**CLASS – XII SUBJECT – MATHEMATICS ASSIGNMENT NO. 4**

1. A particle moves along the curve $y = x^2 + 2x$ at what points on the curve are the x & y co-ordinates of the particle changing at the same rate?
2. A balloon in form V at circular cone surmounted by a hemisphere having a diam. Equal to the height of the cone is being inflated. How fact is its vol. Is changing with respect to the total length h, when h = 9 cm.
3. The radius of cylinder is increasing at the rate 2cm/sec & its attitude decreasing at the rate of 3cm/sec. Find the rate of change volume where radius in 3 cm & alt. 5 cm.
4. A particle moves along the curve $y = \frac{2}{3}x^3 + 1$. Find the points on the move at which the y-co-ordinate is changing twice as fact as co-ordinate.
5. Use differentiate to find the approx. values of (i) $(0.009)^{1/3}$ (ii) $(0.007)^{1/3}$ (iii) $(255)^{1/4}$
6. Find approx. value of f (5.00) if $f(x) = x^3 - 7x^2 + 15$
7. Find the percentage curves in finagling the surface area of cubical box if an error 1% is made in mercury the length of edges of the cube.
8. Verify Rolle's Theorem for the functions $f(x) = (x - 9)^m (x - b)^n$ on the retrieval )(a, b) where m, n are +ve integers.
9. Verify Rolle's theorem for (i) f() $e^x$ / sinx – cosx ) on $\frac{n}{4}, \frac{5n}{4}$
10. Verify mean value theorem for (i) f(x) = 2sinx + sin 2x on (0, π) (ii) $f(x) = x^3 - 2x^2 - x + 3$ on (0, 1) (iii) f(x) = $10g_e^x$ on [1, 2]
11. Prove : tangents to the curve $y = x^2 - 5x + 6$ at points (2, ) and (3, 0) are at right $\angle s1$
12. Find the eg. Of normal to the curve $x = a\cos^3 O$, $y = $ as $u^3$ O at O = $\frac{\pi}{4}$
13. Find the prints on curve $9y^2 = x^3$ where normal to the curve makes equal intercepts with axes.
14. Find points on the curve xy + 4 = 0 at which tangents to curve are inclined at an angle of $45^0$ with x – axis
15. Find the equations of tangent & normal to the curves (i) a = a (or sin $\theta$) y = a (1 + cos $\theta$) at $\theta = \frac{-\pi}{2}$ (ii) $y = x^3 - x$ at x = 2 (iii) $x^2 + 3y + y^2 = 5$ at (1, 1)
16. Prove that one $\left(\frac{x}{9}\right)^n + \left(\frac{y}{9}\right)^n = 2$ touchs the st. line $\frac{x}{a} + \frac{y}{b} = 2$ for all n□N at (a, b)
17. Show that curves $xy = a^2$ and $x^2 + y^2 = 2a^2$ touch each other.
18. Find interval in which f(x) is (i) increase (ii) decrease (a) $f(x) = 2x^3 + px^2 + 12x + 20$ (ii) $f(x) = x^4 = x^3/3$ (iii) f(x) $x^3 + \frac{1}{x^3}$
19. Separate (0, $\frac{\Pi}{2}$ ) in sub-intervals in which f(x) = sin 3x in increasing or decreasing is also f(x) = $\sin^4 x + \cos^4 x$.
20. Find the intervals on which f(x) $2x^3 - 3x^3 - 3(x+7)$ is (i) strictly increasing (ii) strictly decreasing.
21. Find local max & local him. If (i) f(x) = (sinx – cos x) where 0 < x < □/2 (ii) f(x) = sin 4x + cos4x in (0, □/2)
22. Show that □ of max area inscribed in a given circle in an equivalent D.
23. Show that semi-vertical angle of cone of max vol. K of given slant is tan -1 $\sqrt{2}$