MATHS

31. The curve $y = ax^3 + bx^2 + cx$ is inclined at 45^0 to the x-axis at (0, 0) but it touches x-axis at (1,0) then $(a,b,c) =$

1) $(1,-2,1)$ 2) $(1,2,2)$ 3) $(-1,2,-1)$ 4) $(1,0,2)$

32. The abscissa of the point other than origin on the curve $ay^2 = x^3$ the normal at which cuts off equal intercepts on the coordinate axes

1) $\frac{a}{2}$ 2) $\frac{4a}{9}$ 3) $\frac{2a}{3}$ 4) $\frac{a}{3}$

33. The value of n for which length of the sub normal of the curve $xy^n = a^{n+1}$ is constant.

1) -1 2) -2 3) -3 4) -4

34. If $x = y^2, xy = k$ cut orthogonally then $8k^2 =$

1) $\frac{1}{2}$ 2) $\frac{1}{3}$ 3) $\frac{1}{4}$ 4) 1

35. If two curves $\frac{x^2}{a^2}+\frac{y^2}{4}=1$ and $y^3=16x$. Intersect orthogonally then $3a^2$ = ____

1)1 2) 2 3) 3 4) 4

36. If at each point of the curve $y=x^3-ax^2+x+1$ the tangent is inclined at an acute angle with positive direction of x-axis then range of a is

1) $(1,\infty)$ 2) $(0,\infty)$ 3) $(-1,4)$ 4) $\left(-\sqrt{3},\sqrt{3}\right)$

37. If the tangent at (a,b) to the curve $x^3+y^3=c^3$ meets the curve again at (a_1,b_1) then $\frac{a_1}{a}+\frac{b_1}{b}=$

1) 1 2) -1 3) 2 4) -2

38. The equation of tangent to the curve $y=(2x-1)e^{2(1-x)}$ at the point of its maximum.

1) $x=1$ 2) $y=1$ 3) $x+y=1$ 4) $x-y=1$

39. If the tangent to the curve $2y^3 = ax^2 + x^3$ at the point (a,a) cuts off intercepts α, β on the coordinate axes where $\alpha^2 + \beta^2 = 61$ then $|a| =$_____

1) 16 2) 28 3) 30 4) 31

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

1) $\left(\frac{9}{4}, \frac{3}{8}\right)$ 2) $(2,0)$ 3) $\left(\frac{9}{8}, \frac{3}{4}\right)$ 4) $\left(\frac{1}{2}, \frac{3}{2}\right)$

41. An electric lamp is at a height of 20ft above the floor. An object falls freely under gravity starting from the rest at the same height as the lamp but at a horizontal distance 5ft from it. The speed of the shadow of the object on the floor when it has fallen through 16 ft.

1) $\frac{-5}{2}$ *ft* / sec 2) $\frac{-15}{4}$ *ft* / sec 3) $\frac{-25}{2}$ *ft* / sec 4) -25 *ft* / sec

42. A point P – moves on the curves $y = 2x^2$ at 4 feet per second. At what rate the inclination of tangent to the curve at P changing when P – passes through (1, 2).

1) $\frac{16}{\sqrt{17}}$ rad/sec 2) $\frac{16}{17\sqrt{17}}$ rad/sec 3) $\frac{16}{17}$ rad/sec 4) $\frac{1}{\sqrt{17}}$ rad/sec

43. An aeroplane flying horizontally at a height of $\frac{2}{3}$ miles with a velocity 15 mph the rate at which it is moving away from a fixed point on the ground when it passed over the fixed point two minutes ago

1)6 mph 2) 9 mph 3) 8 mph 4) 16 mph

44. A circular disc of area 10 sq.feet is at a distance $2\frac{1}{2}$ feet from a wall and parallel to the wall. A point source of light is moving in a straight line passing through the centre of the disc and perpendicular to it at the rate of 5 ft/sec. The rate of growth of the area of shadow of the disc on the wall when light is at 20 ft from the wall

1) $\frac{320}{343} sq.ft/\sec$ 2) $\frac{124}{343} sq.ft/\sec$ 3) $\frac{1}{343} sq.ft/\sec$ 4) $2\ sq.ft/\sec$

45. If in a triangle the side a and angle A remains constant while other elements changed slightly then $\delta b \sec B + \delta c \sec C =$

1) 0 2) 1 3) 2 4) 3

46. Let $g(x) = 2f\left(\frac{x}{2}\right) + f(2-x)$ and $f''(x) < 0$ for all $x \in (0,2)$ then the interval in which $g(x)$ is decreasing

1) $\left(0, \frac{4}{3}\right)$ 2) $\left(\frac{4}{3}, 2\right)$ 3) $(2,\infty)$ 4) $(-\infty, 0)$

47. The range of a for which $f(x)=x^3+(a+2)x^2+3ax+5$ is invertible.

1) $(1,\infty)$ 2) $(4,\infty)$ 3) $(1,4)$ 4) $(0,1)$

48. $f(x)=x+\cos x-a$ then number of positive roots of $f(x)=0$ when $a>1$

1) 4 2) 2 3) 0 4) 1

49. $f(x)=x^{\frac{1}{x}}(x>0)$ then the interval in which $f(x)$ is decreasing is____ and if $a=e^{\pi}$ $b=\pi^{e}$ then which of the following options are true

1) $(e,\infty), a<b$ 2) $(0,e), a<b$ 3) $(e,\infty), a>b$ 4) $(0,e), a>b$

50. Number of real roots of the equation $f(x)=(x-a)^3+(x-b)^3+(x-c)^3=0$

1)1 2)2 3)3 4)0

51. The equation $2\sin x=|x|+a$ has no-solution then range of a is

1) $\left(\frac{3\sqrt{3}-\pi}{3},\infty\right)$ 2) $\left(-\infty,\frac{3\sqrt{3}-\pi}{3}\right)$ 3) $(0,1)$ 4) $\left(0,\frac{3\sqrt{3}-\pi}{3}\right)$

52. If $a^2+b^2+c^2=1, x^2+y^2+z^2=1$ then maximum value of $|ax+by+cz|$ is

1)1 2) 2 3) 4 4) 6

53. A cubic polynomial vanishes at $x=-2$ and has relative minimum and maximum at $x=-1$ and $x=\frac{1}{3}$. If $\int_{-1}^{+1} f(x)dx=\frac{14}{3}$ then $f(x)=$_____

1) x^3-4x 2) x^3+x^2-x+2 3) x^3-x^2+x-2 4) x^3-x+1

54. Minimum value of $(12x+5y+6)$. If $x^2+y^2=4$

1 -5 2) -10 3) -15 4) -20

55. The semi-vertical angle of cone of maximum volume and given slant height

1) $\frac{\pi}{3}$ 2) $\frac{\pi}{4}$ 3) $\tan^{-1}2$ 4) $\tan^{-1}\sqrt{2}$

56. The sum of hypotenuse and one side of a right angled triangle is given then angle between these sides is_____ So that area of triangle is maximum

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\tan^{-1}(2)$

57. $f(x) = a\log_e|x| + bx^2 + x$ has extreme values at $x = 1$ and $x = 3$ then values of a and b

1) $a = -3/4, b = \frac{-1}{8}$ 2) $a = 3/4, b = \frac{1}{8}$

3) $a = \frac{-3}{4}, b = \frac{+1}{8}$ 4) $a = 3/4, b = -1/8$

58. $f(x) = x^{\alpha}\log_e^{x}$ If $x > 0$

$= 0$ If $x = 0$

If Rolle's theorem can be applied on [0, 1] then $\alpha =$

1) -1 2) $\frac{-1}{2}$ 3)0 4) $\frac{1}{2}$

59. If $2a + 3b + 6c = 0\,(a,b,c \in R)$ then quadratic $ax^2 + bx + c = 0$ has

1)atleast one root in [0, 1] 2) atleast on root in [2, 3]

3)It has no real roots 4)None of the above

60. A value of c for which lagranges mean value theorem holds good for $g(x) = \log_e x$ in [1, 3]

1) $2\log_3 e$ 2) $\frac{1}{2}\log_e 3$ 3) $\log_e 3$ 4) $\frac{1}{2}$