

M. Marks: 60

Time: 3Hours

Note: Section A is compulsory. Attempt any 4 questions from section B.
Section – A
(2 marks each)

1. (i) Find $A - B$, given that $A = \{3, 6, 12, 15, 18, 21\}$ and $B = \{4, 8, 12, 16, 20\}$.
- (ii) Define bijective function and give one example.
- (iii) Prove that $A - (B \cup C) = (A - B) \cap (A - C)$.
- (iv) Using Venn diagram, define disjoint sets.
- (v) How many terms are there in binomial expression of $[(1 - 2y)^2]^7$.
- (vi) $P(n)$: “ $n(n+2)$ is multiple of 5”, is a statement. Is this statement true for $P(4)$?
- (vii) Find the values of x, y, z , if $\begin{bmatrix} x-3 & 3x-z \\ x+y+2 & x+y+z \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 5 & 6 \end{bmatrix}$.
- (viii) Write the matrix with elements $a_{ij} = 2i + j$, $i, j = 1, 2, 3$.
- (ix) Give two merits and demerits of median.
- (x) Find the mode of the data 50, 73, 40, 44, 76, 40, 65, 35 and 40,

Section – B
(10 marks each)

2. Check if relation R in the set N of natural numbers, defined as $R = \{(x, y) : y = x + 5 \text{ and } x < 4\}$, is reflexive, symmetric and transitive.
3. (a) Let $A = \{p, q, r, s\}$, $B = \{p, q, r\}$ and $C = \{q, s\}$. Find all sets X such that
(i) $X \subset B$ and $X \subset C$ (ii) $X \subset A$ and $X \not\subset B$.
- (b) Show that the function $f : \mathbb{N} \rightarrow \mathbb{N}$ given by $f(x) = 2x$, is one-one.
4. Give the definition of the following terms:
(i) Partitioning of set (ii) Equivalent sets (iii) Proper subset (iv) Universal set
5. (a) Use the method of induction, prove that $4^n - 3n - 1, n \in N$ is divisible by 9.
(b) Find a , if 17^{th} and 18^{th} terms in the expansion of $(2 + a)^{50}$ are equal.

6. (a) Show that $\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} = \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$.

(b) Verify $(AB)^{-1} = B^{-1}A^{-1}$ for the matrix A and B , where $A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix}$.

7. (a) Form a frequency table for the variable values: 20, 22, 32, 20, 22, 29, 23, 27, 28, 22, 23, 32, 28, 23, 29, 29, 20, 32, 29, 23, 27, 32, 27, 23, 29, 22, 24, 26, 23, 28.
- (b) Find the mean of the following distribution

Class	0 – 7	7 – 14	14 – 21	21 – 28	28 – 35	35 – 42	42 – 49
Frequency	19	25	36	72	51	43	28