RAR-003-1032004   Seat No. _____

B.C.A. (Sem. II) (CBCS) Examination
March / April - 2019
CS-10: Mathematical & Statistical Foundation of Computer Science

Faculty Code : 003
Subject Code : 1032004

Time : $2\frac{1}{2}$ Hours]   [Total Marks : 70

Instruction : All questions are compulsory.

1   (a)   Answer the following questions in brief :   4

   (1)   Expand $D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}$.

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

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

   (4)   Define determinant.

   (b)   Answer any one from following two questions :   2

   (1)   If $A = \begin{vmatrix} 3 & k \\ 6 & 7 \end{vmatrix} = 3$ then find k.

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

   (c)   Answer any one from following two questions :   3

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

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

(d) Answer any one from following two questions :   5
(1) Explain any two properties of determinants.
(2) Solve :
$$2x + 3y - 2z - 3 = 0, \ x + 2y - z - 2 = 0, \ x + 3y - 2z - 2 = 0$$
by Cramer's rule.

2 (a) Answer the following questions in brief :   4
(1) Define Diagonal matrix.
(2) Define Inverse of a matrix.
(3) Define Null matrix.
(4) Define Square matrix.

(b) Answer any one from following two questions :   2

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

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

(c) Answer any one from following two questions :   3
(1) Define Square and Unit matrix.

(2) If $\begin{bmatrix} x & x+y \\ 4 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 7 \\ 4 & 3 \end{bmatrix}$ then find x and y.

(d) Answer any one from following two questions :   5

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

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

3 (a) Answer the following questions in brief :   4
(1) The distance between two points (4, 4) and (1, 0) is _____.
(2) Define Equal set.
(3) Find the midpoint of line segment joining points A(3,1) and B(5,3).
(4) Define Finite set.

(b) Answer any one from following two questions : **2**

(1) If the distance between two points A(–3,–2) and B(x,1) is $3\sqrt{10}$ then find x.

(2) Define intersection of two sets.

(c) Answer any one from following two questions : **3**

(1) Prove that the triangle with vertices (0,3), (–2,1) and (–1,4) is right angled.

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

(d) Answer any one from following two questions : **5**

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

(2) Show that $(-3, -2), (7, 4)$ and $(1, 14)$ are the vertices of an isosceles right angled triangle.

4 (a) Answer the following questions in brief : **4**

(1) Find mean for the data 25, 35, 63, 22, 54, 23, 45.

(2) Define Range.

(3) Define Mode.

(4) Define Mean.

(b) Answer any one from following two questions : **2**

(1) Define quartiles.

(2) For the data 2, 3, 7, 10, 5, 7, 14, 7, 8, 9, find Mode.

(c) Answer any one from following two questions : **3**

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

Class interval	0 – 8	8 – 16	16 – 24	24 – 32	32 – 40	40 – 48
Frequency	8	7	16	24	15	7

(2) Obtain the median for the following frequency distribution.

X	1	2	3	4	5	6	7	8	9
F	8	10	11	16	20	25	15	9	6

(d) Answer any one from following two questions :   **5**

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

Age in years	20 – 25.	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
No. of members	170	110	80	45	40	35

(2) The median and mode of the following wage distribution are known to be Rs. 33.50 and Rs. 34 respectively. Find the value of k.

Wages : in (Rs.)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	Total
Frequency	4	16	k	100	40	6	4	230

5 (a) Answer the following questions in brief :   **4**

(1) Define Geometric progression.

(2) Define Sequence.

(3) Write down the formula of nth terms of an arithmetic progression.

(4) Write down the formula of nth terms of a geometric progression.

(b) Answer any one from following two questions :   **2**

(1) Find the sum of the first n terms of the series 1+3+5+7+....

(2) Define arithmetic mean and geometric mean.

(c) Answer any one from following two questions :   **3**

(1) Find the middle term of the sequence 4,9,14,19,..........,104.

(2) If the third term of A.P. is 12, sixth term is 42, and then finds T_{26}.

(d) Answer any one from following two questions :   **5**

(1) Find the sum of all natural numbers between 200 and 400 which are divisible by 7.

(2) The sum of three consecutive terms of an A.P. is 15 and the sum of their squares of these terms are 83. Find the terms.