Seat No. _____

HQ-003-1032004

B. C. A. (Sem. II) (CBCS)

(W.E.F. 2016) Examination

April - 2023

CS-10 : Mathematical & Statistical Foundation of Computer Science

Faculty Code : 003

Subject Code : 1032004

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

Instruction : Attempt all the questions.

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

(1) Define Determinant.

(2) How many elements in a 3×3 determinant ?

(3) If any two rows or any two columns of the determinant are identical the value of the determinant is zero. (True or False)

(4) Determinants have no value. (True or False)

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

(1) If $A = \begin{vmatrix} 3 & -7 \\ a & -1 \end{vmatrix} = 11$ then find a.

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

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

(1) Solve the following equations using Cramer's method.
3x+2y=7, 11x-4y=3

(2) If $A = \begin{vmatrix} 5 & 7 & x \\ 4 & 7 & 3 \\ 2 & 3 & 1 \end{vmatrix} = 2$ then find x.

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

(1) Explain any two properties of determinants.

(2) Solve the following equations using Cramer's method.
3x+5y+6z=4, x+2y+3z=2, 2x+4y+5z=3

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

(1) Define Row matrix.

(2) Define Unit matrix.

(3) Define Diagonal matrix.

(4) In matrix number of rows and columns are not necessary to be equal. (True or Fales).

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

(1) $A=\begin{bmatrix}4 & 6\\ 2 & 4\end{bmatrix}$ and $B=\begin{bmatrix}1 & 5\\ 2 & 7\end{bmatrix}$ find A+B

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

(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 $A=\begin{bmatrix}3 & 2\\ 4 & 1\end{bmatrix}$ and $B=\begin{bmatrix}a & b\\ 3 & 5\end{bmatrix}$ find a and b such that AB=BA.

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

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

(2) If $A=\begin{bmatrix}1 & 2 & 2\\ 2 & 1 & 2\\ 2 & 2 & 1\end{bmatrix}$ then prove that $A^2-4A-5I=0$.

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

(1) Define finite set.

(2) Write Distance Formula for two points.

(3) The distance between two points (3, 3) and (6, 4) is _____.

(4) Define empty set.

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

(1) If the distance between tow points (k, -4) and (-8, 2) is 10 then find k.

(2) If A={1, 3, 5, 7} B={-1, 0, 1} then find the value of $(A\cup B)-(A\cap B)$.

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

(1) If $U = \{x / 3 \leq x \leq 13, x \in N\}$, $A = \{y / 2 < y < 7, y \in N\}$, $B = \{3, 5, 7, 9\}$ find $(A \cup B)'$ and $(A \cap B)'$.

(2) Find area of triangle whose vertices are (2, -1), (-3, -4), (0, 2).

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

(1) Explain any one of the De Morgan's laws.

(2) Prove that (3, 2), (5, 4), (3, 6), (1, 4) are the vertices of a square.

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

(1) Mean is average. (True or False)

(2) Median is central value. (True or False)

(3) Define Mode.

(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 median of the following data : 35, 10, 28, 8, 24, 5, 20, 19, 12, 30, 39

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

(1) Find combined mean from the following data :

Group	*A*	*B*	*C*	*D*
n_i	10	20	30	40
X_i	15	10	12	20

(2) Calculate median of the following data:

x	10	20	30	40	50	60
f	12	19	21	25	13	10

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

(1) Find median from the following distribution :

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

(2) Find standard deviation and variance from the following data :

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Freq.	5	7	8	11	9	4	3

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

(1) In A. P. what is common _____ (Ratio / Difference)

(2) Write down the formula of n^{th} term of an A.P.

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

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

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

(1) The 8^{th} term of A. P. is 5 and the 13^{th} term is 25. Find 50^{th} term.

(2) Which term of the series 13+21+29+... is equal to 189?

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

(1) Find sum of the sequence 4, 8, 12, 16, 20...up to 25 terms.

(2) The arithmetic Mean and Geometric Mean of two real numbers are 15 and 9 respectively. Find the two numbers.

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

(1) The sum of the three terms in A. P. is 9 and their products is –165. Find the numbers.

(2) The product of three consecutive terms of a G. P. is –64 and the first term is four times the third. Find the numbers.
