6. Tangent to the curve $y = x^2 + 6$ at a point $(1, 7)$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ at a point Q. Then the coordinates of Q are   *(2005S)*

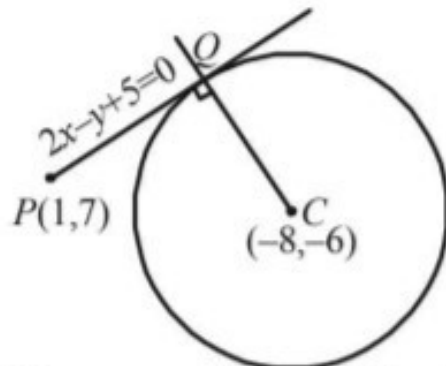(a) $(-6, -11)$ (b) $(-9, -13)$
(c) $(-10, -15)$ (d) $(-6, -7)$

Solution: -

6. (d) The given curve is $y = x^2 + 6$
Equation of tangent at $(1, 7)$ is

$$\frac{1}{2}(y + 7) = x \cdot 1 + 6$$

$$\Rightarrow \quad 2x - y + 5 = 0 \qquad \qquad \text{...(1)}$$

As given this tangent (1) touches the circle
$\quad\quad x^2 + y^2 + 16x + 12y + c = 0$ at Q
Centre of circle $= (-8, -6)$.

Then equation of CQ which is perpendicular to (1) and

passes through $(-8, -6)$ is $y + 6 = -\frac{1}{2}(x + 8)$

$$\Rightarrow \quad x + 2y + 20 = 0 \qquad \qquad \text{...(2)}$$

Now Q is pt. of intersection of (1) and (2)
$\therefore$ Solving eq^n (1) & (2) we get
$x = -6, y = -7$
$\therefore$ Req. pt. is $(-6, -7)$.