EXERCISE – II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. If tangent at point (1, 2) on the curve $y = ax^2 + bx + \frac{7}{2}$ be parallel to normal at (–2, 2) on the curve $y = x^2 + 6x + 10$, then

(A) a = 1 (B) a = –1 (C) b = –5/2 (D) b = 5/2

2. The co–ordinates of the point(s) on the graph of the function, $f(x) = \frac{x^3}{3} - \frac{5x^2}{2} + 7x - 4$ where the tangent drawn cut off intercepts from the co–ordinate axes which are equal in magnitude but opposite in sign is

(A) (2, 8/3) (B) (3, 7/2)
(C) (1, 5/6) (D) None of these

3. The co–ordinates of a point on the parabola $2y = x^2$ which is nearest to the point (0, 3) is

(A) (2, 2) (B) $(-\sqrt{2}, 1)$ (C) $(\sqrt{2}, 1)$ (D) (–2, 2)

4. Consider the curve $f(x) = x^{1/3}$, then

(A) the equation of tangent at (0, 0) is x = 0
(B) the equation of normal at (0, 0) is y = 0
(C) normal to the curve does not exist at (0, 0)
(D) f(x) and its inverse meet at exactly 3 points.

5. 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 is/are

(A) $x + 2y = \pi/2$ (B) $x + 2y = -3\pi/2$
(C) $x - 2y = \pi/2$ (D) $x - 2y = -3\pi/2$

6. The normal to the curve $x = a(\cos\theta + \theta \sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$ at any point 'θ' is such that

(A) It is at a constant distance from the origin
(B) It passes through $(a\pi/2, -a)$
(C) It makes angle $\pi/2 + \theta$ with the x-axis
(D) It passes through the origin

7. In the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$, at point (2, –1)

(A) length of subtangent is 7/6
(B) slope of tangent is 6/7
(C) length of tangent is $\sqrt{(85)}/6$ (D) None of these

8. If the line, ax + by + c = 0 is a normal to the curve xy = 2, then

(A) a < 0, b > 0 (B) a > 0, b < 0
(C) a > 0, b > 0 (D) a < 0, b < 0

9. If the curves $\frac{x^2}{a^2} + \frac{y^2}{4} = 1$ & $y^3 = 16x$ intersect at right angles, then values of a is/are

(A) $\frac{2}{\sqrt{3}}$ (B) 2 (C) $-\frac{2}{\sqrt{3}}$ (D) not possible

10. The equation of normal to the curve $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$ $(n \in N)$ at the point with abscissa equal to 'a' can be

(A) $ax + by = a^2 - b^2$ (B) $ax + by = a^2 + b^2$
(C) $ax - by = a^2 - b^2$ (D) $bx - ay = a^2 - b^2$

11. Let the parabolas $y = x^2 + ax + b$ and $y = x(c - x)$ touch each other at the point (1, 0). Then

(A) a = –3 (B) b = 1 (C) c = 2 (D) b + c = 3

12. For the curve represented parametrically by the equation, $x = 2\ell n \cot t + 1$ and $y = \tan t + \cot t$

(A) tangent at $t = \pi/4$ is parallel to x-axis
(B) normal at $t = \pi/4$ is parallel to y-axis
(C) tangent at $t = \pi/4$ is parallel to the line y = x
(D) tangent and normal intersect at the point (2, 1)

13. The angle at which the curve $y = ke^{kx}$ intersects the y-axis is :

(A) $\tan^{-1}(k^2)$ (B) $\cot^{-1}(k^2)$
(C) $\sin^{-1}\left(\frac{1}{\sqrt{1+k^4}}\right)$ (D) $\sec^{-1}(\sqrt{1+k^4})$

14. Which of the following pair(s) of curves is/are orthogonal

(A) $y^2 = 4ax$; $y = e^{-x/2a}$ (B) $y^2 = 4ax$; $x^2 = 4ay$
(C) $xy = a^2$; $x^2 - y^2 = b^2$ (D) $y = ax$; $x^2 + y^2 = c^2$

15. If y = f(x) be the equation of a parabola which is touched by the line y = x at the point where x = 1. Then

(A) $f'(1) = 1$ (B) $f'(0) = f'(1)$
(C) $2f(0) = 1 - f'(0)$ (D) $f(0) + f'(0) + f''(0) = 1$