

# Chapter-1

## Exercise-1.1

### Set and Function

**Creative Questions:**

1.  $E = \{x: x \in \mathbb{R} \text{ and } x^2 - (a + b)x + ab = 0, a, b \in \mathbb{R}\}$ ,  $F = \{3, 4\}$  and  $G = \{4, 5, 6\}$ -

- a) Find the elements of the set E.
- b) Prove that,  $P(F \cap G) = P(F) \cap P(G)$
- c) Show that,  $E \times (F \cup G) = (E \times F) \cup (E \times G)$

2.  $A = \{x: x \in \mathbb{R} \text{ and } x^2 - (p + q)x + pq = 0, p, q \in \mathbb{R}\}$ ,  
 $B = \{2, 3\}$  and  $C = \{3, 4, 5\}$  [D.B.-16]

- a) Find the elements of the set E.
- b) Show that,  $P(B \cap C) = P(B) \cap P(C)$
- c) Prove that,  $A \times (B \cup C) = (A \times B) \cup (A \times C)$

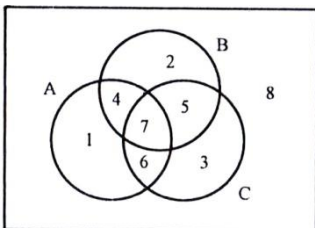
3.  $A = \{x: x \in \mathbb{R} \text{ and } x^2 - (a + b)x + ab = 0$ ,  
 $B = \{2, 3\}$  and  $C = \{2, 4, 5\}$  where  $a, b \in \mathbb{R}$  [D.B.-16]

- a) Determine the components of set A.
- b) Show that,  $P(B \cap C) = P(B) \cap P(C)$
- c) Prove that,  $A \times (B \cup C) = (A \times B) \cup (A \times C)$

4.  $A = \{x: x \in \mathbb{R} \text{ and } x^2 - 9x + 20 = 0$ ,  
 $B = \{5, 6\}$  and  $C = \{x: x \text{ is prime number and } 6 \leq x \leq 12\}$  [Ctg.B-15]

- a) Express A in Tabular Method.
- b) What is the number of elements of,  $P(B \cup C)$
- c) Proof that,  $P(A) \cap P(B) \neq P(A \cup B)$

**5. Step-I**



**Sep-II.** The function,  $F(x) = \frac{ax+b}{cx+d}$ , where  $a, b, c \in \mathbb{R}$

- a) Represent the set area no. -7 by the sets A, B, C in the step-I.

- b) State and prove "De Morgans Law" by the sets A, B, C in the step-I
- c) Find the domain, range, inverse function and justify the function one-one or onto in step-II.

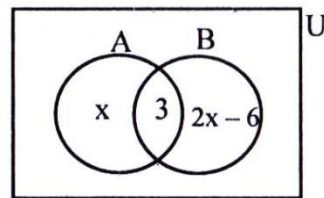
6. **U is a universal set and A, B are two finite sets which are not disjoint**

- a) Express the above information in Venn-diagram.
- b) Show that,  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- c) If  $n(A \cup B) = 30$ ,  $n(B) = 15$ , then find  $n(A \cap B)$ .

7.  $U = \{3, 4, 5, 6, 7, 8, 9\}$ ,  $A = \{x : x \text{ is a prime number}\}$  and  $B = \{x : x \text{ is an even number}\}$

- a) List the elements of the sets A and  $A \cap B$  and show in a Venn diagram.
- b) Show that,  $A' \cap B' = \{9\}$
- c) Verify that,  $n(A' \cup B') = n(A') + n(B') - n(A' \cap B')$

8. **In the Venn diagram, the elements of the sets A and B are shown. Given  $n(A) = n(A' \cap B)$**



- a) Find the value of  $n(A \cap B)$  in terms of x.
- b) Find the value of x,  $n(A)$  and  $n(B)$ .
- c) Prove that,  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$ .

### Exercise-1.2

### Set and Function

**Creative Question**

1. If  $f: \mathbb{R} \rightarrow \mathbb{R}$  where  $g: \mathbb{R} \rightarrow \mathbb{R}$  are defined  $f(x) = \frac{2x+2}{x-1}$  and  $g(x) = \frac{x-3}{2x+1}$

[D. B -17]

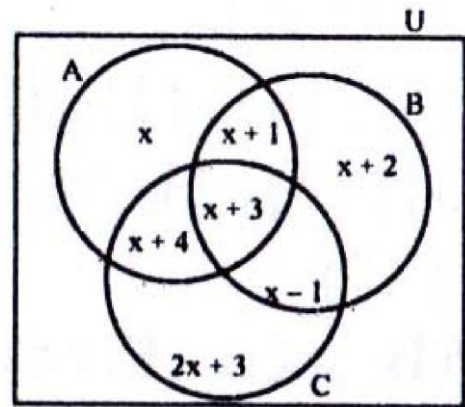
- a) Find the domain of f.
- b) Show that g is one-one and onto function.
- c) If  $3f^{-1}(x) = x$ , then find the value of x

2.  $f(x) = \frac{2}{x-3}$  [R. B -17]  
 a) Find the domain of  $f(x)$ .  
 b) Determine  $f^{-1}(5)$ .  
 c) Draw the graph of the given function.
3.  $f(x) = \frac{2x+2}{x-3}$ ,  $x \neq 3$  is a function [C. B -17]  
 a) Find the domain of  $f(a-1)$ .  
 b) Find the inverse function of given function.  
 c) Show that the given function is one-one and onto.
4.  $S = \{(x, y) : x^2 + y^2 + 6x + 8y + 9 = 0\}$  be a relation and  $A = \{x \in \mathbb{N}, x \text{ is a prime number and } x < 7\}$   
 $B = \{x : x \text{ is positive integer and } \sqrt{x} < 2\}$  are two sets [Ctg. B -17]  
 a) Express the set B in tabular method.  
 b) Show that,  $P(A) \cap P(B) = P(A \cap B)$ .  
 c) Draw the graph of the relation "S" and ascertain from the graph whether 'S' is a function or not.
5.  $f(x) = \sqrt{2x-3}$  is a function [S. B -17]  
 a) If  $f(x)=1$  then determine the value of  $x$ .  
 b) Determine the Domain  $f(x)$  and show the function is one-one.  
 c) Determine the range of  $f^{-1}(x)$ .
6.  $f(x) = \frac{4x+3}{2x+5}$  [J. B -17]  
 a) Find the domain of  $f(x)$ .  
 b) Show that,  $f(x)$  is one-one function.  
 c) If  $f^{-1}(-2) = P$ ,  $f^{-1}(-3)$  find the value of  $p$ .
7.  $F(x) = \sqrt{2-4x}$  is a function [C. B -17]  
 a) Find the domain of the function stated by  $F(x)$ .  
 b) Determine whether the function  $F$  is one-one or not.  
 c) Find the value of  $F^{-1}(-3)$ .
8.  $A = \{x : x \in \mathbb{Z} \text{ and } x^2 \leq 4\}$   
 $B = \{x \in \mathbb{N} : x \text{ is odd and } x < 5\}$   
 $C = \{3, 5\}$  [R. B -15]  
 a) Show A in tabular method.

- b) Show that  $P(B) \cup P(C) \subset P(B \cup C)$ .  
 c) The relation  $S = \{(x, y) : x \in A, y \in A \text{ and } y = \sqrt{4-x^2}\}$  is to be expressed in tabular method. Find Dom S and Range S.

9.  $F(x) = \frac{1}{x-5}$  is a function. [C.B.-15]  
 a) If  $(x)=2$ , find the value of  $x$ .  
 b) Find the domain of  $F(x)$  & determine whether it one-one.  
 c) Find  $F^{-1}(3)$

10.



[S.B.-15]

- a) If  $P(x) = 2x^2 + 3x$ , then find  $P(-2)$ .  
 b) If  $x = 2$ , then show that  $P(B) \neq P(A' \cap B)$ .  
 c)  $f(x) = n(C \cap A' \cap B')$  show that,  $f(x)$  is a one-one function &  $f^{-1}(3) = 0$
11.  $F(x) = \sqrt{1-2x}$ . [B.B.-15]  
 a) Find the domain of  $F(x)$   
 b) State whether the function is one-one.  
 c) Find  $F^{-1}(x)$
12. Given  $f(a) = \frac{a+y}{a-y}$  and  $g(x) = \frac{1}{2x+1}$ .  
 a) Find the discriminant of the equation  $2x^2 - 7x + 1 = 0$   
 b) Solve:  $f(x) + \frac{1}{f(x)} = \frac{5}{2}$  and  $x^2 + y^2 = 90$ .  
 c) Find the domain and range of  $g(x)$  and show that  $g(x)$  is one-one function.