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

   (1) How many elements in 3×3 determinants ?

   (2) Find the value of $\begin{vmatrix} 3 & 1 \\ -1 & 1 \end{vmatrix}$.

   (3) Define : Determinant.

   (4) Determinants must be _____.
        (Square / Rectangle)

   (b) Attempt any one :   2

   (1) If $\begin{vmatrix} 3x & 7 \\ -2 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$ then find x.

   (2) The value of $\begin{vmatrix} 2 & 1 & 2 \\ 1 & 2 & 1 \\ 3 & 1 & 1 \end{vmatrix}$.

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(c) Attempt any one :

(1) Find the value of x, if $\begin{vmatrix} 4 & 5 & -7 \\ -2 & x & 6 \\ 1 & x & 1 \end{vmatrix} = 43.$

(2) Prove that $\begin{vmatrix} 1 & a & a^2+d \\ 1 & b & b^2+d \\ 1 & c & c^2+d \end{vmatrix} = (a-b)(b-c)(c-a).$

(d) Attempt any one :

(1) Solve for x, y and z by using Crammer's method :

$$2x + 3y + z = 9, \quad x + 2y + 3z = 8, \quad 3x + y + 2z = 7$$

(2) Write the rules of determinants.

2 (a) Answer the following questions in short :

(1) Define : Null matrix.

(2) Define : Square matrix

(3) Define : Singular matrix

(4) Define : Lower triangular matrix.

(b) Attempt any one :

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

(2) Define : Addition of matrix with example.

(c) Attempt any one : 3

(1) If $A = \begin{bmatrix} -1 & 2 & -3 \\ 4 & 3 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 & 4 \\ 2 & -1 & 3 \end{bmatrix}$, find $(A+B)^T$.

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

(d) Attempt any one : 5

(1) For the matrix $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 6 \\ -3 & 2 \end{bmatrix}$ prove

that $(AB)^{-1} = B^{-1}A^{-1}$.

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

Hence find A^{-1}.

3 (a) Answer the following questions in short : 4

(1) Write the distance formula for two points.

(2) Define : Area of triangle.

(3) Define : Intersection of two sets.

(4) Write two properties of union of sets.

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(b) Attempt any one :

(1) If $A = \{a, b\}$ and $B = \{1, 2, 3\}$ then find $A \times B$.

(2) Find distance between two points $(-1, 4)$ and $(2, 8)$.

(c) Attempt any one :

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

(2) Prove that $(A \cup B) \cup C = A \cup (B \cup C)$.

(d) Attempt any one :

(1) If $A = \left\{ x \in Z / x^3 = x \right\}$, $B = \left\{ x \in Z / x^2 - x = 0 \right\}$ and $C = \{1, 2\}$. Then prove that $A \times (B - C) = (A \times B) - (A \times C)$

(2) Find the area of triangle whose vertices are $A(x, y - z)$, $B(-x, z)$, $C(x, y + z)$.

(a) Answer the following questions in short :

(1) Define : Mean

(2) The second quartile is also known as _____.
(Median, Mode)

(3) Find the range of the data :
110, 108, 85, 50, 60, 87

(4) "Root mean square deviations from mean" is known as _____.
(Standard deviation / Quartile deviation)

(b) Attempt any one :

(1) Find the median of the following data :

35, 10, 28, 8, 24, 5, 20, 19, 12, 30, 39

(2) Find mode of the following data :

3, 5, 23, 14, 11, 22, 33, 23, 25, 23, 15, 16

2

(c) Attempt any one :

(1) Find the mode from the following frequency distribution :

Class	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50
Frequency	25	29	32	39	27	18	6	2

(2) Find the range and coefficient of range for the following data :

x :	15	20	25	30	35	40	45
f :	12	16	18	20	22	23	25

3

(d) Attempt any one :

(1) Calculate the quartile deviation and coefficient of quartile deviation for the following data :

35, 10, 28, 8, 24, 5, 20, 19, 12, 30

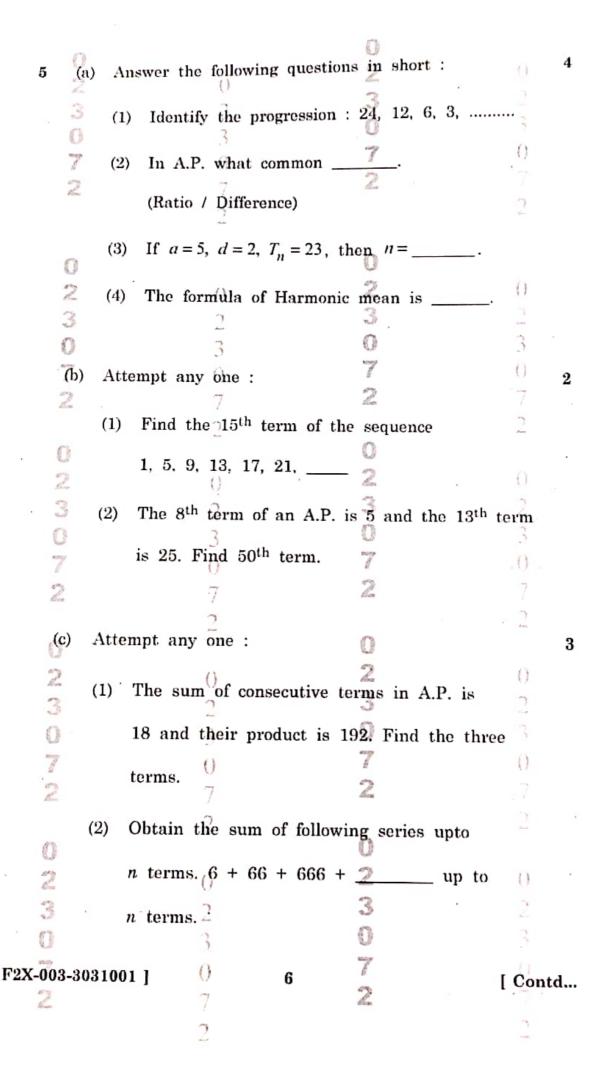(2) Calculate the mean and standard deviation for the following data :

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40
Frequency	7	11	12	19	16	7	5	2

5

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

(1) Identify the progression : 24, 12, 6, 3, ...

(2) In A.P. what common _____.

(Ratio / Difference)

(3) If $a = 5$, $d = 2$, $T_n = 23$, then $n =$ _____.

(4) The formula of Harmonic mean is _____.

(b) Attempt any one : **2**

(1) Find the 15th term of the sequence

1, 5, 9, 13, 17, 21, _____

(2) The 8th term of an A.P. is 5 and the 13th term

is 25. Find 50th term.

(c) Attempt any one : **3**

(1) The sum of consecutive terms in A.P. is

18 and their product is 192. Find the three

terms.

(2) Obtain the sum of following series upto

n terms. 6 + 66 + 666 + _____ up to

n terms.

(d) Attempt any one :

(1) The Arithmetic Mean and Geometric Mean of two real numbers are 6.5 and 6 respectively. Find the two numbers.

(2) For any two real quantities prove that

(i) $AM \times HM = (GM)^2$

(ii) $AM \geq GM \geq HM$.

___