MATHEMATICS

SET THEORY AND RELATIONS & FUNCTION

1. Represent the following in the roster form
   i) Set of months of a year having 30 days
   ii) Set of integers between – 6 & 6
   iii) Set of vowels of English alphabets
   iv) {x ∈ N ; $x^2 < 36$}
2. Represent the following in
   set builder formi) {-1, 1}
   ii) {1, 4, 9, 16, 25, ... 121}
   iii) {1,2 ,4 ,8 , ...}
   iv)Set of odd natural numbers
3. State whether the following are true
   or false
   i) {1, 2} = {1, 1, 2, 2, 2}
   ii) {2} = {1, 2, 3}
   iii) Ø is a subset of every set
4. Write the following intervals in set
   builder form
   i) (-4, 0)
   ii) [-6, 2)
   iii) (9, 12)
   iv) [-2, 3]
5. A & B are two sets such that n(A) = 3 and n(B) = 6. Find n($A \times B$).
6. Taking the set of natural numbers as the universal set, write the
   complement of thefollowing sets
   i) {x : x is an even natural number}
   ii) {x : x is a prime number}
   iii) {x : x is a perfect square
   number}
   iv) {x : 2x + 5 = 9}
9. If U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
   A = {2, 4, 6, 8}
   B = {2, 3, 5, 7, 9}

Verify

i) (A U B)' = $A' \cap B'$

ii) (A ∩ B)' = A' U B'

10. Given that A = {1, 2, 3, ..., 100} write the subset B of A whose elements are representedby x + 2, where x ∈ A

12. If A = {4^n – 3n – 1, n ∈ N}

B = {9(n – 1), n ∈ N} show that A ⊂ B

13. Prove that if A U B = C & A ∩ B = then A = C – B

14. Two finite sets have m & n elements. The total number of subsets of the first set is 56more than the total number of Subsets of the second set. Find values of m & n.

15. Using Venn diagram show the set

i) A' ∩ (B U C)

ii) (A – B) U (B – A)

16If A = {1, 3, 5}, B = {2, 4} find n (A X B)

a) 6 b) 8 c) 10 d) 12

iii)n (B X A)

a) 6 b) 8 c) 10 d) 12

16. Given relation R on Z as R = {(a, b) Z X Z : $a^2 + b^2 \leq 4$}.

The domain of R is

i) {0, 2, 4} ii) {1, ±1, ±2} iii) {1, 2, 3, 4}

iv) {0, 1, 2, 3, 4}

17. Let f(x) = x^2 – x

g(x) = 2x be functions defined on R, findi) (f + g) (0)

a) 0 b)1 c)2 d) 3

ii) (f – g) (-1)

a) 1 b) 4 c) 5 d) 6

iii) (f.g)(2)

a) 0 b)8 c)6 d)None

18. Let R be a relation from N to N defined by R = {(a, b) : a, b ∈ N, $a = b^2$} Are the following true

ii)(a, a) ∈ R , ∀ a ∈ N

iii)(a, b) ∈ R ⇒ (b, a) ∈ R

iv) (a, b) ∈ R , (b, c) ∈ R ⇒ (a, c) ∈ R

20. If A X B = {a, 1), (a, 2), (a, 5), (b, 1), (b, 2), (b, 5)} find B X A

21. If A = {1, 2, 3}, B = {7, 9}. Let f = {(2, 9), (3, 7)}. Is 'f' a function from A to B? Why?

19. Let R be a relation defined on N as R = {(x, y) N X N : x + 2y = 39},

find the domain &range of R

20. Let A = {1, 2, 3}

    B = {3, 4}

    C = {4, 5, 6}

    find

    i) A X (B X C)

    ii) (A X B) (A X C)

21. Find domain of the functions: $f(x) = [x] + x$

22. Find range of the following functions

    i) $f(x) = |x - 3|$

    ii) $f(x) = 5 \sin 4x$

    iii) $f(x) = 5 - |x|$

    iv) $f(x) = 1 + 3 \cos 2x$

23. Let A = {a, b}; B= {c, d}. How many relations are possible from A to B

24. Find domain and range for the functions

    i) $f(x) = |x|$

    ii) $f(x) = \sin x \cos x$

    iii) $f(x) = \sec x$

25. Redefine the function given by $f(x) = |x - 1| + |1 + x|, -2 \leq x \leq 2$

26. Let A = {1, 2, 3, 4} & B = {1, 4, 9, 16, 25}. If R is a relation defined from A to B asR = {(x, y) : x A, y B & $y = x^2$}

    iv) Draw arrow diagram of R

    v) Find domain of R

    vi) Find range of R

    vii)Find co – domain of R

27. Is g = {{1, 1), (2, 3), (3, 5), (4, 7)} a function? Justify.

28. If A = {2, 4, 6, 9} & B = {4, 6, 18, 27, 54}

    Let R be a relation from A to B defined as R = {{a, b) : a < b & a is a factor of b}

    i) Find R

    ii) Find domain and range of R

30. Draw graph of functions $f(x) = |x - 2|$