CHAPTER – : APPLICATION OF DERIVATIVES

MARKS WEIGHTAGE – 09 marks

NCERT Important Questions

EXERCISE 6.2

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EXERCISE 6.3

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EXERCISE 6.5

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MISC. EXERCISE.

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SOLVED EXAMPLES.

- 8 (Pg 201)
- 11 (Pg 202)
- 12 (Pg 203)
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OBJECTIVE TYPE QUESTIONS (1 MARK)

1. The abscissa of the point on the curve $3y = 6x - 5x^3$, the normal at which passes through origin is:

(a) 1 (b) $\frac{1}{3}$ (c) 2 (d) $\frac{1}{2}$

2. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 = 2$

(a) touch each other (b) cut at right angle

(c) cut at an angle $\frac{\pi}{3}$ (d) cut at an angle $\frac{\pi}{4}$

3. The tangent to the curve given by $x = e^t \cdot \cos t$, $y = e^t \cdot \sin t$ at $t = \frac{\pi}{4}$ makes with x-axis an angle:

(a) 0 (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

4. The equation of the normal to the curve $y = \sin x$ at (0, 0) is:

(a) $x = 0$ (d) $y = 0$ (c) $x + y = 0$ (d) $x - y = 0$

5. The point on the curve $y^2 = x$, where the tangent makes an angle of $\frac{\pi}{4}$ with x-axis is

(a) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (b) $\left(\frac{1}{4}, \frac{1}{2}\right)$ (c) (4, 2) (d) (1, 1)

6. The curve $y = x^{\frac{1}{5}}$ has at (0, 0)

(a) a vertical tangent (parallel to y-axis) (b) a horizontal tangent (parallel to x-axis)

(c) an oblique tangent (d) no tangent

7. The equation of normal to the curve $3x^2 - y^2 = 8$ which is parallel to the line $x + 3y = 8$ is

(a) $3x - y = 8$ (b) $3x + y + 8 = 0$ (c) $x + 3y \pm 8 = 0$ (d) $x + 3y = 0$

8. If the curve $ay + x^2 = 7$ and $x^3 = y$, cut orthogonally at (1, 1), then the value of a is:

(a) 1 (b) 0 (c) – 6 (d) 0.6

9. If $y = x^4 - 10$ and if x changes from 2 to 1.99, what is the change in y

(a)0.32 (b) 0.032 (c) 5.68 (d) 5.968

10. The equation of tangent to the curve $y(1 + x^2) = 2 - x$, where it crosses x-axis is:

(a) $x + 5y = 2$ (b) $x - 5y = 2$ (c) $5x - y = 2$ (d) $5x + y = 2$

11. The points at which the tangents to the curve $y = x^3 - 12x + 18$ are parallel to x-axis are:

(a) (2, –2), (–2, –34) (b) (2, 34), (–2, 0) (c) (0, 34), (–2, 0) (d) (2, 2), (–2, 34)

12. The tangent to the curve $y = e^2x$ at the point (0, 1) meets x-axis at:

(a) (0, 1) (b) $\left(-\frac{1}{2}, 0\right)$ (c) (2, 0) (d) (0, 2)

13. The slope of 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) $\frac{-6}{7}$ (d) –6

14. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 - 2 = 0$ intersect at an angle of

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

15. The interval on which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing is:

(a) $[-1, \infty)$ (b) $[-2, -1]$ (c) $(-\infty, -2]$ (d) $[-1, 1]$

16. Let the $f : R \to R$ be defined by $f(x) = 2x + \cos x$, then f :

(a) has a minimum at $x = \pi$ (b) has a maximum, at $x = 0$

(c) is a decreasing function (d) is an increasing function

17. $y = x(x - 3)^2$ decreases for the values of x given by :

(a) $1 < x < 3$ (b) $x < 0$ (c) $x > 0$ (d) $0 < x < \frac{3}{2}$

18. The function $f(x) = 4\sin^3 x - 6\sin^2 x + 12\sin x + 100$ is strictly

(a) increasing in $\left(\pi, \frac{3\pi}{2}\right)$ (b) decreasing in $\left(\frac{\pi}{2}, \pi\right)$

(c) decreasing in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (d) decreasing in $\left[0, \frac{\pi}{2}\right]$

19. Which of the following functions is decreasing on $\left(0, \frac{\pi}{2}\right)$?

(a) $\sin 2x$ (b) $\tan x$ (c) $\cos x$ (d) $\cos 3x$

20. The function $f(x) = \tan x - x$

(a) always increases (b) always decreases

(c) never increases (d) sometimes increases and sometimes decreases.

21. If x is real, the minimum value of $x^2 - 8x + 17$ is

(a) -1 (b) 0 (c) 1 (d) 2

22. The smallest value of the polynomial $x^3 - 18x^2 + 96x$ in $[0, 9]$ is

(a) 126 (b) 0 (c) 135 (d) 160

23. The function $f(x) = 2x^3 - 3x^2 - 12x + 4$, has

(a) two points of local maximum (b) two points of local minimum

(c) one maxima and one minima (d) no maxima or minima

24. The maximum value of $\sin x \cdot \cos x$ is

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\sqrt{2}$ (d) $2\sqrt{2}$

25. At $x = \frac{5\pi}{6}$, $f(x) = 2\sin 3x + 3\cos 3x$ is:

(a) maximum (b) minimum (c) zero (d) neither maximum nor minimum.

26. Maximum slope of the curve $y = -x^3 + 3x^2 + 9x - 27$ is:

(a) 0 (b) 12 (c) 16 (d) 32

27. $f(x) = x^x$ has a stationary point at

(a) x = e (b) x = $\frac{1}{e}$ (c) x = 1 (d) x = $\sqrt{e}$

28. The maximum value of $\left(\frac{1}{x}\right)^x$ is

(a) e (b) e^e (c) $e^{\frac{1}{e}}$ (d) $\left(\frac{1}{e}\right)^{\frac{1}{e}}$

29. The total revenue in Rupees received from the sale of x units of a product is given by $R(x) = 3x^2 + 36x + 5$. The marginal revenue, when x = 15 is
(a) 116 (b) 96 (c) 90 (d) 126

30. On which of the following intervals is the function f given by $f(x) = x^{100} + \sin x - 1$ strictly decreasing?
(a) (0,1) (b) $\left(\frac{\pi}{2}, \pi\right)$ (c) $\left(0, \frac{\pi}{2}\right)$ (d) None of these

31. The interval in which $y = x^2 e^{-x}$ is increasing is
(a) $(-\infty, \infty)$ (b) (– 2, 0) (c) (2, ∞) (d) (0, 2)

32. The slope of the normal to the curve $y = 2x^2 + 3 \sin x$ at x = 0 is
(a) 3 (b) $\frac{1}{3}$ (c) –3 (d) $-\frac{1}{3}$

33. The line y = x + 1 is a tangent to the curve y2 = 4x at the point
(a) (1, 2) (b) (2, 1) (c) (1, – 2) (d) (– 1, 2)

34. The point on the curve $x^2 = 2y$ which is nearest to the point (0, 5) is
(a) $(2\sqrt{2}, 4)$ (b) $(2\sqrt{2}, 0)$ (c) (0, 0) (d) (2, 2)

35. For all real values of x, the minimum value of $\frac{1 - x + x^2}{1 + x + x^2}$ is
(a) 0 (b) 1 (c) 3 (d) $\frac{1}{3}$

36. The maximum value of $[x(x-1)+1]^{\frac{1}{3}}$, $0 \le x \le 1$ is
(a) $\left(\frac{1}{3}\right)^{\frac{1}{3}}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

37. A cylindrical tank of radius 10 m is being filled with wheat at the rate of 314 cubic metre per hour. Then the depth of the wheat is increasing at the rate of
(a) 1 m^3/h (b) 0.1 m^3/h (c) 1.1 m^3/h (d) 0.5 m^3/h

38. 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) $\frac{7}{6}$ (d) $\frac{-6}{7}$

39. The line y = mx + 1 is a tangent to the curve $y^2 = 4x$ if the value of m is

(a) 1 (b) 2 (c) 3 (d) $\frac{1}{2}$

40. The normal at the point (1,1) on the curve $2y + x^2 = 3$ is
(a) $x + y = 0$ (b) $x - y = 0$ (c) $x + y + 1 = 0$ (d) $x - y = 0$

41. The normal to the curve $x^2 = 4y$ passing (1,2) is
(a) $x + y = 3$ (b) $x - y = 3$ (c) $x + y = 1$ (d) $x - y = 1$

42. The points on the curve $9y^2 = x^3$, where the normal to the curve makes equal intercepts with the axes are
(a) $\left(4, \pm\frac{8}{3}\right)$ (b) $\left(4, -\frac{8}{3}\right)$ (c) $\left(4, \pm\frac{3}{8}\right)$ (d) $\left(\pm 4, \frac{3}{8}\right)$

43. The values of a for which $y = x^2 + ax + 25$ touches the axis of x are_____.

44. If f (x) = $\frac{1}{4x^2 + 2x + 1}$, then its maximum value is _____.

45. Let f have second deriative at c such that f '(c) = 0 and f□"(c) > 0, then c is a point of _____.

46. Minimum value of f if f (x) = sinx in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ is _____.

47. The maximum value of sinx + cosx is _____.

48. The curves $y = 4x^2 + 2x - 8$ and $y = x^3 - x + 13$ touch each other at the point_____.

49. The equation of normal to the curve y = tanx at (0, 0) is _____.

50. The values of a for which the function f (x) = sinx – ax + b increases on R are _____.

51. The function f (x) = $\frac{2x^2 - 1}{x^4}$, x > 0, decreases in the interval _____.

52. The least value of the function f (x) = ax + $\frac{b}{x}$ (a > 0, b > 0, x > 0) is _____.

53. The angle θ, $0 < \theta < \frac{\pi}{2}$, which increases twice as fast as its sine is _____