ASSIGNMENT: TANGENT & NORMAL

Q.1. Find equation of normal at a point on the curve $x^2 = 4y$ which passes through point (1, 2). Also, find the equation of corresponding tangent.

Q.2. Prove that all normals to the curves $x = a\cos\theta + a\theta\sin\theta$ and $y = a\sin\theta - a\theta\cos\theta$ are at a constant distance 'a' from the origin.

Q.3. Find the equation of tangents to the curve $y = \cos(x + y)$, $-2\pi \le x \le 2\pi$ that are parallel to the line $x + 2y = 0$.

Q.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 angle.

Q.5 Find the point on the curves $9y^2 = x^3$, where the normal to the curve makes equal intercepts on axes.

Q.6 The equation of tangent at (2, 3) on the curve $y^2 = ax^3 + b$ is $y = 4x - 5$. Find a and b.

Q.7 Prove that the curve $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$ touches the straight line $\frac{x}{a} + \frac{y}{b} = 2$ at (a, b) for all $n \in N$.

Q.8 Show that area of triangle formed by the tangent and normal at the point (a, a) on the curve $y^2(2a - x) = x^3$ *and line* $x = 2a$ *is* $\frac{5a^2}{4}$ $sq.units$.

Q.9 For the curve $y = 4x^3 - 2x^5$. Find all the points at which the tangent passes through the origin.

Q.10 a) Show that the curves $xy = a^2$ and $x^2 + y^2 = 2a^2$ touch each other.

b) Given that curves $2x = y^2$ and $2xy = k$ cut at right angles. Then show that $k^2 = 8$.

Q.11 If the tangent to the curve $y = x^3 + ax + b$ at point P(1, -6) is parallel to the line $y - x = 5$. Find value of a and b. [a = -2 ; b = -5]

Q.12 Find the equation of tangent to curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at point (x_1, y_1) and show that the sum of its intercepts on axes is constant.

ANSWERS

1) $x + y = 3$; $x - y - 1 = 0$

2) $2x + 4y = \pi$; $2x + 4y = -3\pi$

4) P = 4

5) $\left(4, \pm\frac{8}{3}\right)$

6) a = 2 b = -7

9) (0, 0) (1, 2) (-1, -2)