# B.K. BIRLA CENTRE FOR EDUCATION

**SARALA BIRLA GROUP OF SCHOOLS**
**A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL**

**PERIODIC TEST-1, 2025-26**
**MATHEMATICS (041)**

**Class: XIIA** | **Time: 1hr**
**Date: 01.07.25** | **Max Marks: 25**
**Admission no:** | **Roll no:**

**General Instructions:**
Question 1 to 5 carries ONE mark each. Questions 6 to 7 carries TWO marks each. Questions 08 to 09 carries THREE marks each. Question 10 to 11 carry FIVE mark each.

1. Let T be the set of all triangles in the Euclidean plane, and let a relation R on T be defined as a R b if a is congruent to b, $\forall$ a,b $\in T$. Then R is
   a) Reflexive but not transitive
   b) transitive but not symmetric
   c) Equivalence
   d) None of these

2. Let us define a relation R in R as aRb if a$\geq b$. Then R is
   a) An equivalence relation
   b) reflexive , transitive but not symmetric
   c) symmetric, transitive but not reflexive.
   d) neither transitive nor reflexive but symmetric.

3. Let f:R$\rightarrow R$ be defined by f(x)=$\frac{1}{x}$, $\forall$ x$\in$R. Then f is
   a) One-one
   b) onto
   c) bijective
   d) f is not defined.

4. Which of the following functions from Z into Z are bijection?
   a) f(x)= $x^3$
   b) f(x)= x+2
   c) f(x) = 2x+1
   d) $x^2$+1

5. If $3\tan^{-1}x + \cot^{-1}x = \pi$, *then x equals*
   a) 0
   b) 1
   c) -1
   d) $\frac{1}{2}$

6. Let R= $\{(a, a^3): a \text{ is a prime number less than } 5\}$ *be a relation. find the range of* $R$.

7. Write the principle value of $\tan^{-1}\left[\sin(-\frac{\pi}{2})\right]$.

8. Let f: W$\rightarrow W$ be defined as f (n) = $\begin{cases} n+1, \text{if } n \text{ is even} \\ n-1, \text{if } n \text{ is odd} \end{cases}$ ,show that f is bijective function.

9. Find the principle value of $\tan^{-1}(\sqrt{3}) + \cot^{-1}(-\sqrt{3})$.

10. If Z is the set of all integers and R is the relation on Z defined as R= $\{(a, b): a, b \in Z \text{ and } a - b \text{ is divisible by } 5\}$, Prove that R is equivalence relation.

11. Show that the function f in A= R- $\left\{\frac{2}{3}\right\}$ defined as f(x) = $\frac{4x+3}{6x-4}$ is one-one and onto function.

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