SELF ASSESSMENT TEST -5

CLASS B.A,B.SC-1

CURVATURE

1.Define radius of curvature.

2.Find radius of curvature at any pt of curve s = 8a $\sin^2\frac{\psi}{6}$.

3.Find $\frac{ds}{dt}$ for the curve x = a $\cos^3 t$, y = b $\sin^3 t$.

4.Find $\frac{ds}{dx}$ for the curve y = a log ($\sec\frac{x}{a}$).

5.Find $\frac{ds}{dy}$ for the curve y = a cosh $\frac{x}{a}$

6.Prove that radius of curvature at any pt on the curve $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$ is ρ^3 = 27axy

7.The tangents at two pts P & Q on the curve x =a (t+sint), y = a (1-cost) are at right angles. Show that if ρ_1 & ρ_2 are the radii the curvature at pts then $\rho_1^2+\rho_2^2=16a^2$.

8.Prove that radius of curvature at any pt P(X,Y) on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is $\frac{a^2b^2}{p^3}$ where p is perpendicular distance from the centre of the ellipse upon the tangent at P.

9.Find the curvature at $\left(\frac{3a}{2},\frac{3a}{2}\right)$ of the curve $x^3+y^3=3axy$.

10.Show that the radius of curvature at any pt on the curve $y = \frac{c}{2}\left(e^{\frac{x}{c}}+e^{\frac{-x}{c}}\right)$ is equal to the length of the normal at the same pt and it varies as the square of ordinate.

11.Show that radius of curvature for $s^2 = 8ay$ is equal to $\sqrt{16a^2-s^2}$.

12.Find the radius of curvature at the origin of curve

(a) $y^2-3xy+2x^2-x^3+y^4=0$ (b) $x^3+y^3-2x^2+6y=0$.

13.Find the co-ordinates of the centre of curvature at any pt on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ .Hence prove that the evoluteof the hyperbola is $(ax)^{\frac{2}{3}}-(by)^{\frac{2}{3}}=(a^2+b^2)^{\frac{2}{3}}$.

14.Find the radius of curvature for the curve $r^2\cos 2\theta=a^2$.

15.Show that the chord of curvature through the pole of r = a $e^{\theta\cot\alpha}$ is 2r