Seat No. _____

00146

F8X-003-3041001

B. Sc. (I.T.) (Sem. I) (CBCS)

(W.E.F. 2022) Examination

December - 2022

Mathematical & Statistical Foundation of Computer Science : CS-01

(New Course)

Faculty Code : 003

Subject Code : 3041001

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

Instructions : Attempt all the questions.

1 (A) Answer the following questions in brief. **4**

(1) Find the value of determinant $\begin{vmatrix} 0 & 2 \\ 1 & 4 \end{vmatrix}$

(2) The value of a determinant is unchanged if its corresponding rows and columns are interchanged. (True or False)

(3) How many elements in a 3×3 determinant.

(4) Determinant is a square. (True/False)

(B) Attempt any one out of two : **2**

(1) If $A = \begin{vmatrix} 4 & 2 \\ a & 3 \end{vmatrix} = 6$ then find a.

(2) If $D = \begin{vmatrix} 1 & 2 & 3 \\ 3 & 6 & 9 \\ 1 & 2 & 2 \end{vmatrix}$ then find the value of D.

(C) Attempt any one out of two. 3

(1) Solve : $3x+2y-5=0,\ 5x-3y-2=0$ by Cramer's rule.

(2) If $A=\begin{vmatrix} 1 & 2 & 1 \\ 2 & k & 2 \\ -3 & 2 & 1 \end{vmatrix} = 0$ then find k.

(D) Attempt any one out of two. 5

(1) Write rules of determinants.

(2) Solve :
$2x+3y-2z-3=0,\ 3x+3y-2z-4=0,\ x+2y-z-2=0$
by Cramer's rule.

2 (A) Answer the following questions in brief. 4

(1) Define Row matrix.

(2) Define zero matrix.

(3) Define Symmetric matrix.

(4) Define Column matrix.

(B) Answer any one out of two. 2

(1) If $A=\begin{bmatrix} a & a+b \\ 1 & 3 \end{bmatrix}$ and $B=\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ then find a and b.

(2) Define Transpose of a matrix with example.

(C) Attempt any one out of two. 3

(1) If $A=\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ then show that $A^3 = 4A$.

(2) If $A=\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 0 \end{bmatrix}$ and $B=\begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 3 \end{bmatrix}$ then find $(A + B)^T$.

(D) Attempt any one out of two. 5

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

(2) If $A=\begin{bmatrix} -1 & 3 & 5 \\ 1 & -3 & -5 \\ -1 & 3 & 5 \end{bmatrix}$, then show $A = A^2$.

3 (A) Answer the following questions in brief. 4

(1) Find the distance between two points (3, 2) and (–1, 5).

(2) Give an example of finite set.

(3) Find the midpoint of line segment joining points A (6, 3) and B (–2, 1).

(4) Define finite set.

(B) Answer any one out of two. 2

(1) If the distance between two point A (2, 2) and B (x, 5) is 5 then find x.

(2) Define Cartesian products of two sets with example.

(C) Attempt any one out of two. 3

(1) Find the area of triangle whose vertices are (–3, 2), (1, –2) and (5, 6).

(2) If $A = \{1, 2, 3, 4\}$ $B = \{1, 2, 4\}$ $C = \{3\}$ then verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

(D) Attempt any one out of two. 5

(1) Explain De'Morgan laws with logical proof.

(2) Show that A (1, 0), B (0, 1) and C (–1, 0) are vertices of right angled triangle.

4 (A) Answer the following questions in brief. 4

(1) Define average.

(2) Define median.

(3) Define Mode.

(4) Define Range.

(B) Attempt any one out of two. 2

(1) Find mean for the data 1, 6, 4, 9, 5, 6, 5, 4

(2) For the data 2, 3, 5, 9, 8, 2, 1, 2, 7, 4. Find Mode.

(C) Attempt any one out of two. 3

(1) Calculate the median for the following frequency distribution.

Class	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45
f	5	6	15	10	5	4	2	2

(2) Calculate the mean for the following frequency distribution.

(D) Attempt any one out of two. 5

(1) Calculate the standard deviation for the following table.

Class	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
Frequency	170	110	80	45	40	35

(2) Find median and mean for the following data.

x	20 – 25	25 – 30	30 – 40	40 – 50	50 – 60
f	12	23	45	29	7

5 (A) Answer the following questions in brief. 4

(1) Define series.

(2) Define Aritmetic progression.

(3) If 1, 4, 7, 10, ... is a sequence then find its 12^{th} term.

(4) In A.P., T_n = ...

(B) Attempt any one out of two. 2

(1) In A.P. If first term = 3 and d = 2 then find 10^{th} term.

(2) For an A.P. $T_7 = 5$ and $T_{11} = -3$ the find T_{20}.

(C) Attempt any one out of two. 3

(1) If the 12^{th} term of AP is 57 and its 24^{th} term is 107 then find T_{20}.

(2) Find the middle term of the sequence 4, 9, 14, ... 104.

(D) Attempt any one out of two. 5

(1) The sum of three consecutive terms of a G.P. is 21 and their product is 216. Find the terms.

(2) Find three numbers in G.P. such that their product is 216 and their sum is 26.
