# RELATIONS AND FUNCTIONS

**1.** Let $X$ be a family of sets and $R$ be a relation on $X$ defined by '$A$ is disjoint from $B$'. Then $R$ is

(A) Reflexive (B) Symmetric
(C) Anti-symmetric (D) Transitive

**2.** If $R$ is a relation from a set $A$ to a set $B$ and $S$ is a relation from $B$ to a set $C$, then the relation $SoR$

(A) Is from $A$ to $C$ (B) Is from $C$ to $A$
(C) Does not exist (D) None of these

**3.** If $R \subset A \times B$ and $S \subset B \times C$ be two relations, then $(SoR)^{-1} =$

(A) $S^{-1}oR^{-1}$ (B) $R^{-1}oS^{-1}$
(C) $SoR$ (D) $RoS$

**4.** If $R$ be a relation < from $A$ = {1,2, 3, 4} to $B$ = {1, 3, 5} *i.e.,* $(a,b) \in R \Leftrightarrow a < b$, then $RoR^{-1}$ is

(A) {(1, 3), (1, 5), (2, 3), (2, 5), (3, 5), (4, 5)}
(B) {(3, 1) (5, 1), (3, 2), (5, 2), (5, 3), (5, 4)}
(C) {(3, 3), (3, 5), (5, 3), (5, 5)}
(D) {(3, 3) (3, 4), (4, 5)}

**5.** A relation from $P$ to $Q$ is

(A) A universal set of $P \times Q$
(B) $P \times Q$
(C) An equivalent set of $P \times Q$
(D) A subset of $P \times Q$

**6.** Let $A$ = {$a$, $b$, $c$} and $B$ = {1, 2}. Consider a relation $R$ defined from set $A$ to set $B$. Then $R$ is equal to set

(A) $A$ (B) $B$
(C) $A \times B$ (D) $B \times A$

**7.** Let $n$(A) = $n$. Then the number of all relations on $A$ is

(A) $2^n$ (B) $2^{(n)!}$
(C) $2^{n^2}$ (D) None of these

**8.** If $R$ is a relation from a finite set $A$ having $m$ elements to a finite set $B$ having $n$ elements, then the number of relations from $A$ to $B$ is

(A) $2^{mn}$ (B) $2^{mn}-1$
(C) $2mn$ (D) $m^n$

**9.** Let $R$ be a reflexive relation on a finite set $A$ having $n$-elements, and let there be $m$ ordered pairs in $R$. Then

(A) $m \geq n$ (B) $m \leq n$
(C) $m = n$ (D) None of these

**10.** The relation $R$ defined on the set $A$ = {1, 2, 3, 4, 5} by $R = \{(x, y) : |x^2 - y^2| < 16\}$ is given by

(A) {(1, 1), (2, 1), (3, 1), (4, 1), (2, 3)}
(B) {(2, 2), (3, 2), (4, 2), (2, 4)}
(C) {(3, 3), (3, 4), (5, 4), (4, 3), (3, 1)}
(D) None of these

**11.** A relation $R$ is defined from {2, 3, 4, 5} to {3, 6, 7, 10} by $xRy \Leftrightarrow x$ is relatively prime to $y$. Then domain of $R$ is

(A) {2, 3, 5} (B) {3, 5}
(C) {2, 3, 4} (D) {2, 3, 4, 5}

**12.** Let $R$ be a relation on $N$ defined by $x + 2y = 8$. The domain of $R$ is

(A) {2, 4, 8} (B) {2, 4, 6, 8}
(C) {2, 4, 6} (D) {1, 2, 3, 4}

**13.** If $R = \{(x, y) | x, y \in Z, x^2 + y^2 \leq 4\}$ is a relation in $Z$, then domain of $R$ is

(A) {0, 1, 2} (B) {0, – 1, – 2}
(C) {– 2, – 1, 0, 1, 2} (D) None of these

**14.** $R$ is a relation from {11, 12, 13} to {8, 10, 12} defined by $y = x - 3$. Then $R^{-1}$ is

(A) {(8, 11), (10, 13)} (B) {(11, 18), (13, 10)}
(C) {(10, 13), (8, 11)} (D) None of these

**15.** Let $A$ = {1, 2, 3}, $B$ = {1, 3, 5}. If relation $R$ from $A$ to $B$ is given by $R$ ={(1, 3), (2, 5), (3, 3)}. Then $R^{-1}$ is

(A) {(3, 3), (3, 1), (5, 2)} (B) {(1, 3), (2, 5), (3, 3)}
(C) {(1, 3), (5, 2)} (D) None of these

**16.** Let $A$ = {1, 2, 3, 4} and let $R$= {(2, 2), (3, 3), (4, 4), (1, 2)} be a relation on $A$. Then $R$ is

(A) Reflexive (B) Symmetric
(C) Transitive (D) None of these

**17.** The void relation on a set $A$ is

(A) Reflexive

(B) Symmetric and transitive

(C) Reflexive and symmetric

(D) Reflexive and transitive

**18.** Let $R_1$ be a relation defined by

$R_1 = \{(a,b) \mid a \geq b, a, b \in R\}$. Then $R_1$ is

(A) An equivalence relation on $R$

(B) Reflexive, transitive but not symmetric

(C) Symmetric, Transitive but not reflexive

(D) Neither transitive not reflexive but symmetric

**19.** Which one of the following relations on $R$ is an equivalence relation

(A) $a R_1 b \Leftrightarrow |a| = |b|$ (B) $aR_2 b \Leftrightarrow a \geq b$

(C) $aR_3 b \Leftrightarrow a$ divides $b$ (D) $aR_4 b \Leftrightarrow a < b$

**20.** If $R$ is an equivalence relation on a set $A$, then $R^{-1}$ is

(A) Reflexive only

(B) Symmetric but not transitive

(C) Equivalence

(D) None of these

**21.** $R$ is a relation over the set of real numbers and it is given by $nm \geq 0$. Then $R$ is

(A) Symmetric and transitive

(B) Reflexive and symmetric

(C) A partial order relation

(D) An equivalence relation

**22.** In order that a relation $R$ defined on a non-empty set $A$ is an equivalence relation, it is sufficient, if $R$

(A) Is reflexive

(B) Is symmetric

(C) Is transitive

(D) Possesses all the above three properties

**23.** The relation "congruence modulo $m$" is

(A) Reflexive only

(B) Transitive only

(C) Symmetric only

(D) An equivalence relation

**24.** Solution set of $x \equiv 3 \pmod 7$, $p \in Z$, is given by

(A) $\{3\}$ (B) $\{7p-3 : p \in Z\}$

(C) $\{7p+3 : p \in Z\}$ (D) None of these

**25.** Let $R$ and $S$ be two equivalence relations on a set $A$. Then

(A) $R \cup S$ is an equivalence relation on $A$

(B) $R \cap S$ is an equivalence relation on $A$

(C) $R - S$ is an equivalence relation on $A$

(D) None of these

**26.** Let $R = \{(3,3), (6,6), (9,9), (12,12), (6,12), (3,9), (3,12), (3,6)\}$ be a relation on the set $A = \{3, 6, 9, 12\}$. The relation is

(A) An equivalence relation

(B) Reflexive and symmetric only

(C) Reflexive and transitive only

(D) Reflexive only

**27.** $x^2 = xy$ is a relation which is

(A) Symmetric (B) Reflexive

(C) Transitive (D) None of these

**28.** Let $R$ = {(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)} be a relation on the set $A$ = {1, 2, 3, 4}. The relation $R$ is

(A) Reflexive (B) Transitive

(C) Not symmetric (D) A function

**29.** The number of reflexive relations of a set with four elements is equal to

(A) $2^{16}$ (B) $2^{12}$

(C) $2^{8}$ (D) $2^{4}$

**30.** Let $S$ be the set of all real numbers. Then the relation $R = \{(a, b) : 1 + ab > 0\}$ on $S$ is

(A) Reflexive and symmetric but not transitive

(B) Reflexive and transitive but not symmetric

(C) Symmetric, transitive but not reflexive

(D) Reflexive, transitive and symmetric