**Set Operations, Relations and Mappings**

**Type – 1**

**Choose the most appropriate option (a, b, c or d).**

Q 1. Let A and B be two sets such that A ∪ B = A. Then A ∩ B is equal to

(a) φ (b) B (c) A (d) none of these

Q 2. Let A and B be two sets. Then (A ∪ B)' ∪ (A' ∩ B) is equal to

(a) A' (b) A (c) B' (d) none of these

Q 3. Let U be the universal set and A ∪ B ∪ C ∩ u. Then

{(A-B) ∪(B - C) ∪ C-A)}'

is equal to

(a) A ∪ B ∪ C (b) A ∪ (B ∪ C) (c) A ∩ B ∩C (d) A ∩ (B ∪ C)

Q 4. If A and B are two sets then (A - B) ∪ (B - A) ∪ (A ∩ B) is equal to

(a) A ∪ B (b) A ∩ B (c) A (d) B'

Q 5. 20 teachers of a school either teach mathematics or physics. 12 of them teach mathematics while 4 teach both the subjects. Then the number of teachers teaching only physics is

(a) 12 (b) 8 (c) 16 (d) none of these

Q 6. Of the members of three athletic teams in a school, 21 are in the cricket team, 26 are in the hockey team and 29 are in the football team. Among them, 14 play hockey and cricket, 15 play hockey and football, and 12 play football and cricket. Eight play all the three games. The total number of members in the three athletic teams is

(a) 43 (b) 76 (c) 49 (d) none of these

Q 7. The relation "congruence modulo m " is

(a) reflexive only (b) transitive only (c) symmetric only (d) an equivalence relation

Q 8. R is a relation over the set of real numbers and it is given by mn ≥ 0. Then R is

(a) symmetric and transitive (b) reflexive and symmetric

(c) a partial-order relation (d) an equivalence relation

Q 9. R is a relation over the set of integers and it is given by (x, y) ∈ R ⇔ Ix - y I ≤ 1. Then K is

(a) reflexive and transitive (b) reflexive and symmetric

(c) symmetric and transitive (d) an equivalence relation

Q 10. Let r be a relation over the set N x N and it is defined by (a,b) r (c, d) => n + d = b + c. Then r is

(a) reflexive only (b) symmetric only

(c) transitive only (d) an equivalence relation

Q 11. Let A = {1,2,3}. The total number of distinct relations that can be defined

(a) 29 (b) 6 (c) 8 (d) none of these

Q 12. On the set A = {1, 2,3,- 4}, a relation is R - {(1, 3,), (4, 2), (2,4), (2, 3), (3,1)}. The relation R is

(a) a function (b) transitive (c) not symmetric (d) reflexive

Q 13. 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) reflexive only (b) reflexive and transitive only

(c) reflexive and symmetric only (d) an equivalence relation

Q 14. The range of the function f(x) = 7-x Px-3 is 

(a) {1,2,3} (b) {1,2,3,4,5,6} (c) {1,2,3,4} (d) {1,3}

Q 15. Let R = set of real numbers and Rc = set of real angles in radian measure. If f: Rc → R be a mapping such that f(x) = sin x, x e Rc, then f is

(a) one-one and into (b) one-one and onto (c) many-one and onto (d) many-one and into

Q 16. Let f : R → 'R such that f(x) = ,x ∈ R. Then f is

(a) injective (b) surjective (c) bijective (d) none of these

Q 17. f; R x R -> R such that f(x + iy) = +. Then f is

(a) many-one and into (b) one-one and onto (c) many-one and onto (d) one-one and into

Q 18. Let A = {x| - 1 x <} = B. If f: A -» B be bijective then a possible definition of f(x) is

(a) | x | (b) x |x| (c) sin πx (d) none of these

Q 19. Let A = {1, 2,3} and B = {a, b}. Which of the following subsets of A x B is a mapping from A to B?

(a) [(1,a), (3, b), (2, a), (2, b)} (b) {(1, b), (2, a), (3,a)}

(c) {(1, a),(2, b)} (d) none of these

**Type 2**

**Choose the correct options. One or more options may be correct.**

Q 20. Let R be the relation over the set of straight lines of a plane such that l1 R l2 ⇔ l1 ⊥ l2.Then, R is

(a) symmetric (b) reflexive (c) transitive (d) an equivalence relation

Q 21. Let R be the relation over the set of integers such that m R n if and only if m is a multiple of n. Then R is

(a) reflexive (b) symmetric (c) transitive (d) an equivalence relation

Q 22. Let A = {1, 2,3, 4} and R be a relation in A given by

R = {(1,1), (2, 2), (3, 3), (4, 4), (1, 2), (2,1), (3,1), (1, 3)}. Then R is

(a) reflexive (b) symmetric (c) transitive (d) an equivalence relation

Q 23. Let f: R → R be a mapping such that f(x) = . Then f is

(a) many–one (b) one–one (c) into (d) onto

Q 24. LetA = {1,2,3} and B = {a,b,c}. If f is a function from A to S and g is a one-one function from A to B then the maximum number of definitions

(a) f is 9 (b) g is 9 (c) f is 27 (d) g is 6

**Note** For more problems on mapping **(function),** see the chapter on functions in the calculus part of this book.

**Answers**

1b 2a 3c 4a 5b 6a 7d 8d 9b 10d

11a 12c 13a 14a 15d 16d 17a 18d 19b 20a

21ac 22ab 23ac 24cd