

Chapter End Test Paper
(2019-20)

Date : _____
Duration : 1:00 Hr.
Max. Marks : 30

Mathematics
Topic : Relations and Functions

Class
XII

Instructions:

- ▶ All questions are compulsory.
- ▶ Use of calculators is not allowed.

Section - A (1 mark)

- Let R be the relation in the set \mathbf{N} given by $R = \{(a, b) : a = b - 2, b < 6\}$ then choose the correct answer.
(a) $(2, 4) \in R$ (b) $(3, 8) \in R$ (c) $(6, 8) \in R$ (d) $(8, 7) \in R$
- Let $A = \{1, 2, 3\}$. Then number of equivalence relations containing $(1, 2)$ is
(a) 1 (b) 2 (c) 3 (d) 4
- Number of binary operations on the set $\{a, b\}$ are
(a) 10 (b) 16 (c) 20 (d) 8
- If the set A contains 5 elements and set B contains 6 elements, then the number of one-one and onto mappings from A to B is
(a) 720 (b) 120 (c) 0 (d) none of these
- Let $f: \mathbf{R} \rightarrow \mathbf{R}$ be the functions defined by $f(x) = x^3 + 5$ then $f^{-1}(x)$ is
(a) $(x + 5)^{\frac{1}{3}}$ (b) $(x - 5)^{\frac{1}{3}}$ (c) $(5 - x)^{\frac{1}{3}}$ (d) $(5 - x)$
- The identity element for the binary operation $*$ defined on $\mathbf{Q} - \{0\}$ as $a * b = \frac{ab}{2} \forall a, b \in \mathbf{Q} - \{0\}$ is
(a) 1 (b) 0 (c) 2 (d) none of these

Section - B (2 marks)

- If $A = \{a, b, c, d\}$ and $f = \{(a, b), (b, d), (c, a), (d, c)\}$ show that f is one-one from A onto A find f^{-1}
- Consider the binary operations \wedge on the set $\{1, 2, 3, 4, 5\}$ defined by $a \wedge b = \min \{a, b\}$. Write the operation table of the operation \wedge .

Section - C (4 marks)

- Consider $f: \mathbf{R}_+ \rightarrow [4, \infty]$ given by $f(x) = x^2 + 4$. Show f is invertible with the f^{-1} of f given by $f^{-1}(y) = \sqrt{y - 4}$, where \mathbf{R}_+ is the set of all non-negative real number.
- (i) Find gof and fog if,
 $f(x) = 8x^3$ and $g(x) = x^{\frac{1}{3}}$
(ii) $f(x) = (3 - x)^{\frac{1}{3}}$, then find $\text{fof}(x)$

Section - D (6 marks)

11. Consider $F : \mathbb{R}_+ \rightarrow [-5, \infty]$ given by $f(x) = 9x^2 + 6x - 5$. Show f is invertible with the f^{-1} of f given by $f^{-1}(y) = \left(\frac{(\sqrt{y+6})-1}{3} \right)$
12. Show that the relation R in the set $A = \{x \in \mathbb{Z} : 0 \leq x \leq 12\}$, given by $R = \{(a, b) : (a - b) \text{ is multiple of } 4\}$.

