Monthly Test, June - 2024

Standard : 10

TIME : 45 minutes Mathematics Marks: 25

Part - I 4 x 1 = 4

Choose the correct answer and write the option code and the corresponding answer .

1) 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) 8

2) If $f: A \to B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
a)7 b) 49 c) 1 d) 14

3) 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}

4) $f = \{(2, a), (3, b), (4, b), (5, c)\}$ is a _____
a) identity function b) one-one function
c) many-one function d) constant function

Part - II 3 x 2 = 6

Answer any 3 questions. Question No. 8 is compulsory :

5) Let A = {3,4,7,8} and B = {1,7,10}. Which of the following sets are relations from A to B?
$R_1 = \{(3, 7), (4, 7), (7, 10), (8,1)\}$ ii) $R_2 = \{(3, 1), (4, 12)\}$

6) Let f be a function $f : N \to N$ define by $f(x) = 3x + 2$, $x \in N$.
i) Find the pre-image of 53 ii) find the image of 3

7) Find k if $f \circ f(k) = 5$ where $f(k) = 2k - 1$.

8) If $Z = \{0, 1\}$, Find $(Z \times Z) \times Z$ and $n[(Z \times Z) \times Z]$.

Part - III 3 × 5 = 15

Answer any 3 questions. Question No. 12 is compulsory :

9) Given $A = \{1, 2, 3\}$, $B = \{2, 3, 5\}$, $C = \{3, 4\}$ and $D = \{1, 3, 5\}$,
check if $(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$ is true?

10) Represent the given relation by a) an arrow diagram, b) a graph and c) a set in roster form, wherever possible. $\{(x, y) | y = x+3, x, y \text{ are natural numbers} < 10\}$

11) If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $(f \circ g) \circ h = f \circ (g \circ h)$.

12) If the function $f : R \to R$ is defined by $f(x) = \begin{cases} 2x + 7 & x < -2 \\ x^2 - 1 & -2 \le x < 3 \\ 3x - 2 & x \ge 3 \end{cases}$ then find the values of

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

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