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ELECTRICAL ELECTRONICS ENGINEERING

Parametric equation of curve are given in equation (1) and (2)

$$x = \cos t + t \sin t \quad \text{--- (1)}$$

$$y = \sin t - t \cos t \quad \text{--- (2)}$$

- (i) determine an expression for radius of curvature
- (ii) expression for the coordinate  $(h, k)$  of the centre of curvature.

Soln

$$y = \sin t - t \cos t$$

$$x = \cos t + t \sin t$$

$$\begin{aligned} \frac{dy}{dt} &= \cos t - (\cancel{t} \sin t + \cancel{\cos t}) \\ &= \cos t + t \sin t - \cos t \\ &= \cos t - \cos t + t \sin t \end{aligned}$$

$$\frac{dy}{dt} = \underline{t \sin t}$$

$$\begin{aligned} \frac{dx}{dt} &= -\sin t + (t \cos t + \sin t) \\ &= -\sin t + t \cos t + \sin t \end{aligned}$$