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DM-003-003208

DM-003-003208   Seat No. _____

B. C. A. (Sem. II) (CBCS) Examination
March - 2022
CS-10 : Mathematics & Statistics Foundation of Comp. Sci.
(Old Course)

Faculty Code : 003
Subject Code : 003208

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

Instruction : All questions are compulsory.

1 Answer the following questions in brief :   **20**

(1) Empty set is denoted by _____.

(2) A square matrix A is said to be symmetric matrix if $A^T =$ _____ .

(3) Define subset of a set.

(4) Define equal set.

(5) Define power set.

(6) Define Unit matrix.

(7) If given sequence is 2, 4, 6, 8, 10, ... then 17th term is _____

(8) The distance between two points (2, 3) and (5, 7) is _____

(9) If sequence is 2, 5, 8, 11, ... then 30th term is _____

(10) A matrix is a _____ array of numbers.

(11) If $N = 65$ and $\Sigma fx = 362$ then arithmetic mean $\overline{X} =$ _____ .

(12) If sequence 3, 6, 12, 24, 48, ... then 15th term is _____

(13) The range of data 3, 5, –5, –8, 7, 12, 9, –12, 9, 1 is _____

(14) If the number of columns of matrix A is not equal to the number of rows of matrix B then Multiplication AB is possible ?

(15) Define Range.

(16) Define Median.

(17) The distance between two points $A(0,0)$ and $B(4,3)$ is _____

(18) If the number of rows and columns are equal, then the matrix is called _____ matrix.

(19) Define inverse of matrix.

(20) Define symmetric matrix.

2 (a) Attempt any three from following six questions ;   **6**

    (1) Find the area of triangle whose vertices are $P(2,3)$, $Q(4,3)$ and $R(3,2)$.

    (2) Define Adjoint matrix.

    (3) Draw a Venn diagram to verify. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

    (4) If distance between the points $P(-8,2)$ and $Q(k,-4)$ is 10, find k ?

    (5) Define intersection of two sets with example.

    (6) List the properties of inverse of matrix.

(b) Attempt any three from following six questions :   **9**

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

    (2) If $A = \{1,5,3\}$, $B = \{5,3\}$, $C = \{1,5,10\}$, $D = \{3,8\}$ then prove that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$

    (3) Explain De Morgan's law with proof.

    (4) 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

    (5) Find the ratio in which the point $C(3,6)$ divides the join of points $A(2,4)$ and $B(4,8)$.

    (6) Show that the points $(1,5)$, $(3,9)$ and $(5,8)$ are the vertices of right angle triangle.

(c) Attempt any two from the following five questions : **10**

(1) Find the inverse of the matrix

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

(2) In a group of 26 people, 8 take tea but not coffee and 16 take tea. How many take coffee but not tea ?

(3) Obtain equation of line passing through two points. (x_1, y_1) and (x_2, y_2).

(4) For the sets A, B and C prove that
$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

(5) if the 4$^{\text{th}}$ term of a geometric progression is 54 and its 5$^{\text{th}}$ term is 162. Then find the sum of its first 9 terms.

3 (a) Attempt any three from the following six questions : **6**

(1) Define sequence and series.

(2) Define Arithmetic progression.

(3) Define inverse of matrix

(4) Define standard deviation.

(5) Define equivalent set with example.

(6) If a, b, c are in arithmetic progression then prove that $b+c$, $c+a$, $a+b$ are also in arithmetic progression.

(b) Attempt any three from following six questions : **9**

(1) If $A = \{1, 2, 3, 4, 5\}$, $B = \{2, 3, 4\}$ and $C = \{4, 5, 6\}$ then show that $A - (B \cup C) = (A - B) \cap (A - C)$

(2) State and prove associative properties of set theory.

(3) Explain Range and quartile.

(4) Find the sum of n terms geometric progression for the following series :

$S_n = 0.7 + 0.77 + 0.777 + \ldots\ldots + $ up to n terms.

(5) Explain diagonal matrix and Null matrix.

(6) Obtain the mean for the following frequency distribution.

$X :$	1	2	3	4	5	6	7	8	9	10
$F :$	85	70	10	500	80	42	250	40	75	36

(c) Attempt any two from following five questions :   **10**

(1) The line segment joining the pair of points $A(2, -4)$ and $B(-3, 6)$ is divided by y axis. Find ratio and coordinates on y axis.

(2) In $n(U) = 1000$, $n(A) = 300$, $n(B) = 400$, $n(A \cap B) = 200$. Find $n(A' \cup B')$.

(3) The sum of three consecutive terms of an arithmetic progression is 18 and their product is 192. Find the three terms.

(4) Find the adjoint the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & -1 & 3 \\ 4 & 2 & 0 \end{bmatrix}$

(5) Calculate the mean and standard deviation for the following table :

Age in years	40-50	50-60	60-70	70-80	80-90	90-100
No. of members	3	61	132	153	140	51