St.JOSEPH'S COLLEGE OF ENGINEERING, CHENNAI-119

St.JOSEPH'S INSTITUTE OF TECHNOLOGY, CHENNAI-119

B.E/B.TECH (COMMON TO ALL BRANCHES)-FIRST SEMESTER

MA6151/ MATHEMATICS – I

ASSIGNMENT – II UNIT-III APPLICATIONS OF DIFFERENTIAL CALCULUS

PART – A

1.	**Find the radius of curvature of $y = e^x$ at the point at (0,1)**
2.	**Find the curvature of the curve $x^2 + y^2 - 2x - 4y - 4 = 0$**
3.	**Find the evolute of the curve whose centre of curvature of the curve is $\bar{x} = 2a + 3at^2$, $\bar{y} = -2at^3$**
4.	**Define Evolutes and Involutes.**
5.	**Find the centre of curvature of the curve $y = x^2$ at the point (1,–1)**
6.	**Find the envelope of the family of lines $\frac{x}{t} + yt = 2c$, t being the parameter.**
7.	**Find the envelope of the family of straight lines $y = mx + \frac{a}{m}$, m being the parameter**
8.	**Find the envelope of the family of circles $(x-\alpha)^2 + y^2 = r^2$, α being the parameter.**

PART – B

1(a)	**Find the radius of curvature of the curve $y^2 = 4x$ at $(1,2)$**
1(b)	**Find the envelope of $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ given $a^n + b^n = c^n$, where c is a known constant**
2(a)	**Find the radius of curvature at any point θ of the cycloid $x = a(\theta + \sin\theta)$; $y = a(1 - \cos\theta)$**
2(b)	**Find the circle of curvature of the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at $\left(\frac{a}{4}, \frac{a}{4}\right)$.**
3(a)	**Find the envelope of the system of lines $\frac{x}{l} + \frac{y}{m} = 1$, where l and m are connected by the relation $\frac{l}{a} + \frac{m}{b} = 1$, l and m are the parameters.**

3(b)	**Find the equation of the circle of curvature of the rectangular hyperbola $xy = 12$ at the point $(3,4)$**
4(a)	**Find the evolute of the curve $x^{2/3} + y^{2/3} = a^{2/3}$**
4(b)	**Find the evolute of the parabola $x^2 = 4ay$ considering it as the envelope of its normal**