

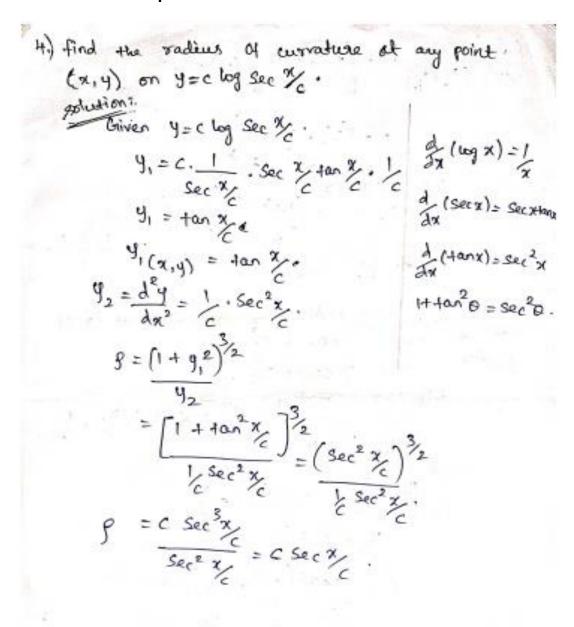
## SNS COLLEGE OF ENGINEERING Kurumbapalayam (Po), Coimbatore – 641 107



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Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

#### **Topic: 3.2 – RADIUS OF CURVATURE**

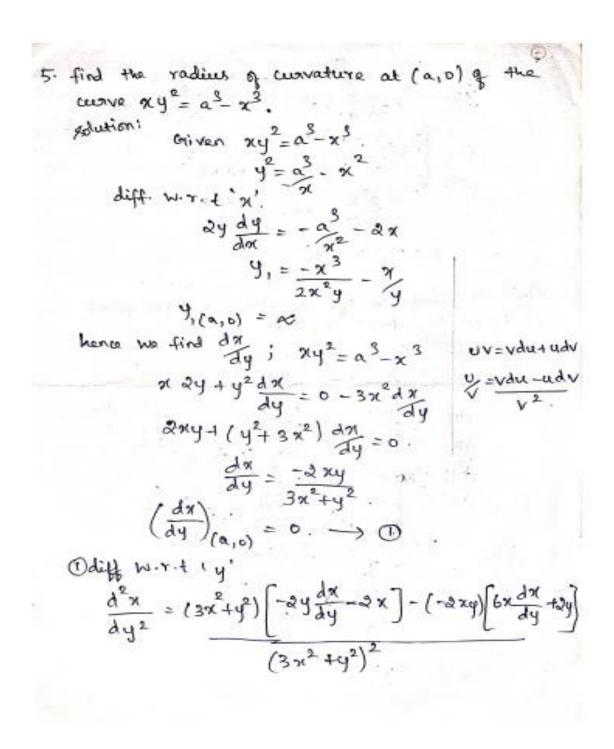




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$$\frac{d^2x}{dy^2}\Big|_{(a,0)} = \frac{(3a^2+0)[(0-aa)-0]}{(3a^2+0)^2} = \frac{-ba^3}{qa^4} = \frac{-2}{3a}$$

$$f = \left[1 + \left(\frac{dx}{dy}\right)^2\right]^{\frac{3}{2}} = \frac{(1+0)^{\frac{5}{2}}}{-\frac{2}{3}a}$$

$$f = \int \frac{d^2x}{dy^2} = \frac{(1+0)^{\frac{5}{2}}}{-\frac{2}{3}a}$$

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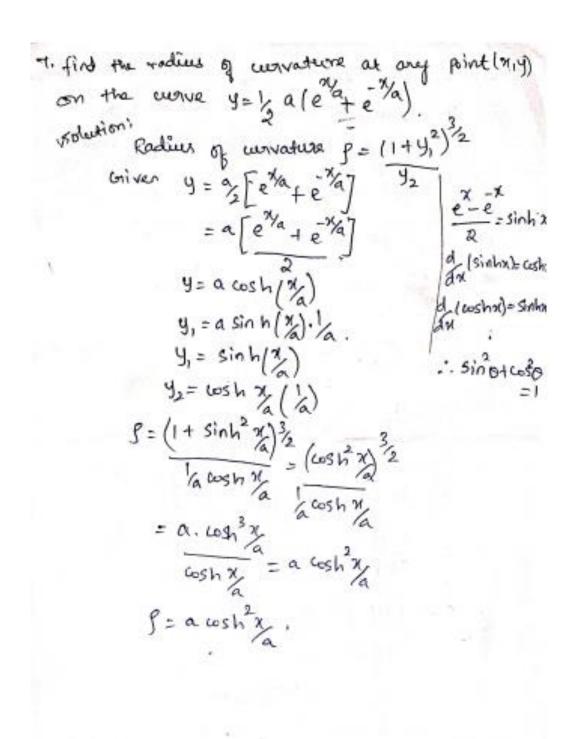
$$f = \int \frac{d^2x}{-\frac{$$



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Parametric to cartesian form;

Find the radius of curvature at any point

$$x = a \cos^3\theta$$
,  $y = a \sin^3\theta$  on the curve  $x^3 + y^3 = a^3$ .

Foliation:

Given  $x = a \cos^3\theta$ ,  $y = a \sin^3\theta$ .

$$\frac{dx}{d\theta} = 3 a \cos^3\theta (-\sin\theta) = -3a \sin\theta \cos^2\theta$$
.

$$\frac{dy}{d\theta} = 3a \sin^3\theta \cos\theta = 3a \sin^3\theta \cos\theta$$
.

$$\frac{dy}{dx} = \frac{dy}{d\theta} \cdot \frac{d\theta}{dx} = \frac{3a \sin^3\theta \cos\theta}{-3a \cos^2\theta \sin\theta}$$
.

$$\frac{d^2y}{dx^2} = \frac{d}{d\theta} \left(\frac{dy}{dx}\right) \cdot \frac{d\theta}{dx} = \frac{d}{d\theta} \left(-\tan\theta\right) \frac{d\theta}{dx}$$
.

$$= -\sec^2\theta$$

$$= -3a \cos^2\theta \sin\theta$$

$$\frac{d^2y}{dx} = \frac{d}{d\theta} \left(\frac{dy}{dx}\right) \cdot \frac{d\theta}{dx} = \frac{d}{d\theta} \left(-\tan\theta\right) \frac{d\theta}{dx}$$
.

$$= -\sec^2\theta$$

$$= -3a \cos^2\theta \sin\theta$$

$$\frac{d\theta}{dx} = -3a \cos^2\theta \sin\theta$$

$$\frac{d\theta}{dx}$$