CHAPTER – 1 – SET LANGUAGE

I. Answer in brief (2 marks)

1. Write the set of letters of the following words in Roster form (i) ASSESSMENT (ii) PRINCIPAL
2. List the set of letters of the following words in Roster form.

   (i) INDIA (ii) PARALLELOGRAM (iii) MISSISSIPPI (iv) CZECHOSLOVAKIA
3. Represent the following sets in Roster form.

   (i) A = The set of all even natural numbers less than 20.

   (ii) B = $\{y : y = \frac{1}{2n}, n \in \mathbb{N}, n \leq 5\}$.

   (iii) C = {x : x is perfect cube, $27 < x < 216$}

   (iv) D = $\{x : x \in \mathbb{Z}, -5 < x \leq 2\}$
4. Represent the following sets in descriptive form.

   (i) P ={ January, June, July}

   (ii) Q = {7, 11, 13, 17, 19, 23, 29}

   (iii) R = $\{x : x \in N, x < 5\}$

   (iv) S = {x : x is a consonant in English alphabets}
5. If A = {1, 2,3,4,5,7,9,11}, find n(A).
6. Write all the subsets of A = {a, b}.
7. Verify whether A={20, 22, 23, 24} and B={25, 30, 40, 45} are disjoint sets.
8. Find the number of subsets and the number of proper subsets of a set X={a, b, c, x, y, z}.
9. Find the cardinal number of the following sets.

   (i) M = {p, q, r, s, t, u}

   (ii) P = $\{x : x = 3n+2, n \in \mathbb{W}$ and $x < 15\}$

   (iii) Q = $\{y : y = \frac{4}{3n}, n \in \mathbb{N}$ and $2 < n \leq 5\}$

   (iv) R = $\{x : x$ is an integers, $x \in \mathbb{Z}$and $-5 \leq x < 5\}$

   (v) S = The set of all leap years between 1882 and 1906.
10. Identify the following sets as null set or singleton set.

    (i) A = $\{x : x \in \mathbb{N}, 1 < x < 2\}$

    (ii) B = The set of all even natural numbers which are not divisible by 2

    (iii) C = {0}.

    (iv) D = The set of all triangles having four sides.

11. State which pairs of sets are disjoint or overlapping?

    (i) A = {f, i, a, s} and B = {a, n, f, h, s}

    (ii) C = {x: x is a prime number, x > 2} and D ={x: x is an even prime number}

    (iii) E = {x: x is a factor of 24} and F = {x: x is a multiple of 3, x < 30}

12. If A = {a, {a, b}}, write all the subsets of A.

13. Write down the power set of the following sets:

    (i) A = {a, b} (ii) B = {1, 2, 3} (iii) D = {p, q, r, s} (iv) E = ∅

14. (i) If n(A) = 4, find n[P(A)]. (ii) If n(A)=0, find n[P(A)]. (iii) If n[P(A)] = 256, find n(A).

15. Represent AΔB through Venn diagram.

16. Let A={b, d, e, g, h} and B = {a, e, c, h}. Verify that n(A–B) = n(A)–n(A∩B).

17. (i) If n(A) = 25, n(B) = 40, n(A∪B) = 50 and n(B′) = 25 , find n(A∩B) and n(U).

    (ii) If n(A) = 300, n(A∪B) = 500, n(A∩B) = 50 and n(B′) = 350, find n(B) and n(U).

18. If U = {x : x ∈ N, x ≤ 10}, A = {2,3,4,8,10} and B = {1,2,5,8,10}, then verify that n(A ∪ B) = n(A) + n(B) – n(A ∩ B).

19. Verify n(A ∪ B ∩ C) = n(A)+n(B) + n(C) − n(A ∩ B) − n(B ∩ C) − n(A ∩ C) + n(A ∩ B ∩ C) for the following sets.

    (i) A = {a,c,e, f ,h}, B = {c,d,e, f } and C = {a,b,c, f }

    (ii) A = {1, 3,5}, B = {2, 3,5,6} and C = {1,5,6,7}

20. In a class, all students take part in either music or drama or both. 25 students take part in music, 30 students take part in drama and 8 students take part in both music and drama. Find

    (i) The number of students who take part in only music.

    (ii) The number of students who take part in only drama.

    (iii) The total number of students in the class.

21. In a party of 45 people, each one likes tea or coffee or both. 35 people like tea and 20 people like coffee. Find the number of people who

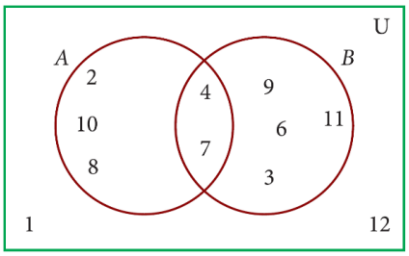
    (i) like both tea and coffee. (ii) do not like Tea. (iii) do not like coffee.

22. A and B are two sets such that n(A–B) = 32 + x, n(B–A) = 5x and n(A∩B) = x. Illustrate the information by means of a Venn diagram. Given that n(A) = n(B), calculate the value of x.

II. <u>Answer in a paragraph (5 marks)</u>

1. Using the given Venn diagram, write the elements of

    (i) A (ii) B (iii) A∪B (iv) A∩B (v) A–B (vi) B–A (vii) A′ (viii) B′ (ix) U



2. Find A∪B, A∩B, A – B and B – A for the following sets.

   (i) A = {2, 6, 10, 14} and B={2, 5, 14, 16}

   (ii) A = {a, b, c, e, u} and B={a, e, i, o, u}

   (iii) A = {x : x ∈ N, x ≤ 10} and B={x : x ∈ W, x < 6}

   (iv) A = Set of all letters in the word "mathematics" and B = Set of all letters in the word "geometry"

3. If U={a, b, c, d, e, f, g, h}, A={b, d, f, h} and B={a, d, e, h}, find the following sets.

   (i) A′ (ii) B′ (iii) A′∪B′ (iv) A′∩B′ (v) (A∪B)′ (vi) (A∩B)′ (vii) (A′)′ (viii) (B′)′

4. Let U={0, 1, 2, 3, 4, 5, 6, 7}, A={1, 3, 5, 7} and B={0, 2, 3, 5, 7}, find the following sets.

   (i) A′ (ii) B′ (iii) A′∪B′ (iv)A′∩B′ (v)(A∪B)′ (vi) (A∩B)′ (vii) (A′)′ (viii) (B′)′

5. If A = {b,e, f ,g} and B = {c,e,g,h}, then verify the commutative property of (i) union of sets (ii) intersection of sets.

6. If A={x : x = 2^n, n -W and n < 4}, B = {x : x = 2n, n - ∈ ℕ and n ≤ 4} and C = {0,1,2,5,6}, then verify the associative property of intersection of sets.

7. Verify A∩ (B ∪ C) = (A∩B) ∪ (A∩C) using Venn diagrams.

8. Verify A−(B ∪ C) = (A−B) ∩(A−C) using Venn diagrams.

9. If P = {x : x ∈ W and 0 < x < 10}, Q = {x : x = 2n+1, n ∈ W and n < 5} and R = {2, 3,5,7,11,13}, then verify P −(Q ∩ R) = (P − Q) ∪ (P − R).

10. From the Venn diagram, verify that n(A∪B) = n(A)+n(B) – n(A∩B).

11. Verify (A∪ B) ' = A' ∩ B' using Venn diagrams.

12. If A = {x : x ∈ ℤ,−2 < x ≤ 4}, B={x : x ∈ W, x ≤ 5}, C = {−4,−1, 0,2, 3, 4}, then verify A∪(B∩C) = (A∪B) ∩ (A∪ C).

13. Verify A∪ (B∩C) = (A∪ B) ∩ (A∪ C) using Venn diagrams.

14. If A = {b,c,e,g,h} , B = {a,c,d,g,i} and C = {a,d,e,g,h} , then show that A−(B∩C) = (A−B) ∪ (A−C) .

15. Verify A−(B ∩ C) = (A−B) ∪ (A−C) using Venn diagrams.

16. Verify (A∩ B) ' = A' ∪ B' using Venn diagrams.

17. In a school, all students play either Hockey or Cricket or both. 300 play Hockey, 250 play Cricket and 110 play both games. Find

(i) the number of students who play only Hockey.

(ii) the number of students who play only Cricket.

(iii) the total number of students in the School.

18. In a college, 240 students play cricket, 180 students play football, 164 students play hockey, 42 play both cricket and football, 38 play both football and hockey, 40 play both cricket and hockey and 16 play all the three games. If each student participate in atleast one game, then find (i) the number of students in the college (ii) the number of students who play only one game.

19. In a residential area with 600 families $\frac{3}{5}$ owned scooter $\frac{1}{3}$ owned car, $\frac{1}{4}$ owned bicycle, 120 families owned scooter and car, 86 owned car and bicylce while 90 families owned scooter and bicycle. If $\frac{2}{15}$ of families owned all the three types of vehicles, then find (i) the number of families owned atleast two types of vehicle. (ii) the number of families owned no vehicle.

20. A survey was conducted among 200 magazine subscribers of three different magazines A, B and C. It was found that 75 members do not subscribe magazine A, 100 members do not subscribe magazine B, 50 members do not subscribe magazine C and 125 subscribe atleast two of the three magazines. Find

(i) Number of members who subscribe exactly two magazines.

(ii) Number of members who subscribe only one magazine.

21. In a colony, 275 families buy Tamil newspaper, 150 families buy English newspaper, 45 families buy Hindi newspaper, 125 families buy Tamil and English newspapers, 17 families buy English and Hindi newspapers, 5 families buy Tamil and Hindi newspapers and 3 families buy all the three newspapers. If each family buy atleast one of these newspapers then find

(i) Number of families buy only one newspaper

(ii) Number of families buy atleast two newspapers

(iii) Total number of families in the colony.

22. A survey of 1000 farmers found that 600 grew paddy, 350 grew ragi, 280 grew corn, 120 grew paddy and ragi, 100 grew ragi and corn, 80 grew paddy and corn. If each farmer grew atleast any one of the above three, then fi nd the number of farmers who grew all the three.

23. Each student in a class of 35 plays atleast one game among chess, carrom and table tennis. 22 play chess, 21 play carrom, 15 play table tennis, 10 play chess and table tennis, 8 play carrom and table tennis and 6 play all the three games. Find the number of students who play (i) chess and carrom but not table tennis (ii) only chess (iii) only carrom (**Hint**: Use Venn diagram)

24. In a class of 50 students, each one come to school by bus or by bicycle or on foot. 25 by bus, 20 by bicycle, 30 on foot and 10 students by all the three. Now how many students come to school exactly by two modes of transport?