1. If $f(x+y) = f(x).f(y)$ for all x and y and $f(5) = 2$, $f'(0) = 3$, then $f'(5)$ will be
(a) 2 (b) 4 (c) 6 (d) 8

2. If $f(a) = 3, f'(a) = -2, g(a) = -1, g'(a) = 4$, then $\lim_{x\to a} \frac{g(x)f(a) - g(a)f(x)}{x-a} =$
(a) - 5 (b) 10 (c) - 10 (d) 5

3. If $f(x) = \cos x.\cos 2x.\cos 4x.\cos 8x.\cos 16x$ then $f'\left(\frac{\pi}{4}\right)$ is
(a) $\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$
(c) 0 (d) None of these

4. If $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$, $\frac{dy}{dx} =$
(a) $\cos\theta$ (b) $\tan\theta$
(c) $\sec\theta$ (d) cosecθ

5. Let $f(x) = \begin{vmatrix} x^3 & \sin x & \cos x \\ 6 & -1 & 0 \\ 1 & p^2 & p^3 \end{vmatrix}$ where p is a constant. Then $\frac{d^3}{dx^3}[f(x)]$ at $x = 0$ is
(a) p (b) $p + p^2$
(c) $p + p^3$ (d) Independent of p

6. If $x = \int_0^y \frac{1}{\sqrt{1+4t^2}}dt$, then $\frac{d^2y}{dx^2}$ is
(a) 2y (b) 4y (c) 8y (d) 6 y

7. The position of a point in time 't' is given by $x = a + bt - ct^2$, $y = at + bt^2$. Its acceleration at time 't' is
(a) $b - c$ (b) $(b+c)$
(c) $2b - 2c$ (d) $2\sqrt{b^2 + c^2}$

8. The rate of change of the surface area of a sphere of radius r when the radius is increasing at the rate of 2cm/sec is proportional to
(a) $\frac{l}{r}$ (b) $\frac{l}{r^2}$ (c) r (d) r^2

9. The point (s) on the curve $y^3 + 3x^2 = 12y$ where the tangent is vertical (parallel to y-axis), is are
(a) $\left[\pm\frac{4}{\sqrt{3}}, -2\right]$ (b) $\left(\pm\frac{\sqrt{11}}{3}, 1\right)$
(c) $(0,0)$ (d) $\left(\pm\frac{4}{\sqrt{3}}, 2\right)$

10. Maximum value of $\left(\frac{1}{x}\right)^x$ is
(a) $(e)^e$ (b) $(e)^{1/e}$
(c) $(e)^{-e}$ (d) $\left(\frac{1}{e}\right)^e$

11. The sum of two non-zero numbers is 4. The minimum value of the sum of their reciprocals is
(a) $\frac{3}{4}$ (b) $\frac{6}{5}$
(c) 1 (d) None of these

12. The adjacent sides of a rectangle with given perimeter as 100 cm and enclosing maximum area are
(a) 10 cm and 40 cm (b) 20 cm and 30 cm
(c) 25 cm and 25 cm (d) 15 cm and 35 cm

13. x tends 0 to π then the given function $f(x) = x\sin x + \cos x + \cos^2 x$ is
(a) Increasing
(b) Decreasing
(c) Neither increasing nor decreasing
(d) None of these

14. The function $\sin^4 x + \cos^4 x$ increase if
(a) $0 < x < \frac{\pi}{8}$ (b) $\frac{\pi}{4} < x < \frac{3\pi}{8}$
(c) $\frac{3\pi}{8} < x < \frac{5\pi}{8}$ (d) $\frac{5\pi}{8} < x < \frac{3\pi}{4}$

15. The abscissae of the points of the curve $y = x^3$ in the interval [-2, 2], where the slope of the tangent can be obtained by mean value theorem for the interval [- 2, 2] are
(a) $\pm\frac{2}{\sqrt{3}}$ (b) $\pm\frac{\sqrt{3}}{2}$
(c) $\pm\sqrt{3}$ (d) 0

16. The curves $C_1 : y = 1 - \cos x, x \in (0, \pi)$ and $C_2: y = \frac{\sqrt{3}}{2}|x| + a$ will touch each other if
(a) $a = \frac{3}{2} - \frac{\pi}{\sqrt{3}}$ (b) $a = \frac{3}{2} - \frac{\pi}{2\sqrt{3}}$
(c) $a = \frac{1}{2} - \frac{\pi}{\sqrt{3}}$ (d) $a = \frac{3}{4} - \frac{\pi}{\sqrt{3}}$

17. If $x \sin(\alpha + y) = \sin y$ and $\sec^2 y\frac{dy}{dx} = \frac{m}{(x^2 + 2nx + 1)}$. Then
(a) m - n = 1 (b) m + n = 1 (c) $m^2 + n^2 = 1$ (d) m = n

18. If $y = \tan^{-1}\sqrt{\frac{1-\sin x}{1+\sin x}}$, then the value of dy/dx at $x = \pi/6$ is
(a) -1/2 (b) ½ (c) 1 (d) -1

19. Let $f(x)$ be a polynomial function of second degree. If f(1) = f(-1) and a, b, c are in A.P., then $f'(a), f'(b), f'(c)$ are in -
(a) G.P. (b) H.P.
(c) A.G.P (d) A.P.

20. The differential of e^{x^3} with respect to log x is -
(a) $3x^2e^{x^3} + 3x^2$ (b) $3x^2e^{x^3}$
(c) $3x^3e^{x^3}$ (d) e^{x^3}

21. The tangent and normal to the curve $y = 2\sin x + \sin 2x$ are drawn at P $\left(x = \frac{\pi}{3}\right)$, then area of the quadrilateral formed by the tangent, the normal at P and the coordinate axis is-

(a) $\frac{\pi}{3}$ (b) 3π

(c) $\frac{\pi\sqrt{3}}{2}$ (d) None of these

22. If a + b + c = 0, then the equation $3ax2 + 2bx + c = 0$ has, in the interval (0, 1)

(a) At least one root (b) At most one root

(c) No root (d) None of these

23. If h(x) = f(x) + f(-x) then h(x) has got an extreme value where f '(x) is -

(a) An even function (b) An odd function

(c) Zero (d) None of these

24. The function $f(x) = \int_{-1}^{x} t(e^t - 1)(t-1)(t-2)^3(t-3)^5\,dt$ has a local max. at x =

(a) 0 (b) 1 (c) 2 (d) 3

25. $\frac{d}{dx}\left[\sin^2 \cot^{-1}\left\{\sqrt{\frac{1-x}{1+x}}\right\}\right]$ equals

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

26. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \ldots\ldots to\ \infty}}}$ then $\frac{dy}{dx} =$

(a) $\frac{x}{2y-1}$ (b) $\frac{2}{2y-1}$

(c) $\frac{-1}{2y-1}$ (d) $\frac{1}{2y-1}$

27. If $y = x^{x^{x^{\ldots\infty}}}$, then $x(1 - y\log_e x)\frac{dy}{dx}$ is

(a) x^2 (b) y^2

(c) xy^2 (d) None of these

28. If $y = x^2 + \cfrac{1}{x^2 + \cfrac{1}{x^2 + \cfrac{1}{x^2 + \ldots\infty}}}$, then $\frac{dy}{dx} =$

(a) $\frac{2xy}{2y - x^2}$ (b) $\frac{xy}{y + x^2}$

(c) $\frac{xy}{y - x^2}$ (d) $\frac{2x}{2 + \frac{x^2}{y}}$

29. The length of perpendicular from (0, 0) to the tangent drawn to the curve $y^2 = 4(x+2)$ at point (2, 4) is

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{3}{\sqrt{5}}$

(c) $\frac{6}{\sqrt{5}}$ (d) 1

30. $f(x) = xe^{x(1-x)}$ then $f(x)$ is

(a) Increasing on $\left[\frac{-1}{2}, 1\right]$ (b) Decreasing on R

(c) Increasing on R (d) Decreasing on $\left[\frac{-1}{2}, 1\right]$

31. If the line ax + by + c = 0 is a tangent to the curve xy + 2 = 0 then

(a) a > 0, b > 0 (b) a > 0, b < 0

(c) a > 0, c > 0 (d) a > 0, c < 0

32. If A + B = π/3where A, B > 0 then minimum value of secA + secB is equal to

(a) 4 (b) 8 (c) 6 (d) None of these

33. If $f(x) = x^3 + ax^2 + bx + c$ attains it's local minima at certain negative real number then

(a) $a^2 – 3b > 0, a < 0, b < 0$

(b) $a^2 – 3b > 0, a < 0, b > 0$

(c) $a^2 - 3b > 0, a > 0, b < 0$

(d) $a^2 - 3b > 0, a > 0, b > 0$

34. Let 'P' be a point on $x^2 = 4y$ that is nearest to the point A(0, 4) then co-ordinates of 'P' are

(a) (4, 4) (b) (0, 0) (c) ($\sqrt{8}$, 2) (d) (2, 1)

35. Let f "(x) > 0 $\forall$ x $\in$ R and g(x) = f(2 - x) + f(4 + x). Then g(x) is increasing in

(a) (-∞, -1) (b) (-∞, 0)

(c) (-1, ∞) (d) None

36. Tangents are drawn to $x^2 + y^2 = 16$ from the point P(0, h). These tangents meet the x-axis at A and B. If the area of triangle PAB is minimum then

(a) $h = 12\sqrt{2}$ (b) $h = 6\sqrt{2}$

(c) $h = 8\sqrt{2}$ (d) $h = 4\sqrt{2}$

37. The parabolas $y^2 = 4ax$ and $x^2 = 4$ by intersect orthogonally at point $P(x_1, y_1)$ where $x_1 . y_1 \neq 0$ provided

(a) $b = a^2$ (b) $b = a^3$ (c) $b^3 = a^2$ (d) None

38. A tangent is draw to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ so that per intercepted by the axes is minimum. The length of this part of the tangent is

(a) 11 (b) 8 (c) 9 (d) 10

39. The three sides of a trapezium are equal each being 6" long. The area of the trapezium when it is maximum is

(a) 27sq. inch (b) 21sq. inch

(c) $27\sqrt{3}$ sq.inch (d) None of these

40. Let g : R $\to$ R be a differentiable function satisfying g(x) = g(y) g(x - y) $\forall$ x, y $\in$ R and g'(0) = a and g'(3) = b then g'(- 3) is -

(a) $\frac{a^2}{b}$ (b) $\frac{a}{b}$ (c) $\frac{b}{a}$ (d) None of these

41. If f(x) = $\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}$ then $f'(x)$ at x = 1.5 is

(a) 0 (b) $-\sqrt{2}$ (c) $-\sqrt{3}$ (d) - 4

42. If $f(x) = \log_x (\ln (x))$ then $f'(x)$ at x = e is

(a) 0 (b) 1 (c) e (d) 1/e

43. If for a continuous function f, f(0) = f(1) = 0 & $f'(1) = 2$ and $g(x) = f(e^x). e^{f(x)}$ then g'(0) is equal to -

(a) 1 (b) 2 (c) 0 (d) None of these

44. Let [ ] denote the greatest integer function and $f(x) = [\tan^2 x]$. Then

(a) $\lim_{x\to 0} f(x)$ does not exist

(b) f(x) is continuous at x = 0

(c) f(x) is not differentiable at x = 0

(d) f′(0) = 1

45. If y = sin x + cos x and y_n denotes the n^{th} order derivative of y with respect to x, then at $x = \frac{\pi}{2}$, the value of

$$\begin{vmatrix} y_n & y_{n+1} & y_{n+2} \\ y_{n+3} & y_{n+4} & y_{n+5} \\ y_{n+6} & y_{n+7} & y_{n+8} \end{vmatrix}$$ is equal to -

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

46. If $f(x) = \sin\left\{\frac{\pi}{3}[x]-x^2\right\}$ for 2 < x < 3 and [x] denotes the greatest integer less than or equal to x, then $f'(\sqrt{\pi/3})$ is equal to -

(a) $\sqrt{\pi/3}$ (b) $-\sqrt{\pi/3}$ (c) $-\sqrt{\pi}$ (d) None of these

47. Let f(x) = $\sqrt{x-1}+\sqrt{x+24-10\sqrt{x-1}}$, 1 < x < 26 be real valued function, then $f'(x)$ for 1 < x < 26 is

(a) 0 (b) $\frac{1}{\sqrt{x-1}}$

(c) $2\sqrt{x-1} - 5$ (d) None of these

48. If $y = \log_e x^3 + 3\sin^{-1}x + kx^2$ and $y'\left(\frac{1}{2}\right) = 2\sqrt{3}$ then k =

(a) 6 (b) - 6 (c) $2\sqrt{3}$ (d) None

49. If $y = \tan^{-1}\left(\frac{2^x}{1+2^{x+1}}\right)$ then $\frac{dy}{dx}$ at x = 0 is

(a) $-\frac{3}{5}\log_e 2$ (b) $\frac{1}{10}\log_e 2$

(c) 2 (d) None

50. If $f(x) = \log_x (\ell nx)$ then $f'(x)$ at x = e is

(a) 1/e (b) e (c) $e^{1/e}$ (d) None of these

51. Let f(x) = Max. {x +1, |x| +1}. Then f(x) is non differentiable at

(a) 0.5 (b) 1.0 (c) 0 (d) 2.0

52. If $y = \tan^{-1}\left(\frac{2^x}{1+2^{x+1}}\right)$, then dy/dx at x = 0 is :

(a) $-\frac{3}{5}\log_e 2$ (b) $\frac{1}{10}\log_e 2$

(c) 2 (d) None of these

53. If $y = f\left(\frac{3x+4}{5x+6}\right)$ and $f'(x) = \tan x^2$ then $\frac{dy}{dx}$ is equal to

(a) $-2\tan\left(\frac{3x+4}{5x+6}\right)^2\left(\frac{1}{(5x+6)^2}\right)$ (b) $f\left(\frac{3\tan x^2+3}{5\tan x^2+6}\right)\tan x^2$

(c) $\tan x^2$ (d) None

54. If f(x) = x + tanx and f is inverse of g then g'(x) is equal to

(a) $\frac{1}{1+[g(x)-x]^2}$ (b) $\frac{1}{2+[g(x)-x^2]}$

(c) $\frac{1}{2+[g(x)-x]^2}$ (d) None

55. If $y = (1 + x)(1 + x^2)(1 + x^4)....(1 + x^{2^n})$ then $\frac{dy}{dx}$ at x = 0 is -

(a) 1 (b) 0 (c) -1 (d) None of these

56. If $y = \cos 2x^0$, then $\frac{dy}{dx} =$

(a) $\frac{-\pi}{180}\sin 2x^0$ (b) $\frac{\pi}{360°}\sin 2x^0$

(c) $\frac{\pi}{180°}\sin 2x^0$ (d) $\frac{-\pi}{360°}\sin 2x^0$

57. If the relation between subnormal SN and subtangent ST at any point S on the curve $by^2 = (x + a)^3$ is $p(SN) = q(ST)^2$, then p/q =

(a) $\frac{a}{27b}$ (b) $\frac{8a}{27b}$ (c) $\frac{8b}{27a}$ (d) $\frac{8b}{27}$

58. The curve y = f(x) is such that the area of the trapezium formed by the coordinate axis ordinate of an arbitrary point and the tangent at this point equals half the square of its abscissa. The curve is

(a) $y = cx^2 \pm x$ (b) $y = cx^2 \pm 1$

(c) $y = cx \pm x^2$ (d) $y = cx^2 \pm x \pm 1$

59. The equation of curve passing through (1, 1) in which the sub-tangent is always bisected at the origin is -

(a) $y^2 = x$ (b) $2x^2 - y^2 = 1$

(c) $x^2 + y^2 = 2$ (d) x + y = 2

60. Let f(x) is differentiable function in [0, 2]. f(0) = 0 and $f'(x) \le \frac{1}{2}\ \forall\ x \in [0, 2]$, then

(a) $|f(x)| \le 2$ (b) $f(x) \le 1$

(c) f(x) = 2x (d) f(x) = 3 for some x ∈ (0, 2)

61. The point (s) on the curve $y^3 + 3x^2 = 12y$ where the tangent is vertical is (are)

(a) $(\pm 4/\sqrt{3}, -2)$ (b) $(\pm\sqrt{11/3}, 1)$

(c) (0, 0) (d) $(\pm 4/\sqrt{3}, 2)$

62. The equation $e^{x-8} + 2x - 17 = 0$ has-
(a) Two real roots (b) One real root
(c) Eight real roots (d) Four real roots

63. The radius of the base of a cone is increasing at the rate of 3 cm/minute and the altitude is decreasing at the rate of 4 cm/minute. The rate of change of lateral surface when the radius = 7 cm and altitude = 24 cm, is -
(a) $54\pi\ cm^2$ / min (b) $7\pi\ cm^2$ / min
(c) $27\pi\ cm^2$ / min (d) None of these

64. The value of 'a' for which the equation
$x^3 - 3x + a = 0$ has two different roots in [0, 1] is given by -
(a) -1 (b) 2 (c) 1 (d) None of these

65. Let $f(x)$ and g(x) be defined and differentiable for $x \geq x_0$ and $f(x_0) = g(x_0), f'(x) > g'(x)$ for $x > x_0$, then -
(a) $f(x) < g(x)$ for some $x > x_0$
(b) $f(x) = g(x)$ for some $x > x_0$
(c) $f(x) > g(x)$ for some $x > x_0$
(d) None of these

66. If the curves $y^2 = 6x$, $9x^2 + by^2 = 16$, cut each other at right angles then the value of b is -
(a) 2 (b) 4 (c) 9/2 (d) None of these

67. If at each point of the curve $y = x^3 - ax^2 + x + 1$, the tangent is inclined at an acute angle with the positive direction of x-axis, then
(a) $a > 0$ (b) $a \leq \sqrt{3}$
(c) $-\sqrt{3} \leq a \leq \sqrt{3}$ (d) None

68. The value of c in Lagrange's theorem for the function f(x) = log sin x in the interval $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$ is
(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) None of these

69. On dropping a stone in stationary water circular ripples are observed. Rate of flow of ripples is
6 cm/sec. when radius of the circle is 10cm, then fluid rate of increase in its area is :
(a) 120 cm^2/sec (b) $\pi\ cm^2$/sec
(c) $120\pi\ cm^2$/sec (d) None

70. 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

71. The equation $e^{x-1} + x - 2 = 0$, has
(a) One real root (b) Two real roots
(c) Three real roots (d) Infinite real roots

72. 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) 22/7 b) 6/7 (c) - 6 (d) None

73. Let a, b be two different roots of a polynomial f(x). Then there exist at least one root lying between a and b of the polynomial equation-
(a) f(x) (b) $f'(x) = 0$ (c) $f''(x) = 0$ (d) None of these

74. The equation of the normal, to the curve y = x + sin x cos x at $x = \pi/2$ is
(a) x = 2 (b) $x = \pi$ (c) $x + \pi = 0$ (d) $2x = \pi$

75. If f and g are two increasing functions such that fog is defined, then-
(a) Fog is an increasing function
(b) Fog is a decreasing function
(c) Fog is neither increasing nor decreasing
(d) None of these

76. The set of all x for which log (1 + x) $\leq$ x is
(a) $(0, \infty)$ (b) $(-1, \infty)$
(c) (-1, 0) (d) None of these

77. Let $f(x) = x^3 + 6x^2 + px + 2$. If the largest possible interval, in which f(x) is a decreasing function, is (-3, -1), then p equals
(a) 9 (b) 3 (c) -2 (d) None of these

78. If $f(x) = (a + 2)x^3 - 3ax^2 + 9ax - 1$ is decreasing on R, then 'a' lies in the interval-
(a) $(-\infty, -2)$ (b) $(-2, \infty)$
(c) (-3, 0) (d) $(-\infty, -3]$

79. A truck is to be driven 300 km on a highway at a constant speed of x kmph. Speed rules of the highway required that $30 \leq x \leq 60$. The fuel costs Rs. 10 per litre and is consumed at the rate of $2 + \frac{x^2}{600}$ litres per hour. The wages of the driver are Rs. 200 per hour. The most economical speed to drive the truck, in kmph is
(a) 30 (b) 60 (c) $30\sqrt{3.3}$ (d) $20\sqrt{3.3}$

80. Let $a_n = \frac{n}{n^2 + 122}$, $n \in N$ then value of n for which a_n is largest is -
(a) 10 (b) 11 (c) 12 (d) 13

81. Let $f(x) = \begin{cases} |x| & \text{for } 0 < |x| \leq 2 \\ 1 & \text{for } x = 0 \end{cases}$. Then at x = 0, f has -
(a) A local maximum (b) No local maximum
(c) A local minimum (d) No extremum

82. A telephone company in a town has 500 subscribers on its list and collects fixed charges of Rs. 300 per subscriber per year. The company proposes to increase the annual subscription and it is believed that for every increase of Rs. 1, one subscriber will discontinue the service. What increase will bring maximum income in the company -

(a) 100 (b) 10 (c) 50 (d) 20

83. Area of the greatest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, is -

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

84. The value of the function

$f(x) = \int_{-1}^{x} t(e^t - 1)(t-1)(t-2)^3(t-3)^5\, dt$ is minimum at -

(a) x = 0 (b) x = 1
(c) x = 2 (d) x = 1 and x = 3

85. If f (x) = Max {| 6 - x^2 |, | x |}, the minimum value of f (x) in the interval [-3, 3] is -

(a) 2 (b) 6 (c) 0 (d) None of these

86. Let $f(x) = x^3 + bx^2 + cx + d$; $0 < b^2 < c$ then f(x) :

(a) Is strictly increasing (b) Has local maxima
(c) Has local minima (d) Is bounded curve

87. The minimum distance of the point (a, b, c) from x-axis is -

(a) $\sqrt{a^2 + b^2}$ (b) $\sqrt{c^2 + a^2}$
(c) $\sqrt{b^2 + c^2}$ (d) $\sqrt{a^2 + b^2 + c^2}$

88. Let $f(x) = \begin{cases} |x|, & 0 < |x| \le 0 \\ 1, & x = 0 \end{cases}$ then at x = 0, f has

(a) A local maximum (b) No local maximum
(c) A local minimum (d) No extremum

89. $f(x) = \begin{cases} 6 : & x \le 1 \\ 7 - x : & x > 1 \end{cases}$ then for f(x), x = 1 is -

(a) A point of local maxima
(b) A point of local minima
(c) Neither a point of local minima nor maxima
(d) A stationary point

90. Let $f(x) = \int_{0}^{x} t(e^t - 1)(t-1)^9(t+2)^3\ (t+4)^4 \log(t+1)\, dt$, then -

(a) f(x) attains local maxima at x = 0 only
(b) f(x) attains local minima at x = 0 and - 2
(c) f(x) does not have any point of local maxima and minima
(d) None of these

91. If $f(x) = x^x$; $[a, \infty) \to [b, \infty)$ is an invertible function then the minimum values of a & b are -

(a) $\frac{1}{e}, e^{-1/e}$ (b) e, $e^{1/e}$
(c) $\frac{1}{e}, e^{-e}$ (d) None of these

92. If $f(x) = \left(\frac{x^a}{x^b}\right)^{a+b} \cdot \left(\frac{x^b}{x^c}\right)^{b+c} \cdot \left(\frac{x^c}{x^a}\right)^{c+a}$, then f′(x) is equal to

(a) 1 (b) 0 (c) x^{a+b+c} (d) None of these

93. If 2x + 2y = 2x + y, then the value of $\frac{dy}{dx}$ at x = y = 1 is

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

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

(a) (0, 0) (b) (2, 0)
(c) (-1/2, 0) (d) None of these

95. A ladder 5 m long is leaching against a wall . The bottom of the ladder is pulled along the ground away from the wall, at the rate of 2m/sec. How fast its height on the wall decreasing when the foot of the ladder is 4 m away from the wall -

(a) $\frac{4}{3}$ m/sec (b) $\frac{8}{3}$ m/sec
(c) $\frac{10}{3}$ m/sec (d) $\frac{6}{3}$ m/sec

96. Let g ' (x) > 0 and f ' (x) < 0 $\forall$ x $\in$ R then

(a) g(f(x + 1)) > g(f(x - 1))
(b) g(g(x + 1)) < g(g(x - 1))
(c) g(f(x + 1)) < g(f(x - 1))
(d) None of these

97. The function $f(x) = \sin^4 x + \cos^4 x$ increasing if -

(a) $0 < x < \pi/8$ (b) $\pi/4 < x < 3\pi/8$
(c) $3\pi/8 < x < 5\pi/8$ (d) $5\pi/8 < x < 3\pi/4$

98. Let f(x) the n positive function differentiable on [0, a] such that f(0) = 1 and f (a) = $3^{1/6}$.
If $f'(x) \ge (f(x))^4 + (f(x))^{-2}$, then the maximum value of a is-

(a) $\pi/6$ (b) $\pi/12$ (c) $\pi/24$ (d) $\pi/36$

99. A function ' f ' is such that f ' (a) = f '' (a) = f ''' (a) = … $f^{(2n)}$ (a) = 0, and ' f ' has a local maximum value ' b' at x = a, if f (x) is equal to -

(a) $(x - a)^{2n+2}$ (b) $b - 1 - (x + 1 - a)^{2n+1}$
(c) $b - (x - a)^{2n+2}$ (d) $(x - a)^{2n+2} - b$

100. A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. The two sides having fence are of same length x. The maximum area enclosed by the park is -

(a) πx^2 (b) $\frac{3}{2} x^2$
(c) $\frac{1}{2} x^2$ (d) $\sqrt{x^3/8}$