CLASS XII SUBJECT: MATHEMATICS

1. f: R → R is defined by f(x) = $(3 - x^3)^{1/3}$, then find fof(x).
2. Check whether the relation R defined on the set A = {1, 2, 3, 4, 5, 6} as R = {(a, b): b = a + 1} is reflexive, symmetric or transitive.
3. Let f : N → Y be a function defined as f(x) = 4x + 3, where, Y = {y ∈ N : y = 4x + 3, for some x ∈ N}. Show that f is invertible. Find its inverse
4. Prove that the function, f : N → N is defined by f(x) = $x^2 + x + 1$ is one-one but not onto. Find inverse of f : N → S, where S is range of f.
5. If sin ($\sin^{-1}15 + \cos^{-1}x$) = 1, then find the value of x.
6. If A is a square matrix such that $A^2 = I$, then find the simplified value of $(A - I)^3 + (A + I)^3 - 7A$
7. If A is a square matrix of order 3 such that |adjA| = 64,then find |A|
8. Given A = $\begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$,compute A and show that $2A^{-1} = 9I - A$
9. A = $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and Iis the identity matrix of order 2, then show that $A^2 = 4A - 3I$. Hence, find A^{-1}.
10. Determine the value of the constant 'k' so that the function

$$f(x) = \begin{cases} \frac{kx}{|x|}, & \text{if } x < 0 \\ 3, & \text{if } x \geq 0 \end{cases}$$

Is continuous at x=0

11. Find the value of k, so that the function

$$f(x) = \begin{cases} \left(\frac{1 - \cos 4x}{8x^2}\right), & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$$

Is continuous at x=0.

12. If $\sqrt{1+y} + y\sqrt{1+x} = 0$,(x ≠ y), then prove that $dy/dx = -\frac{1}{(1+x)^2}$
13. log ($x^2 + y^2$) = 2 $\tan^{-1}\left(\frac{y}{x}\right)$ show that $dy/dx = \frac{(x+y)}{(x-y)}$