

UNIT TEST – 1

STD : X  
SUBJECT : MATHS

TIME : 1 ½ Hrs  
MARKS : 50

SETS AND FUNCTIONS  
SECTION – I

10 x 1 = 10

**NOTE:** (i) Answer all the 10 questions  
(ii) Choose the correct answer from the given four alternatives and write the option code and the corresponding answer

- If  $A \subset B$ , then  $A \cap B$  is  
a) B                      b)  $A \setminus B$                       c) A                      d)  $B \setminus A$
- If  $A = \{p,q,r,s\}$ ,  $B = \{r,s,t,u\}$  then  $A \setminus B$  is  
a)  $\{p,q\}$                       b)  $\{t,u\}$                       c)  $\{r, s\}$                       d)  $\{p,q,r,s\}$
- If  $n[p(A)] = 64$  then  $n(A)$  is  
a) 6                      b) 8                      c) 4                      d) 5
- Which one of the following is not true?  
a)  $A \setminus B = A \cap B'$     b)  $A \setminus B = A \cap B$     c)  $A \setminus B = (A \cup B) \cap B'$     d)  $A \setminus B = (A \cup B) \setminus B$
- If  $n(A) = 20$ ,  $n(B) = 30$  and  $n(A \cup B) = 40$ , then  $n(A \cap B)$  is equal to  
a) 50                      b) 10                      c) 40                      d) 70
- If  $\{(7,11), (5,a)\}$  represents a constant function, then the value of 'a' is  
a) 7                      b) 11                      c) 5                      d) 9
- Given  $f(x) = (-1)^x$  is a function from  $N$  to  $Z$ , then the range of  $f$  is  
a)  $\{1\}$                       b)  $N$                       c)  $\{1, -1\}$                       d)  $Z$
- If  $f = \{(6,3), (8,9), (5,3), (-1,6)\}$  then the pre-image of 3 are  
a) 5 and -1                      b) 6 and 8                      c) 8 and -1                      d) 6 and 5
- If the range of a function is a singleton set then it is  
a) a constant function    b) an identity function  
c) A bijective function    d) an one-one function
- If  $f : A \rightarrow B$  is a bijective function and if  $n(A) = 5$ , then  $n(B)$  is equal to  
a) 10                      b) 4                      c) 5                      d) 25

**SECTION – II**

**5 x 2 =10**

**NOTE:** (i) Answer 5 questions

(ii) Question number 17 is compulsory. Select any 4 questions from the first 6 questions

11. If  $A \subset B$ , then find  $A \cap B$  and  $A \setminus B$  (Use Venn Diagram)
12. Verify the commutative property of set intersection for  
 $A = \{1, m, n, o, 2, 3, 4, 7\}$   $B = \{2, 5, 3, -2, m, n, o, p\}$
13. Let  $P = \{a, b, c\}$ ,  $Q = \{g, h, x, y\}$  and  $R = \{a, e, f, s\}$  Find  $R \setminus (P \cap Q)$
14. If  $X = \{1, 2, 3, 4, 5\}$   $Y = \{1, 3, 5, 7, 9\}$  determine which of the following relations from  $X$  to  $Y$   $\{(1, 1), (1, 3), (3, 5), (3, 7), (5, 7)\}$  is a function? Give reason for your answer.
15. Let  $A = \{1, 2, 3, 4, 5\}$   $B = \mathbb{N}$   $f: A \rightarrow B$  be defined by  $f(x) = x^2$ . Find the range of  $f$ . Identify the type of function.
16. If  $A$  and  $B$  are two sets and  $U$  is the universal set such that  $n(U) = 700$ ,  
 $n(A) = 200$ ,  $n(B) = 300$   $n(A \cap B) = 100$ , find  $n(A' \cap B')$ .
17.  $A = \{-2, -1, 1, 2\}$  and  $f = \left\{ \left( x, \frac{1}{x} \right) : x \in A \right\}$ . Write down the range of  $f$ . Is  $f$  a function from  $A$  to  $A$ ?

**(OR)**

Let  $U = \{4, 8, 12, 16, 20, 24, 28\}$ ,  $A = \{8, 16, 24\}$  and  $B = \{4, 16, 20, 28\}$  Find  
(i)  $(A \cup B)'$  and  $(A \cap B)'$

**SECTION – III**

**6 x 5 =30**

**NOTE:** (i) Answer 6 questions

(ii) Question number 25 is compulsory. Select any 5 questions from the first 7 questions

18. Prove by Venn Diagram that  $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$ .
19. Given that  $U = \{a, b, c, d, e, f, g, h\}$   $A = \{a, b, f, g\}$  and  $B = \{a, b, c\}$ . Verify De Morgan's law of complementation.
20. For  $A = \{x / -3 \leq x < 4, x \in \mathbb{R}\}$ ,  $B = \{x / x < 5, x \in \mathbb{N}\}$  and  $C = \{-5, -3, -1, 0, 1, 3\}$ , Show that  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

21. In a group of students, 65 play foot ball, 45 play hockey, 42 play cricket, 20 play foot ball and hockey, 25 play foot ball and cricket, 15 play hockey and cricket and 8 play all the three games. Find the number of students in the group. (Assume that each student in the group plays atleast one game)
22. Let  $A = \{0, 1, 2, 3\}$  and  $B = \{1, 3, 5, 7, 9\}$  be two sets. Let  $f: A \rightarrow B$  be a function given by  $f(x) = 2x + 1$ . Represent this function as (i) a Set of ordered pairs (ii) a table (iii) an arrow diagram and (iv) a graph.
23. A function  $f: [-3,7) \rightarrow \mathbb{R}$  is defined as follows

$$f(x) = \begin{cases} 4x^2 - 1 & : -3 \leq x < 2 \\ 3x - 2 & : 2 \leq x \leq 4 \\ 2x - 3 & : 4 < x < 7 \end{cases}$$

Find (i)  $f(5) + f(6)$  (ii)  $f(1) - f(-3)$  (iii)  $f(-2) - f(4)$  (iv)  $\frac{f(3)+f(-1)}{2f(6)-f(1)}$

24. Verify  $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$  for the sets given below:

$$A = \{a,b,c,d,e\}, B = \{x,y,z\} \text{ and } C = \{a,e,x\}$$

25. In a town 85% of people speak Tamil, 40% speak English and 20% speak Hindi. Also, 32% speak English and Tamil, 13% speak Tamil and Hindi and 10% speak English and Hindi, Find the percentage of people who can speak all the three languages.

(OR)

Let  $A = \{5, 6, 7, 8\}$ ;  $B = \{-11, 4, 7, -10, -7, -9, -13\}$  and  $f = \{(x,y) / y=3-2x \ x \in A, y \in B\}$

1. Write down the elements of f.
2. What is the co-domain?
3. What is the range?
4. Identify the type of function