# TANGENT & NORMAL
# DPP - 1

**1.** If the line $ax + by + c = 0$ is a normal to the curve $xy = 1$, then-

(A) $a, b \in R$ (B) $a > 0, b > 0$

(C) $a < 0, b > 0$ or $a > 0, b < 0$ (D) $a < 0, b < 0$

**2.** If the tangent to the curve $f(x) = x^2$ at any point $(c, f(c))$ is parallel to line joining the points $(a, f(a))$ and $(b, f(b))$ on the curve, then a,c,b are in-

(A) H.P. (B) G.P. (C) A.P. (D) A.P.andG.P. both

**3.** The graphs $y = 2x^3 - 4x + 2$ and $y = x^3 + 2x - 1$ intersect in exactly 3 distinct points. The slope of the line passing through two of these points

(A) is equal to 4 (B) is equal to 6 (C) is equal to 8 (D) is not unique

**4.** For the curve $x + t^2 - 1$, $y = t^2 - t$, the tangent line is perpendiuclar to x- axis, where

(A) $t = 0$ (B) $t = \infty$ (C) $t = \frac{1}{\sqrt{3}}$ (D) $= t - \frac{1}{\sqrt{3}}$

**5.** The slope of the tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at the point $(2, -1)$ is

(A) $\frac{22}{7}$ (B) $\frac{6}{7}$ (C) $-6$ (D) none

**6.** Angle between the tangents to the curve $y = x^2 - 5x + 6$ at the point $(2, 0)$ and $(3, 0)$ is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{3}$

**7.** The equation of the tangent at the point p(t), where t is any parameter, to the parobola $y^2 = 4ax$ is

(A) $yt = x + at^2$ (B) $y = xt + at^2$ (C) $y = tx$ (D) $y = x + \frac{a}{t}$

**8.** The values of a for which $y = x^2 + ax + 25$ touches the axis of x are

(A) $\pm 5$ (B) $\pm 10$ (C) $\pm 15$ (D) none

**Multiple Correct**

**9.** Equation of a tangent to the curve $y \cot x = y^3 \tan x$ at the point where the abscissa is $\frac{\pi}{4}$ is

(A) $4x + 2y = \pi + 2$ (B) $4x - 2y = \pi + 2$

(C) $x = 0$ (D) $y = 0$

**Match the column**

**10.** match the following columns

| | Column - I | | Column - II |
|---|---|---|---|
| (A) | The equation of the tangent to the curve $y = e^x$ at $x = 0$ is | (P) | $y = x - 1$ |
| (B) | The equation of the normal to the curve $x + y = x^y$, where it cuts the x-axis is | (Q) | $y = x + 1$ |
| (C) | The equation of the normal to the curve $y = \lvert x^2 - \lvert x \rvert \rvert$ at $x = -2$ is | (R) | $y = 2x + 2$ |
| (D) | The equation of the tangent to the curve $y = x^4 + 2e^x$ at $(0, 2)$ is | (S) | $3y = x + 8$ |

# DPP - 2

**1.** A particle moves along the curve $y = x^2 + 2x$. Then the points on the curve are the x and y coordinates of the particle changing at the same rate, are-

(A) $\left(\frac{-3}{4}, \frac{-1}{2}\right)$ (B) $\left(\frac{-1}{2}, \frac{-3}{4}\right)$ (C) $\left(\frac{3}{4}, \frac{1}{2}\right)$ (D) $\left(\frac{1}{2}, \frac{3}{4}\right)$

**2.** The length of subtangent at the point $x = a$ of the curve $ay^2 = (a+x)^2$ $(3a-x)$ is-

(A) a (B) 2a (C) 4a (D) 6a

**3.** If M $(x_0, y_0)$ is the point on the curve $3x^2 - 4y^2 = 72$, which is nearest to the line $3x + 2y + 1 = 0$, then the value of $(x_0 + y_0)$ is equal to

(A) 3 (B) – 3 (C) 9 (D) – 9

**4.** The normal to the curve, $x^2 + 2xy - 3y^2 = 0$, at (1, 1) :

(A) meets the curve again in the fourth quadrant.
(B) does not meet the curve again.
(C) meets the curve again in the second quadrant.
(D) meets the curve again in the third quadrant.

**5.** The point on the curve $y^2 = x$, the tangent at which values an angle of 45° with x-axis will be given by

(A) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (B) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (C) (2 ,4) (D) $\left(\frac{1}{4}, \frac{1}{2}\right)$

**6.** If the tangent to the curve $x + y = e^{xy}$ be parallel to the y-axis, then the point of contact is

(A) (1, 0) (B) (0, 1) (C) (1, 1) (D) none

**7.** If the parametric equation of curve is given by $x = e^t \cot$, $y = e^t \sin t$, then the tangent to the curve at the point $t = \frac{\pi}{4}$ values with the axis of the angle is

(A) 0 (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

**8.** The curve $y - e^{xy} + x = 0$ has a vertical tangent at the point

(A) (1, 1) (B) at no point (C) (0, 1) (D) (1, 0)

**9.** The tangent to the curve $y = e^{2x}$ at the pont (0 ,1) meets the x-axis of

(A) (0 ,a) (B) (2, 0) (C) $\left(-\frac{1}{2}, 0\right)$ (D) none

**10.** Match the following columns

The tangent $y = ax^2 + bx + 10$ at (1, 2) is parallel to the normal at the point (2, 3) on the curve $y = x^2 + 6x + 20$. Then

| Column - I | | Column - II | |
|---|---|---|---|
| (A) | The value of a is | (P) | 7.9 |
| (B) | The value of b is | (Q) | -15.9 |
| (C) | The value of 2a + b is | (R) | -8 |
| (D) | The value of a + b is | (S) | -0.1 |

## TANGENT & NORMAL
# DPP - 3

**1.** The line $\frac{x}{a}+\frac{y}{b}=1$ touches the curve $x^2 + y^2 = 1$ at the point

(A) (a, b) (B) $\left(\frac{1}{b},\frac{1}{a}\right)$ (C) $\left(a,\frac{a}{b}\right)$ (D) $\left(\frac{1}{a},\frac{1}{b}\right)$

**2.** If the tangent at P(1, 1) on $y^2 = x(2, - x)^2$ meets the curve again at Q then point Q is

(A) (-1, 2) (B) $\left(\frac{9}{4},\frac{3}{8}\right)$ (C) (4, 4) (D) none

**3.** The co-ordinates of the point on the curves $y = x^2 + 3x + 4$ the tangent of at which passes through the origin is equal to

(A) (2, 14) (-2, 2) (B) (2, 14) (-2, -2) (C) (2, 14) (2, 2) (D) none

**4.** If the tangent (1, 1) on $y^2 = x(2 - x)^2$ meets the curve again at P, then P is

(A) (-1, 2) (B) (4, 4) (C) $\left(\frac{9}{4},\frac{3}{8}\right)$ (D) none

**5.** The number of points on the curve $x^{3/2} + y^{3/2} = a^{3/2}$ where the tangents are equally inclined to the axes is

(A) 1 (B) 2 (C) 4 (D) none

**6.** The point on the curve $\sqrt{x}+\sqrt{y}=2a^2$ at which the tangent is equally inclined to the axies is

(A) $(4a^4, 0)$ (B) $(0, 4a^4)$ (C) $(a^4, a^4)$ (D) none

**7.** The area of the triangel formed by the tangent to the curve $y = \frac{8}{4+x^2}$ at x = 2 and the co-ordinate axes is

(A) 2 sq. units (B) 4 sq. units (C) 8 sq. units (D) $\frac{7}{2}$ sq. units

**8.** Any tangent at a point P(x, y) to the ellipse $\frac{x^2}{8}+\frac{y^2}{18}=1$ meets the co-ordinate axes in the points A and B such that the area of the triangle OAB is least, then the point P is

(A) $(\sqrt{8}, 0)$ (B) $(0, \sqrt{8})$ (C) (2, 3) (D) none

**Multiple Correct**

**9.** The tangent to the curve $y = x^2 + 3x$ will pass through the point (0, -9) if it is at the point

(A) (3, 18) (B) (1, 4) (C) (-4, 4) (D) (-3, 0)

**Match the columns**

**10.** Match the following columns

Let the equation of the curve is $y = x^3 + 3x + 4x - 1$ at $x = 0$

| | Column - I | Column - II | |
|---|---|---|---|
| (A) | The length of the tangent is | (P) | 4 |
| (B) | The length of the normal is | (Q) | 4-Jan |
| (C) | The length of the sub-tangent is | (R) | $\sqrt{7}$ |
| (D) | The length of the sub-normal is | (S) | $\sqrt{17}/4$ |

## TANGENT & NORMAL
# DPP - 4

**1.** The co-ordinates of the point P on the curve $y^2 = 2x^3$, the tangent at which is perpendicular to the line $4x - 3y + 2 = 0$ are gvien by

(A) (2, 4) (B) (0, 0) (C) $\left(\frac{1}{8}, -\frac{1}{16}\right)$ (D) none

**2.** If $y = 4x - 5$ is a tangent to the curve $y^2 = ax^3 + b$ at (2, 3) then
(A) a = 2, b = -7 (B) a = -2, b = 7 (C) a = -2, b = -7 (D) a = 2, b = 7

**3.** If the tangent to the curve $xy + ax + by = 0$ at (1, 1) is inclined at an angle $\tan^{-1} 2$ to axis of x then (a, b) is
(A) (-1, -2) (B) (-1, 2) (C) (1, -2) (D) (1, 2)

**4.** A function $y = f(x)$ has a 2nd order derivative $f'(x) = 6x - 1$. If the graph passes through the point (2, 1) and at this point tangent to the graph is $y = 3x - 1$, then the funciton is
(A) $(x - 1)^3$ (B) $(x - 1)^2$ (C) $(x + 1)^3$ (D) $(x + 1)^2$

**5.** If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $g'(3)$ is equal to
(A) –1 (B) -3/4 (C) 4/3 (D) 1

**6.** The equation to the normal to the curve $y = \sin x$ at (0, 0) is
(A) x = 0 (B) y = 0 (C) x + y = 0 (D) x - y = 0

**7.** The normal to the curve $x = a(1 + \cos\theta)$, if $a\sin\theta$ a $\theta$ alsways passes through the fixed point
(A) (a, a) (B) (a, 0) (C) (0, a) (D) none

**8.** If the normal to the curve $y = f(x)$ at the point 3, 4) makes an angle $\frac{3\pi}{4}$ with the +ve x-axis $f'(3)$ is

(A) -1 (B) $-\frac{3}{4}$ (C) $\frac{4}{3}$ (D) 1

**9.** The point on the curve whee the normal to the curve $9y^2 = x^3$ makes equal intercepts with the axes is

(A) $\left(4, \frac{8}{3}\right)$ (B) $\left(-4, \frac{8}{3}\right)$ (C) $\left(4, -\frac{8}{3}\right)$ (D) none

**10.** The normal at any point $P\left(ct, \frac{c}{t}\right)$ on the curve $xy = c^2$ meets the curve at $Q\left(ct_1, \frac{c}{t_1}\right)$ then $t_1$ is

(A) –t (B) $\frac{1}{t^2}$ (C) $-\frac{1}{t^3}$ (D) none