CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: MATHEMATICS

Chapter Name : Relations & Functions (Chap : 1)

Total : 14 Marks (expected) [MCQ(1)-2 Mark, VSA-(2)-4 Marks, SA-(1)-3 Marks, LA(1)-5 Marks]

Level - 1 & 2 (Higher Order)

Section - A

MCQ Type :

1. Let A = {1, 2}, then number of reflexive relations on A is

Ⓐ 2 Ⓑ 4 Ⓒ 0 Ⓓ 8

(Hints : if n(A) = x then number of reflexive relation is 2^{x^2-x})

2. For real x, let $f(x) = x^3 + 6x + 1$. Then,

Ⓐ f is 1–1 and not onto on R Ⓑ f is onto on R but not 1–1

Ⓒ f is 1 – 1 & onto on R Ⓓ f is neither on-one nor onto on R

(Hints : 1 – 1 & onto function)

3. If A = {1, 2, 3} and I_A be the identity relation on A, then

Ⓐ $(1, 2) \in I_A$ Ⓑ $(2, 3) \in I_A$ Ⓒ $(1, 3) \in I_A$ Ⓓ $(2, 2) \in I_A$

(Hints : Identity function)

4. Let the function $f : R \to r$ be defined by, $f(x) = x^2$, find $f^{-1}(25)$

Ⓐ 5 Ⓑ $\sqrt{5}$ Ⓒ – 5 Ⓓ {–5, 5}

(Hints : Definition of $f^{-1}(x)$)

5. The mapping f is invertible if f is

Ⓐ injective Ⓑ Surjective Ⓒ Bijective Ⓓ None of these

(Hints : Definition of f^{-1})

6. The relation "congruent modulo" is

Ⓐ reflexive relation Ⓑ a symmetric relation Ⓒ a transitive relation Ⓓ all of these

(Hints : Equivalence relaion)

7. Let $A \neq \phi$ and $R \subseteq AXA$ and R is antisymmetric relation. If $(-1, x) \in R$ & $(x, -1) \in R$ then the value of x is

Ⓐ –1 Ⓑ 1 Ⓒ 0 Ⓓ ϕ

(Hints : Definition of antisymmetric relation)

Section - B

very short answer (VSA) :

1. A function $f : A \to B$ defined by $f(x) = 2x$ is both one-one and onto. If A = {1, 2, 3, 4}, then find the set B.

(Hints : find range using f(x) = 2x)

2. How many equivalence relations on the set {1, 2, 3} containing (1, 2) and (2, 1) are there in all? Justify your answer.

(Hints : Equivalence relation)

3. An equivalence relation R in A divides it into equivalence classes A_1, A_2, A_3. What is the value of $A_1 \cup A_2 \cup A_3$ and $A_1 \cap A_2 \cap A_3$?

(Hints : Equivalence relation)

4. Show that modulus function is not a bijective function.

(Hints : Bijective function)

5. In what condition f(x) = $\frac{ax+b}{cx+d}$ always represents one-one function ?

6. Prove that f : R $\rightarrow$ R defined by, f(x) = sin x $\forall$ x$\in$R is not bijective.

7. Prove that f : [–1, 1] $\longrightarrow$ [–1, 1] is neither one-one nor onto. where f(x) = |x|

Section - C

Short Answer (SA) Type Question :

1. Check whether the relation R in the set Z of integers defined as R = {(a, b) : a + b is 'divisible by 2'} is reflexive, symmetric or transitive. Write the equivalence class containing O i.e [0] .

(Hints : Find the set of all those elements of z which are related to 0 i.e [0] = {b$\in$z = (0, b) $\in$R})

2. Let R be the relation on set of real numbers R defined as {(x, y) : x – y + $\sqrt{3}$ is an irrational number x, y $\in$ R}. Verify whether R is reflexive, symmetric or transitive.

3. Show that the function f : N – N, where N is a set of natural numbers, given by f(n) = $\begin{cases} n-1, & n = \text{even} \\ n+1, & n = \text{odd} \end{cases}$ is a bijection.

(Hints : bijective function)

4. If $e^x + e^{f(x)} = e$ then find the domain and range of f(x).

(Hints : domain and range)

5. Let f(x) = x|x| and g(x) = $\sqrt{|x|}$ then the number of elements in the set {x$\in$R : f(x) = g(x)} is equal to k.

   Find the value of k.

(Hints : Equal function)

6. Let R be a relation on N defined by R = {(x, y) : x + 2y = 8}. the range of R is {1, λ, 3}, find he value of λ.

(Hints : Domain and Range)

7. A relation R is defined on the set of real numbers as

   R = {(x, y) : 1 + xy > 0 where x and y are real numbers }
   show that R is not transitive.

Section - D

Long Answer (LA) Type Question :

1. (i) Let f : R $\longrightarrow$ R defined by $f(x) = 2x^2$ 5x + 6. Find $f^{-1}(-2)$.

(Hints : Definition of f^{-1})

   (ii) Let g : R $\longrightarrow$ R defined by $g(x) = x^2 + 2$. Find $f^{-1}([-2, 2])$.

(Hints : Definition of f^{-1})

2. Let $f : W \longrightarrow W$ defined by $f(x) = \begin{cases} x+1, & \text{when } x \text{ is even} \\ x-1, & \text{when } x \text{ is odd} \end{cases}$

Show that f is bijective. And show hat $f^{-1} = f$.

(Hints : bijective function)

3. If $f : R^+ \longrightarrow R^+$ is a polynomial function satisfying the functional equation $f(f(x)) = 6x - f(x)$, then $f(17) = ?$

(Hints : Composite function)

4. If $f : R \longrightarrow R$ defined by $f(x) = 2x + 1$. Find $g : R \longrightarrow R$ such that $(gof)(x) = 10x + 10$.

(Hints : Composite function)

5. Let, $A = \{1, 2, 3\}$ be a given set. Define a relation on A which is

(i) neither symmetric nor antisymmetric on A.
(ii) symmetric but not antisymmetric on A.
(iii) both symmetric and antisymmetric.

(Hints : Concep of symmetric and antisymmetric relation)

6. Let, $A = \{1, 2, 3\}$, $B = \{a, b, c, d\}$ calculate the number of

(i) one-one function.
(ii) onto function.

(Hints : $4p_3$, $|A| < B \Rightarrow 0$)

7. Let $A = \{1, -1, 0\}$ Calculate the number of

(i) reflexive relation on A
(ii) Symmetric relation on A
(iii) Antisymmetric relation A

(Hints : (i) 2^{n^2-n} (ii) $2\frac{n(n+1)}{2}$ (iii) $2^n.3\frac{n(n-1)}{2}$ **)**

Section - A

1. Ⓑ
2. Ⓒ
3. Ⓓ
4. Ⓓ
5. Ⓒ
6. Ⓓ
7. Ⓐ

Section - B

1. {2, 4, 6, 8}
2. 2
3. Λ, ϕ
5. $ad - bc \neq 0$

Section - C

4. $(-\infty, 1), (-\infty, 1)$
5. $k = 2$
6. $\lambda = 1$

Section - D

1. (i) ϕ, (ii) 0.
2.
3. –51, 34
4. $g(x) = 5x + 5$
6. (i) 24 (ii) 0
7. (i) 64 (ii) 64 (iii) 216