

UNIT TEST - I
CLASS XII (2025-26)
SUBJECT: MATHEMATICS

MAX. MARKS: 30

TIME: 1 HR.

General Instructions:

- Questions 1-5 carry 1 mark each
Questions 6-9 carry 2 marks each
Questions 10-13 carry 3 marks each
Questions 14 carry 5 marks

1. Let A be a matrix of order $m \times n$ and B is a matrix such that $A'B$ and BA' are defined. Find the order of matrix B .
2. If a set A has 4 elements and set B has 6 elements. Find the number of bijective functions from A to B .
3. Evaluate $\sin^{-1}\left(\sin \frac{3\pi}{4}\right)$.
4. Write the smallest equivalence relation defined on $A = \{2, 3, 4\}$.
5. If $\begin{bmatrix} x+3y & y \\ 7-x & 4 \end{bmatrix} = \begin{bmatrix} 4 & -1 \\ 0 & 4 \end{bmatrix}$, find the value of $2x-3y$.
6. Find the value of k if $\sin^{-1}\left[k \tan\left(2 \cos^{-1} \frac{\sqrt{3}}{2}\right)\right] = \frac{\pi}{3}$.
7. Let $R = \{(a, a') : a \text{ is a prime number less than } 5\}$ be a relation. Find the range of R .
8. Check whether the function $f: R \rightarrow R$ defined by $f(x) = 1+x^2$ is bijective or not.
9. If $\begin{bmatrix} a & c & -1 \\ 3 & 0 & b \\ 1 & -5 & 0 \end{bmatrix}$ is a skew symmetric matrix, then find the value of $2a^2 - (b-c)^2$.
10. Show that the relation R on the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a-b| \text{ is even}\}$ is an equivalence relation. Also find $[2]$.
11. Prove that $\cot^{-1}\left(\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}\right) = \frac{x}{2}$, $x \in \left[0, \frac{\pi}{4}\right]$.
12. Show that $\sin^{-1}(2x\sqrt{1-x^2}) = 2\sin^{-1}x$, $\frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$.
13. Find X and Y if $X+Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X-Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$.
14. Find a matrix X such that $X \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$.