Class XII

Chapter 6- Application of Derivatives

Topic – Tangents and Normals

Worksheet (Advance)

1. Prove that the equation of tangent and normal to the hyperbola $x^2/a^2 - y^2/b2 = 1$ at (x1,y1) are $xx1/a^2 - yy1/b^2 = 1$ and $a^2x/x1 + b^2y/y1 = a^2 + b^2$ (HOTS)(4)

2. If the straight line $x\cos\vartheta + y\sin\vartheta = p$ touches $x^2/a^2 + y^2/b^2 = 1$ prove that $p^2 = a^2\cos^2\vartheta + b^2\sin^2\vartheta$ (HOTS) (4)

3. If the curves $ax^2 + by^2 = 1$ and $a^1x^2 + b^1y^2 = 1$ intersect orthogonally, prove that $1/a - 1/a^1 = 1/b - 1/b^1$ (HOTS) (6)

4. Find the value of p for which the curves $x^2 = 9p(9-y)$ and $x^2 = p(y+1)$ cut each other at right angles. (4)

5. Prove that the curve $(x/a)^n + (y/b)^n = 2$ touches the straight line $x/a + y/b = 2$ at (a,b)for all values of n being natural no. (4)

6. Show that the curves $x^2/(a^2 + k) + y^2/(b^2 + k) = 1$ and $x^2/(a^2 + k^1) + y^2/(b^2 + k^1) = 1$ intersec t orthogonally. (4)

7. The curve $y = ax^3 + bx^2 + cx + 5$ touches the x-axis at the point (-2,0) and Cuts the y-axis at a point where the slope is 3. Find the equation of the curve completely (6)

8. Tangents are drawn from the origin to the curve y=sinx .Prove that their point sof contact lie on the curve $x^2 y^2 = x^2 - y^2$ (4)