## RELATIONS AND FUNCTIONS
## Multiple Choice Questions [MCQ ]

**1.** Let A = {1, 2, 3} and consider the relation R = {1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (2,1)}. Then R is
(a) an equivalence relation (b) reflexive and symmetric but not transitive
(c) reflexive and transitive but not symmetric (d) reflexive but neither symmetric nor transitive

**2.** Let A = {1, 2, 3} and consider the relation R = {1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1,3), (3 , 1)}. Then R is
(a) an equivalence relation (b) reflexive and symmetric but not transitive
(c) reflexive and transitive but not symmetric (d) reflexive but neither symmetric nor transitive

**3.** Let A = {1, 2, 3} and consider the relation R = {1, 1), (2, 2), (3, 3), (1, 2), (2, 1)}.Then R is
(a) reflexive and symmetric but not transitive (b) reflexive but neither symmetric nor transitive
(c) an equivalence relation (d) reflexive and transitive but not symmetric

**4.** Let A = {1, 2, 3} and consider the relation R = {(1, 1), (1, 2), (2, 1)}. Then R is
(a) reflexive and symmetric but not transitive (b) symmetric but neither reflexive nor transitive
(c) reflexive but neither symmetric nor transitive (d) reflexive and transitive but not symmetric

**5.** Let A = {1, 2, 3} and consider the relation R = {(1, 3)}. Then R is
(a) transitive (b) symmetric
(c) reflexive (d) none of these

**6.** Let A = {1, 2, 3} and consider the relation R = {1, 1), (2, 2), (3, 3)}.Then R is
(a) reflexive and symmetric but not transitive (b) reflexive but neither symmetric nor transitive
(c) reflexive and symmetric and transitive (d) reflexive and transitive but not symmetric

**7.** Let A = {1, 2, 3} and R = {(1, 1), (2, 3), (1, 2)} be a relation on A, then the minimum number of ordered pairs to be added in **R** to make **R** reflexive and transitive.
(a) 4 (b) 2
(c) 3 (d) 1

**8.** The maximum number of equivalence relations on the set {1 , 2, 3} is
(a) 6 (b) 4
(c) 3 (d) 5

**9.** Let R be a relation on the set N be defined by {(x, y) : x, y $\in$ N, 2x + y = 41}. Then, R is
(a) reflexive (b) symmetric
(c) transitive (d) none of these

**10.** Relation R in the set **Z** of all integers defined as R = {(x, y) : x – y is an even integer}is
(a) reflexive and transitive (b) symmetric and Transitive
(c) reflexive and symmetric (d) an equivalence relation

**11.** Let R be the relation on the set of all real numbers defined by a R b iff $|a - b| \leq 1$. Then, R is
(a) reflexive and transitive (b) symmetric and Transitive
(c) reflexive and symmetric (d) an equivalence relation

**12.** Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is sister of b. Then R is
(a) symmetric but not transitive (b) transitive but not symmetric
(c) both symmetric and transitive (d) neither symmetric nor transitive

**13.** Relation R in the set A = {1, 2, 3, 4, 5, 6, 7, 8} as R = {(x, y) : x divides y}is
(a) reflexive and symmetric but not transitive (b) reflexive and transitive but not symmetric
(c) reflexive but neither symmetric nor transitive (d) symmetric but neither reflexive nor transitive

**14.** Let L denote the set of all straight lines in a plane. Let a relation R be defined by $l_1$ R $l_2$ if and only if $l_1$ is perpendicular to $l_2$ ,$\forall$ $l_1$, $l_2$ $\in$ L. Then R is

(a) symmetric (b) reflexive

(c) transitive (d) reflexive and symmetric

**15.** If A = {a, b, c} then number of relations containing (a , b) and (a , c) which are reflexive and symmetric but not transitive is

(a) 4 (b) 3

(c) 2 (d) 1

**16.** The relation R in the set {1, 2, 3, ... , 13, 14} defined by R = {(x , y) : 3x – y = 0} is

(a) symmetric (b) reflexive

(c) transitive (d) none of these

**17.** The relation R in the set of natural numbers N defined by R = {(x , y) : x > y} is

(a) reflexive and symmetric but not transitive (b) transitive but neither reflexive nor symmetric

(c) reflexive but neither symmetric nor transitive (d) symmetric but neither reflexive nor transitive

**18.** A function f : X → Y is one-one (or injective), then which of the following is true?

(a) $\forall x_1, x_2 \in X, f(x_1) = f(x_2) \Rightarrow x_1 = x_2$. (b) $x_1 \neq x_2 \Rightarrow f(x_1) \neq f(x_2)$ .

(c) both (a) and (b) are true (d) none of these

**19.** A function f : X → Y is said to be onto (or surjective), then which of the following is true?

(a) if $\forall$ y$\in$ Y, $\exists$ some x $\in$X such that y = f (x) (b) range of f = Y

(c) both (a) and (b) are true (d) none of these

**20.** A function f : X → Y is said to be bijective , if f is

(a) one-one only (b) onto only

(c) one-one but not onto (d) one-one and onto

**21.** If a set A contains **m** elements and the set B contains **n** elements with n > m, then number of bijective functions from A to B will be:

(a) m × n (b) $m^n$

(c) $n^m$ (d) 0

**22.** Which of the following functions from I(Set of Integers) to itself is a bijection?

(a) $f(x) = x^3$ (b) f(x) = x + 2

(c) f (x) = 2x + 1 (d) $f(x) = x^2 + x$

**23.** Let X = {– 1, 0, 1}, Y = {0, 2} and a function f : X →Y defined by $y = 2x^4$, is

(a) one-one onto (b) one-one into

(c) many-one onto (d) many-one into

**24.** Let $f(x) = x^2 - 4x - 5$, then

(a) f is one-one on R (b) f is not one-one on R

(c) f is bijective on R (d) None of these

**25.** The function f : R → R given by $f(x) = x^2$, x $\in$R when R is the set of real numbers, is

(a) one-one and onto (b) onto but not one-one

(c) neither one-one nor onto (d) one-one but not onto

**26.** The signum function, f : R → R is given by $f(x) = \begin{cases} 1, \text{if } x > 0 \\ 0, \text{if } x = 0 \\ -1, \text{if } x < 0 \end{cases}$

(a) one-one (b) many-one

(c) onto (d) none of these

**27.** Let f : R → R be defined by $f(x) = \begin{cases} 3x, & \text{if } x \le 1 \\ x^2, & \text{if } 1 < x \le 3 \\ 2x, & \text{if } x > 3 \end{cases}$ , then f (– 1) + f (2) + f (4) is

(a) 9 (b) 3

(c) 4 (d) 8

**28.** The greatest integer function f : R → R be defined by f(x) = [x] is

(a) one-one and onto (b) onto but not one-one

(c) one-one but not onto (d) neither one-one nor onto

**29.** The function f : N → N, where N is the set of natural numbers is defined by

$$f(x) = \begin{cases} n^2, & \text{if } n \text{ is odd} \\ n^2 + 1, & \text{if } n \text{ is even} \end{cases}$$

(a) one-one and onto (b) neither one-one nor onto

(c) one-one but not onto (d) onto but not one-one

**30.** The total number of injective mappings from a set with m elements to a set with n elements, m ≤ n, is

(a) $n^m$ (b) $m^n$

(c) mn (d) $\frac{n!}{(n-m)!}$

**ANSWERS**

| Q. No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Answer | (d) | (c) | (c) | (b) | (a) | (c) | (c) | (d) | (d) | (d) |
| Q. No. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Answer | (c) | (b) | (b) | (a) | (d) | (d) | (b) | (c) | (c) | (d) |
| Q. No. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | (d) | (b) | (c) | (b) | (c) | (b) | (a) | (d) | (c) | (d) |