CUET (UG) – MATHEMATICS

Chapter Test - Relations and Functions

General Instructions

1. Total Questions: **20**
2. Duration: **60 Minutes**
3. All questions are compulsory.
4. Each question carries **5 marks**.
5. For each correct answer: **+5 marks**.
6. For each incorrect answer: **-1 mark**.
7. No negative marking for unanswered questions.
8. Use of calculator or electronic devices is strictly prohibited.
9. Choose the most appropriate answer from the given options.

1. Let $A = \{1, 2, 3\}$. Let $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 1), (2, 3), (3, 2)\}$. The relation R is:
   (A) Reflexive and symmetric but not transitive
   (B) Reflexive and transitive but not symmetric
   (C) Symmetric and transitive but not reflexive
   (D) An equivalence relation

2. The number of all one-one functions from set $A = \{1, 2, 3\}$ to itself is:
   (A) 3
   (B) 6
   (C) 8
   (D) 9

3. Let $f : R \to R$ be defined as $f(x) = x^4$. Choose the correct answer:
   (A) f is one-one onto
   (B) f is many-one onto
   (C) f is one-one but not onto
   (D) f is neither one-one nor onto

4. The principal value branch of $\sec^{-1} x$ is:
   (A) $[-\frac{\pi}{2}, \frac{\pi}{2}]$
   (B) $[0, \pi] - \{\frac{\pi}{2}\}$
   (C) $(0, \pi)$
   (D) $(-\frac{\pi}{2}, \frac{\pi}{2}) - \{0\}$

5. If $R = \{(a, b) : a, b \in Z$ and $(a - b)$ is divisible by $5\}$, then R is:
   (A) Only reflexive
   (B) Only symmetric
   (C) Only transitive
   (D) An equivalence relation

6. Let $f : A \to B$ and $g : B \to C$ be two functions such that $g \circ f$ is injective. Then:
   (A) f must be injective
   (B) g must be injective
   (C) f must be surjective
   (D) g must be surjective

7. The value of $\cos^{-1}(\cos \frac{7\pi}{6})$ is:
   (A) $\frac{7\pi}{6}$
   (B) $\frac{5\pi}{6}$
   (C) $\frac{\pi}{6}$
   (D) $\frac{\pi}{3}$

8. The domain of the function $\sin^{-1}(2x - 3)$ is:
   (A) $[-1, 1]$
   (B) $[1, 2]$
   (C) $[0, 3]$
   (D) $[-2, 2]$

9. Let L be the set of all lines in a XY plane and R be the relation in L defined as $R = \{(L_1, L_2) : L_1$ is perpendicular to $L_2\}$. R is:
   (A) Reflexive
   (B) Symmetric
   (C) Transitive
   (D) Equivalence

10. If $f(x) = \frac{x-1}{x+1}$, then $f(f(x))$ is equal to:
    (A) x
    (B) $-\frac{1}{x}$
    (C) $\frac{1}{x}$
    (D) $-x$

11. The value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$ is:
    (A) π
    (B) $-\frac{\pi}{3}$
    (C) $\frac{\pi}{3}$
    (D) $\frac{2\pi}{3}$

12. The maximum number of equivalence relations on the set $A = \{1, 2, 3\}$ is:
    (A) 2
    (B) 3
    (C) 5
    (D) 6

13. If $\sin^{-1} x = y$, then:
    (A) $0 \leq y \leq \pi$
    (B) $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$
    (C) $0 < y < \pi$
    (D) $-\frac{\pi}{2} < y < \frac{\pi}{2}$

14. Let $f : R \to R$ be defined by $f(x) = 3x$. Then f is:
    (A) One-one onto
    (B) Many-one onto
    (C) One-one but not onto
    (D) Neither one-one nor onto

15. The relation R in the set $\{1, 2, 3\}$ given by $R = \{(1, 2), (2, 1)\}$ is:
    (A) Reflexive
    (B) Symmetric
    (C) Transitive
    (D) None of these

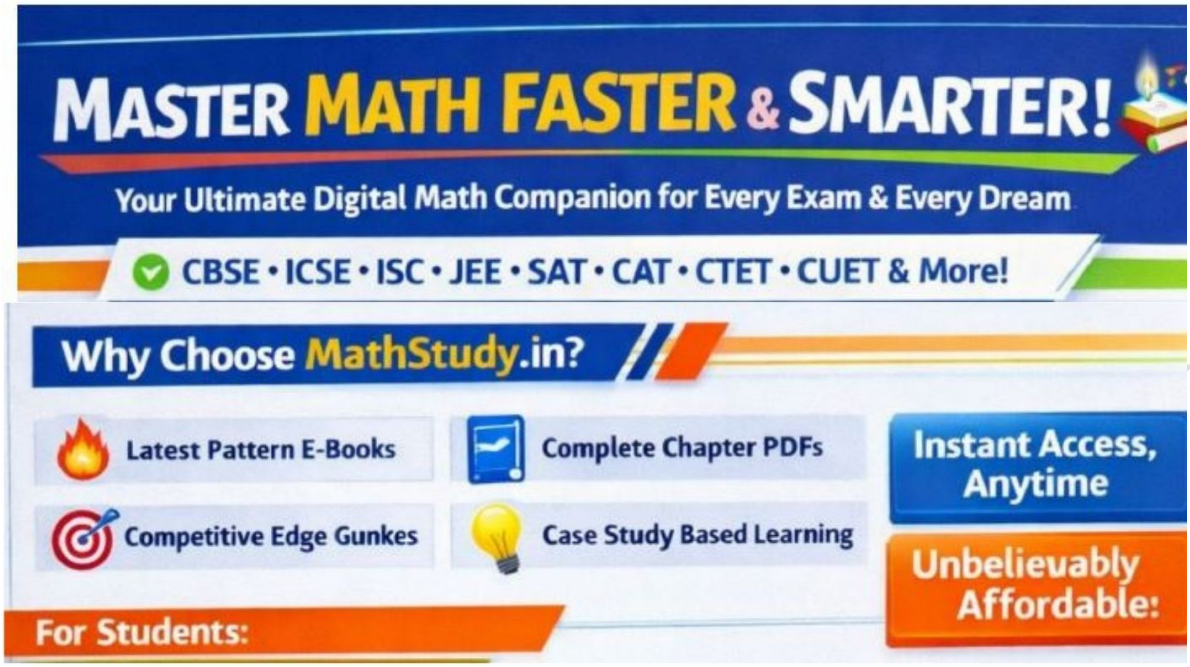
16. The range of $\tan^{-1} x$ is:
    (A) $[-\frac{\pi}{2}, \frac{\pi}{2}]$
    (B) $(-\frac{\pi}{2}, \frac{\pi}{2})$
    (C) $[0, \pi]$
    (D) R

17. If $\sin(\sin^{-1} \frac{1}{5} + \cos^{-1} x) = 1$, then the value of x is:
    (A) 0
    (B) $\frac{4}{5}$
    (C) $\frac{1}{5}$
    (D) 1

18. A function $f : X \to Y$ is onto if:
    (A) Range of $f = Y$
    (B) Range of $f \subset Y$
    (C) f is one-one
    (D) $Y \subset$ Range of f

19. The value of $\sin^{-1}(\sin \frac{3\pi}{5})$ is:
    (A) $\frac{3\pi}{5}$
    (B) $\frac{2\pi}{5}$
    (C) $\frac{\pi}{5}$
    (D) $-\frac{2\pi}{5}$

20. Let $A = \{1, 2, 3\}$. The number of relations containing $(1, 2)$ and $(1, 3)$ which are reflexive and symmetric but not transitive is:
    (A) 1
    (B) 2
    (C) 3
    (D) 4



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