    (1) Find inverse of matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & -3 & -4 \\ 3 & 2 & -1 \end{bmatrix}$

    (2) If $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 0 \\ 1 & 1 & -1 \end{bmatrix}$ then prove that $A^3+4A^2-A=12I_3$.

3   (a) Answer the following : 4
    (1) Define an infinite set.
    (2) Write distance Formula for two points.
    (3) The distance between tow points (1, 5) and (2, 4) is_____.
    (4) Define an equivalent sets.

(b) Answer any **one** of the following : 2

    (1) If the two points $(k, -5)$ and $(2, k)$ is at the distance 13, then find $k$.

    (2) Write properties of complement set.

(c) Answer any **one** of the following : 3

    (1) If $U = \{1, 2, 3, 4, 5, 6, 7\}$, $A = \{x / x < 4, y \in N\}$,

        $B = \{y / 1 < y < 6\}$ then prove that

        $(A \cap B) \cup (A \cap B') = A$

    (2) Show that the set points $A(1, -1)$, $B(2, 1)$ and $C(4, 5)$ are collinear.

(d) Answer any **one** of the following : 5

    (1) Explain any one of De Morgen's law.

    (2) Show that the triangle with vertices at the points $(-7, 0)$, $(1, 10)$ and $(2, 1)$ is isosceles triangle.

**4** (a) Answer the following : 4

    (1) Define Mean.

    (2) Median is the middle value of the series. (True or False)

    (3) Most frequently occurrence in the observation is called_____.

    (4) If mean=46, median=36 find mode.

(b) Answer any **one** of the following : 2

    (1) The mean of 10 observations is 35 and mean of 15 observations is 25. Find the mean of all 25 observations.

    (2) Find the mean of the following data : 12, 19, 25, 31, 32, 35, 37, 32

(c) Answer any **one** of the following : 3

    (1) Find standard deviation of the following data :

| $x_1$ | 9 | 16 | 11 | 12 | 14 | 18 | 20 | 12 |
|---|---|---|---|---|---|---|---|---|

    (2) Calculate median of the following data :

| $x$ | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|
| $f$ | 12 | 16 | 18 | 20 | 22 | 23 | 25 |

(d) Answer any **one** of the following :       5

(1) Find mode from the following data :

| Class | 0 – 20 | 20 – 40 | 40 – 60 | 60 – 80 | 80 – 100 | 100 – 120 | 120 – 140 |
|-------|--------|---------|---------|---------|----------|-----------|-----------|
| Freq. | 9 | 11 | 12 | 15 | 18 | 20 | 25 |

(2) Claculate median of the following data :

| Class | 0 – 5 | 5 – 10 | 10 – 15 | 15 – 20 | 20 – 25 | 25 – 30 | 30 – 35 | 35 – 40 |
|-------|-------|--------|---------|---------|---------|---------|---------|---------|
| Freq. | 7 | 11 | 12 | 19 | 16 | 7 | 5 | 2 |

**5** (a) Answer the following :       4

    (1) What is Sequence ?

    (2) What is Progression ?

    (3) Write down the formula of $n^{th}$ terms of a G. P.

    (4) Write down the formula of sum of $n^{th}$ terms of an A.P.

(b) Answer any **one** of the following :       2

    (1) Find required term of the sequence,

        –15/8, –7/8, 1/8, 9/8,..... $15^{th}$ term.

    (2) The first term of a G. P. is 50 and the $4^{th}$ term is 1350. Find $10^{th}$ term.

(c) Answer any **one** of the following :       3

    (1) Find $21^{st}$ term of an A. P. whose $9^{th}$ term is –6 and common difference is 5/4.

    (2) The second and fourth term of G. P. are 18 and 72 respectively. Find the sum of its first 10 terms.

(d) Answer any one of the following :       5

    (1) If third, $20^{th}$ and last term of an A. P. are 6.5, 57.5 and 87.5, find first term, common difference and the number of terms.

    (2) The sum of three consecutive terms in G. P. is 28 and their product is 512, find the numbers.