PARISHRAM 2025

Mathematics

DPP: 5

Relations and Functions

Q1 $A = \{1, 2, 3, 4\}, B = \{1, 2, 3, 4, 5, 6\}$ are two sets, and function $f : A \to B$ is defined by $f(x) = x + 2 \forall x \in A$, then the function f is
(A) Bijective (B) Onto
(C) One-one (D) Many One

Q2 Let ***A*** = {***a***, ***b***, ***c***} and let ***R*** = {(***a***, ***a***), (b, ***b***), (***a***, ***b***), (***b,*** a)}. Then, ***R*** is
(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

Q3 Let ***S*** be the set of all straight lines in a plane. Let ***R*** be a relation on ***S*** defined by ***a R b*** $\Leftrightarrow a \perp b$. Then, ***R*** is
(A) reflexive but neither symmetric nor transitive
(B) symmetric but neither reflexive nor transitive
(C) transitive but neither reflexive nor symmetry
(D) an equivalence relation

Q4 **Assertion (A):** The relation ***f*** : {1, 2, 3, 4} $\to$ {***x, y, z, p***} such that ***f*** = {(1, ***x***), (2, ***y***), (3, ***z***)} is a bijective function
Reason (R): The function ***f*** : {1, 2, 3} $\to$ {***x, y, z, p***} such that ***f*** = {(1, ***x***), (2, ***y***), (3, ***z***)} is one-one.
(A) Both A and R are correct and R is the correct explanation of A
(B) Both A and R are correct but R is NOT the correct explanation of A
(C) A is correct but R is not correct
(D) A is not correct but R is correct

Q5 Let ***S*** be the set of all straight lines in a plane. Let ***R*** be a relation on ***S*** defined by ***a R b*** $\Leftrightarrow$ ***a*** $\|$ ***b***. Then, ***R*** is
(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

Q6 The function $f : [0, \infty) \to R$ given by $f\left(x\right) = \frac{x}{x+1}$ is:
(A) ***f*** is both one-one and onto
(B) ***f*** is one-one but not onto
(C) ***f*** is onto but not one-one
(D) neither one-one nor onto

Q7 Let ***R*** be a relation on the set ***N*** of all natural numbers, defined by ***a R b*** $\Leftrightarrow$ ***a*** is a factor of ***b***. Then, ***R*** is
(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

Q8 Let ***S*** be the set of all real numbers and let ***R*** be a relation on ***S***, defined by ***a R b*** $\Leftrightarrow$ (1 + ***ab***) > 0. Then, ***R*** is
(A) reflexive and symmetric but not transitive
(B) reflexive and transitive but not symmetric
(C) symmetric and transitive but not reflexive
(D) none of these

Q9 Let ***S*** be the set of all real numbers and let ***R*** be a relation on ***S*** defined by $a\,R\,b \Leftrightarrow a^2 + b^2 = 1$. Then, ***R*** is
(A) symmetric but neither reflexive nor transitive
(B) reflexive but neither symmetric nor transitive
(C) transitive but neither reflexive nor symmetric
(D) none of these

Q10 Let $f : R \to R$ be a function defined by $f(x) = \frac{x-m}{x-n}$, where $m \neq n$. Then
(A) f is one-one onto
(B) f is one-one into
(C) f is many one onto
(D) f is many one into

Q11 Show that a function $f : \mathbb{R} \to \mathbb{R}$ defined as $f\left(x\right) = \frac{5x-3}{4}$ is both one-one and onto.

Q12 Show that the function ***f*** in $A = R - \left\{\frac{2}{3}\right\}$ defined as $f\left(x\right) = \frac{4x+3}{6x-4}$ is one-one and onto.

Q13 Let ***S*** be the set of all sets and let $R = \{(A,\ B) :\ A \subset B)\}$, i.e., ***A*** is a proper subset of ***B***. Show that ***R*** is (i) transitive (ii) not reflexive (iii) not symmetric.

Q14 Let ***A*** be the set of all points in a plane and let ***O*** be the origin. Show that the relation ***R*** = {(***P***, ***Q***): ***P***, ***Q*** ∈ ***A*** and ***OP*** = ***OQ***} is an equivalence relation.

Q15 Let ***A*** = {1, 2, 3} and ***R*** = {(1, 1), (2, 2), (3, 3), (1, 2) (2, 3)}.
Show that ***R*** is reflexive but neither symmetric nor transitive.

Answer Key

Q1	(C)
Q2	(C)
Q3	(B)
Q4	(D)
Q5	(D)
Q6	(B)
Q7	(B)
Q8	(A)
Q9	(A)
Q10	(B)
Q11	Check the solution
Q12	Check the solution
Q13	Check the solution
Q14	Check the solution
Q15	Check the solution