Tutorial-Curve Tracing) B.Sc./B. Tech Semester-I by Prof. Raj Kumar (24/10/2026)

Trace the following curves

1. $a^2y = x^3$; Cubical parabola
2. $xy^2 = 4a^2(2a - x)$;
3. $y^2(2a - x) = x^3$ Cissoid
4. $x^5 + y^5 = 5ax^2y^2$
5. $y = a\cosh\frac{x}{a}$ Catenary
6. $y(x^2 - 1) = (x^2 + 1)$
7. $y(x^2 + 4a^2) = 8a^3$
8. $a^2x^2 = y^3(2a - y)$
9. $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ or $x = a\cos^3\theta \;\; y = a\sin^3\theta$ Astroid
10. $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ Cycloid
11. $r = a + b\cos\theta \;,\; a > b$
12. $r = a(1 + \cos\theta)$ Cardiod
13. $r = a\sin 3\theta$ Three leaves rose
14. $r = a(1 - \cos\theta)$ Cardiod
15. $r = a\cos 2\theta$ Four leaves rose
16. $x = a(\theta + \sin\theta), y = a(1 + \cos\theta)$ Cycloid
17. $y^2 = x^5(2a - x)$
18. $r = a + b\cos\theta \;,\; a < b$ Limecon
19. $r^2 = a^2\cos 2\theta$
20. $r(1 - \cos\theta) = 2a$
21. $r(1 + \cos\theta) = 2a$
22. $r^2\cos 2\theta = a^2$ Hyperbola
23. $y^2 = ax^3$ Semi- cubical parabola
24. $\left(\frac{x}{a}\right)^{\frac{2}{3}} + \left(\frac{y}{b}\right)^{\frac{2}{3}} = 1$ or $x = a\cos^3\theta \;\; y = b\sin^3\theta$ Hypocycloid
25. $x = (y - 1)(y - 2)(y - 3)$
26. $x = a\cos t + \frac{1}{2}a\log\tan^2\left(\frac{t}{2}\right), y = a\sin t$ {Tractrix}
27. $x = \frac{3at}{1+t^3}; y = \frac{3at^2}{1+t^3}$
28. $x = \frac{1-t^2}{1+t^2}; y = \frac{2t}{1+t^2}$
29. $x = t^2, y = t - \frac{1}{3}t^3$
30. $x = a(\theta + \sin\theta), y = a(1 + \cos\theta)$ Cycloid
31. $x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$ Cycloid
32. $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ Cycloid

PTO

Polar Curves	Corresponding Cartesian	Name of the Curve
$r^2 \cos 2\theta = 1$	$x^2 - y^2 = 1$	Rectangular Hyperbola
$r^2 \sin 2\theta = 8$	$xy = 4$	Rectangular Hyperbola
$r \cos\theta = 2$	$x = 2$	Straight Line
$r(\sin\theta + \cos\theta) = 1$	$x + y = 1$	Straight Line
$r \cos(\theta - {}^{\pi}/_{3}) = 3$	$x + \sqrt{3}\, y = 6$	Straight Line
$r = \dfrac{4}{2\cos\theta - \sin\theta}$	$y = 2x - 4$	Straight Line
$r = \dfrac{5}{\sin\theta - 2\cos\theta}$	$y - 2x = 5$	Straight Line
$r \sin\theta = r \cos\theta$	$x = y$	Straight Line
$r^2 = 1$	$x^2 + y^2 = 1$	Circle
$r = \cos\theta + \sin\theta$	$x^2 + y^2 = x + y$	Circle
$r = 2a \cos\theta$	$x^2 + y^2 = 2ax$	Circle
$r \sin\theta = e^{r\cos\theta}$	$y = e^x$	Exponential Curve
$r = 3\cos\theta$ (*multiply by r*)	$x^2 + y^2 = 3y$	Ellipse
$r^2 + 2r^2 \sin\theta \cos\theta = 1$	$x^2 + y^2 + 2xy = 1$	Ellipse
$r\, sin^2\theta = a \cos\theta$	$y^2 = ax$	Parabola
$r \cos 2\theta = 25$	$x^2 - y^2 = 25\sqrt{x^2 + y^2}$	