

UNIT TEST – 1

CHAPTER 1 : FUNCTIONS AND RELATIONS

CLASS : X

SUBJECT : MATHEMATICS

MARKS : 50

I. CHOOSE THE CORRECT ANSWER**9 X 1 = 9**

- $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
(a) 8 (b) 20 (c) 12 (d) 16
- If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B , then the number of elements in B is (a) 3 (b) 2 (c) 4 (d) 6
- If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
(a) $(2, -2)$ (b) $(5, 1)$ (c) $(2, 3)$ (d) $(3, -2)$
- Let $n(A) = m$ and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is (a) m^n (b) n^m (c) $2^{mn} - 1$ (d) 2^{mn}
- If $f(x) = 2x^2$ and $g(x) = 13x$, then $f \circ g$ is
(a) $32x^2$ (b) $23x^2$ (c) $29x^2$ (d) $16x^2$
- 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 the range of a function is a singleton set then it is
(a) constant function (b) an Identity function
(c) a Bijective function (d) An one one function
- If $A = Z - \{0\}$ and let $f : A \rightarrow A$ defined by $f(x) = \frac{|x|}{x}$ where $|x| = \begin{cases} x & \text{if } x > 0 \\ -x & \text{if } x < 0 \end{cases}$ then f is Function.
(a) onto (b) constant (c) Absolute value (d) one one.
- If $A = \{4, 9, 16, 36\}$ $B = \{1, 2, 3, 4, 5, 6\}$ and $f : A \rightarrow B$ defined by $f = \{(4, 2), (9, 3), (16, 4), (36, 6)\}$ is Function (a) Injective (b) Bijective (c) surjective (d) constant

II. ANSWER THE FOLLOWING FOLLOWING QUESTIONS (ANY 8)**8 X 2 = 16**

- Let $A = \{1, 2, 3\}$ and $B = \{x \mid x \text{ is a prime number less than } 10\}$. Find $A \times B$ and $B \times A$.
- If the ordered pairs $(x^2 - 3x, y^2 + 4y)$ and $(-2, 5)$ are equal, then find x and y .

12. A Relation R is given by the set $\{(x, y)/y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$.

Determine its domain and range.

13. Given $f(x) = \frac{4x}{x+1}$ with domain $\{-3, -2, 0, 1, 3\}$. Find range of f.

14. let $f(x) = 2x + 5$ if $x \neq 0$ then find $\frac{f(x+2)-f(2)}{x}$.

15. Given $f(x) = 2x - x^2$ find (i) $f(1)$ and (ii) $f(x+1)$.

16. Show that the function $f: N \rightarrow N$ defined by $f(m) = m^2 + m + 3$ is one - one function.

17. If $f: N \rightarrow N$ defined by $f(x) = \frac{1}{2}(x + 1)$ a function? Justify your answer.

18. If $f(x) = 2x + 5$ and $g(x) = 2x + k$ finds k so that $f \circ g = g \circ f$.

19. If $f(x) = 2x - 1$, $g(x) = x+12$, show that $f \circ g = g \circ f = x$

III. ANSWER THE FOLOWING FOLLWING QUESTIONS (ANY 5)

5 X 5 = 25

20. Given $A = \{2, 3, 5\}$, $B = \{1, 2, 3\}$ $C = \{2, 5\}$, $D = \{2, 3, 5\}$ check if

$$(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$$

21. A function f is defined by $f(x) = 3 - 2x$. Find x such that $f(x^2) = (f(x))^2$.

22. If $A = \{0, 3, 6, 12\}$ $B = \{1, 2, 3, 5, 7\}$ and $f: A \rightarrow B$ is defined by $f(x) = \frac{1}{3}(x + 3)$ represent f as (i) an arrow diagram

(ii) a table (iii) a table form (iv) a graph.

23. Let $f = \{(-1, 3), (0, -1), (2, -9)\}$ be a linear function from Z into Z. Find $f(x)$.

24. verify that the composition of functions is associative

$$f(x) = x - 3 \quad g(x) = 2x - 5 \quad h(x) = 5x$$

25. A function $f: [-3, 7] \rightarrow R$ 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) $\frac{f(3)+f(-1)}{2f(6)-f(1)}$ (ii) $f(5)+f(6)$ (iii) $f(1) - f(-3)$ (iv) $f(-2) - f(4)$

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