Past Examination Questions

Tangents and Normals

Part. 3

1. The points $A(1, 2)$ and $B(7, 14)$ lie on the curve whose equation is $y = x^2 - 6x + 7$. P is a point on the curve such that the tangent at P is parallel to AB. Find (i) the co-ordinates of P, (ii) the equation of the normal at P. The normal at P meets the curve again at Q. Find the co-ordinates of Q. (N82/P1/16)

2. The equation of a curve is $y = 4x + \frac{1}{x}$. Find the equation of the tangent to the curve at the point where $x = 2$. (N82/P2/1ii)

3. Given that the equation of a curve is $xy = 12$, find (i) the equation of the tangent to the curve at $x = 2$, (ii) the co-ordinates of the points on the curve at which the tangent has gradient $-\frac{3}{4}$. (J83/P2/3)

4. Find the equation of the tangent to the curve $y = x^2\sqrt{8 - 2x}$ at the point $(2, 8)$. (J84/P1/15a)

5. The equation of a curve is $y = x + \frac{4}{x^2}$. Find the equation of the tangent to the curve at the point $(1, 5)$. (Sp1/10ii)

6. Find the equation of the tangent to the curve $y = x^3 - 8x^2 + 15x$ at the point $(4, -4)$. Calculate the co-ordinates of the point where the tangent meets the curve again. (J85/P1/3)

7. Find the equation of the normal to the curve $y = x^2 - 4x + 5$ at $(3, 2)$. The normal meets the curve again at Q. Find the co-ordinates of Q. (N85/P2/2)

8. The normal to the curve $y = 2x^3 - 5x^2$ at the point $(2, -4)$ crosses the x-axis at A. Calculate the co-ordinates of A. (J86/P1/1)

9. Find the equation of the tangent to the curve $y = \frac{3+x}{1-2x}$ at the point where the curve crosses the line $y = -1$. (J86/P2/6b)

10. A and B are the points on the curve $y = 3x - \frac{8}{x}$ with x co-ordinates 2 and 4 respectively. Find the x co-ordinate of the point of intersection of the tangents at A and B. (N86/P1/11i)

1. (i) $(4, -1)$

   (ii) $2y + x = 2$; $(1\frac{1}{2}, \frac{1}{4})$

2. $4y = 15x + 4$

3. (i) $y + 3x = 12$

   (ii) $(4, 3)$, $(-4, -3)$

4. $y = 6x - 4$

5. $y + 7x = 12$

6. $y + x = 0$; $(0, 0)$

7. $x + 2y - 7 = 0$; $(\frac{1}{2}, \frac{13}{4})$

8. $(-14, 0)$

9. $7y + 11 = x$

10. $2\frac{2}{3}$