



RELATIONS AND FUNCTIONS -MCQ

Class 12 - Mathematics

Time Allowed: 1 hour and 30 minutes

Maximum Marks: 40

1. Let S be the set of all real numbers and let R be a relation on S, defined by $a R b \Leftrightarrow |a - b| < 1$. Then, R is [1]
 - a) Reflexive and symmetric but not transitive
 - b) Reflexive and transitive but not symmetric
 - c) Symmetric and transitive but not reflexive
 - d) An equivalence relation
2. The relation R in the set of natural numbers N defined as $R = \{(x, y) : x > y\}$ is [1]
 - a) reflexive, transitive but not symmetric
 - b) transitive but neither reflexive nor symmetric
 - c) reflexive, symmetric but not transitive
 - d) an equivalence relation
3. A relation R in set $A = \{1, 2, 3\}$ is defined as $R = \{(1, 1), (1, 2), (2, 2), (3, 3)\}$. Which of the following ordered pair in R shall be removed to make it an equivalence relation in A? [1]
 - a) (1, 1)
 - b) (3, 3)
 - c) (1, 2)
 - d) (2, 2)
4. Which of the following is not an equivalence relation on I, the set of integers: x, y [1]
 - a) $x R y, x + y$ is an even integer
 - b) $x R y, x = y$
 - c) $x R y, x \leq y$
 - d) $x R y, x - y$ is an even integer
5. Which of the following is not an equivalence relation on Z? [1]
 - a) $a R b \Leftrightarrow a - b$ is an even integer
 - b) $a R b \Leftrightarrow a + b$ is an even integer
 - c) $a R b \Leftrightarrow a < b$
 - d) $a R b \Leftrightarrow a = b$
6. Let R be a relation on the set N of natural numbers defined by $n R m$ if n divides m. Then R is [1]
 - a) Transitive and symmetric
 - b) Reflexive and symmetric
 - c) Reflexive, transitive but not symmetric
 - d) Equivalence
7. Which of the following functions from Z into Z are bijections? [1]
 - a) $f(x) = x^3$
 - b) $f(x) = 2x + 1$
 - c) $f(x) = x + 2$
 - d) $f(x) = x^2 + 1$
8. The function $f : R \rightarrow R$ defined by $f(x) = x^2 + x$ is [1]
 - a) bijective
 - b) many-one
 - c) onto
 - d) one-one
9. Let $f : R \rightarrow R$ be given by $f(x) = [x]^2 + [x + 1] - 3$, where $[x]$ denotes the greatest integer less than or equal to x. [1]

24. **Assertion (A):** The relation R in the set $A = \{1, 2, 3, 4, 5, 6\}$ defined as $R = \{(x, y) : y \text{ is divisible by } x\}$ is not an equivalence relation. [1]

Reason (R): The relation R will be an equivalence relation, if it is reflexive, symmetric and transitive.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

25. **Assertion (A):** The function $f : \mathbb{R}^* \rightarrow \mathbb{R}^*$ defined by $f(x) = \frac{1}{x}$ is one-one and onto, where \mathbb{R}^* is the set of all non-zero real numbers. [1]

Reason (R): The function $g : \mathbb{N} \rightarrow \mathbb{R}^*$ defined by $f(x) = \frac{1}{x}$ is one-one and onto.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

26. **Assertion (A):** If $A = \{0, 1\}$ and \mathbb{N} be the set of natural numbers. Then, the mapping $f : \mathbb{N} \rightarrow A$ defined by $f(2n - 1) = 0, f(2n) = 1, \forall n \in \mathbb{N}$, is onto. [1]

Reason (R): Range = Codomain

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

27. **Assertion (A):** The possible number of reflexive relations of a set A whose $n(A) = 4$ is 2^{12} . [1]

Reason (R): Number of reflexive relation on a set contain n elements is 2^{n^2-n} .

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

28. **Assertion (A):** The relation R in the set $A = \{1, 2, 3, 4\}$ defined as $R = \{(x, y) : y \text{ is divisible by } x\}$ is an equivalence relation. [1]

Reason (R): A relation R on the set A is equivalence if it is reflexive, symmetric and transitive.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

29. **Assertion (A):** Let $A = \{2, 4, 6\}$ and $B = \{3, 5, 7, 9\}$ and defined a function $f = \{(2, 3), (4, 5), (6, 7)\}$ from A to B. Then, f is not onto. [1]

Reason (R): A function $f : A \rightarrow B$ is said to be onto, if every element of B is the image of some elements of A under f.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

30. **Assertion (A):** Every function is invertible. [1]

Reason (R): Only bijective functions are invertible.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false. d) A is false but R is true.

31. **State whether the given statement is True or False:** **[10]**
- (a) Consider the set $A = \{1, 2, 3\}$ and the relation $R = \{(1, 2), (1, 3)\}$. R is a transitive relation. **[1]**
- (b) The union of all equivalence classes gives the whole set. **[1]**
- (c) Let $A = \{0, 1\}$ and N be the set of natural numbers. Then the mapping $f : N \rightarrow A$ defined by $f(x) = \begin{cases} 0, & \text{when } x = 2n - 1 \\ 1, & \text{when } x = 2n \end{cases}, \forall n \in N$, is onto. **[1]**
- (d) f is one-one iff $f(x_1) = f(x_2) \Rightarrow x_1 = x_2$ for all $x_1, x_2 \in X$ **[1]**
- (e) Let A be a finite set. Then, each injective function from A into itself is not surjective. **[1]**
- (f) Let $R = \{(3, 1), (1, 3), (3, 3)\}$ be a relation defined on the set $A = \{1, 2, 3\}$. Then R is symmetric, transitive but not reflexive. **[1]**
- (g) A function $f : X \rightarrow Y$ is said to be onto function, if every element of Y is the image of some element of X under f. **[1]**
- (h) The relation R on the set $A = \{1, 2, 3\}$ defined as $R = \{(1, 1), (1, 2), (2, 1), (3, 3)\}$ is reflexive, symmetric and transitive. **[1]**
- (i) A function which is not one-one, is known as many-one function. **[1]**
- (j) Two equivalence classes are either disjoint or identical. **[1]**