

SRM Institute of Science and Technology
Ramapuram campus
Department of Mathematics
18MAB101T – Calculus and linear algebra
Year/Sem: I/I
Part-A
Branch: Common to All
Unit – IV
Differential Calculus

1.	The locus of centre of curvature is called	1 Mark	
	(a) Involute (b) Evolute (c) Radius of curvature (d) Envelope	Ans (b)	(CLO-4 Remember)
2.	The envelope of the family of curves $A\alpha^2 + B\alpha + C = 0$ (α is parameter) is	1 Mark	
	(a) $B^2 + 4AC = 0$ (b) $B^2 - 4AC = 0$ (c) $B^2 + AC = 0$ (d) $B^2 - AC = 0$	Ans (b)	(CLO-4 Remember)
3.	The curvature of the straight line is	1 Mark	
	(a) 1 (b) 2 (c) -1 (d) 0	Ans (d)	(CLO-4 Remember)
4.	Evolute of a curve is _____ of the normals of that curve	1 Mark	
	(a) Involute (b) Length (c) Envelope (d) End points	Ans (c)	(CLO-4 Remember)
5	The radius of curvature at (3,4) on the curve $x^2 + y^2 = 25$ is	1 Mark	
	(a) 5 (b) 4 (c) 0 (d) 2	Ans (a)	(CLO-4 Remember)

6.	What is the curvature of a circle of radius 3?	1 Mark	
	(a) 3 (c) $\frac{1}{3}$	(b) -3 (d) $-\frac{1}{3}$	Ans (c) (CLO-4 Remember)
7.	In an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ the radius of curvature at the end of which axis is equal to the semi-latus rectum?	1 Mark	
	(a) minor (c) vertical	(b) major (d) horizontal	Ans (b) (CLO-4 Remember)
8.	Evolute of a curve is the envelope of _____ of that curve.	1 Mark	
	(a) tangent (c) parallel	(b) normal (d) locus	Ans (b) (CLO-4 Remember)
9.	The evolute of the cycloid $x = a(\theta - \sin \theta)$, $y = a(1 - \cos \theta)$ is	1 Mark	
	(a) astroid (c) cycloid	(b) parabola (d) circle	Ans (c) (CLO-4 Remember)
10.	A curve which touches each member of a family of the curves is called – – – of that family	1 Mark	
	(a) Evolute (c) Circle of curvature	(b) Envelope (d) Radius of curvature	Ans (b) (CLO-4 Remember)
11.	Envelope of the curve $y = mx + \frac{a}{m}$ (where m is the parameter) is	1 Mark	
	(a) $x^2 + ay = 0$ (c) $y^2 - 4ax = 0$	(b) $x + 4ay = 0$ (d) $y^2 + 4ax = 0$	Ans (c) (CLO-4 Remember)

12.	If the radius of curvature and curvature of a curve at any point are ρ and k respectively, then	1 Mark	
	(a) $\rho = \frac{-1}{k}$ (b) $\rho = k$ (c) $\rho = -k$ (d) $\rho = \frac{1}{k}$	Ans (d)	(CLO-4 Remember)
13	The radius of curvature at the point $(0, c)$ of the curve $y = c \cosh \left(\frac{x}{c} \right)$ is	1 Mark	
	(a) $\rho = c$ (b) $\rho = c^2$ (c) $\rho = kc$ (d) $\rho = kc^2$	Ans (a)	(CLO-4 Remember)
14	The radius of curvature of the curve $y = e^x$ at $x=0$ is	1 Mark	
	(a) $2\sqrt{2}$ (b) $\sqrt{2}$ (c) 2 (d) 4	Ans (a)	(CLO-4 Remember)
15	The radius of curvature at the point (x, y) of the curve $y = c \log \sec \left(\frac{x}{c} \right)$ is	1 Mark	
	(a) $\rho = c \sec \left(\frac{x}{c} \right)$ (b) $\rho = c \cos \left(\frac{x}{c} \right)$ (c) $\rho = c \sin \left(\frac{x}{c} \right)$ (d) $\rho = c \tan \left(\frac{x}{c} \right)$	Ans (a)	(CLO-4 Remember)
16	The parametric form of the curve $y^2 = 4ax$ is	1 Mark	
	(a) $x = at^2; y = 2at$ (b) $x = at; y = 2at$ (c) $x = at^2; y = 2at^2$ (d) $x = 2at^2; y = 2at$	Ans (a)	(CLO-4 Remember)

17	The envelope of the curve $y = mx + \frac{a}{m}$ where m is the parameter is	1 Mark	
	(a) $y^2 - 4ax = 0$ (b) $y^2 + 4ax = 0$ (c) $x^2 + y^2 = 1$ (d) $xy = c^2$	Ans (a)	(CLO-4 Remember)
18	The radius of curvature of the curve $y = \log \sec x$ at any point on it is	1 Mark	
	(a) $\sec x$ (b) $\tan x$ (c) $\cot x$ (d) $\operatorname{cosec} x$	Ans (a)	(CLO-4 Remember)
19	The radius of curvature of the curve $x = t^2, y = t$ at $t = 1$ is	1 Mark	
	(a) $5 \frac{\sqrt{5}}{2}$ (b) $\frac{\sqrt{5}}{2}$ (c) $\frac{5}{2}$ (d) $\sqrt{5}$	Ans (a)	(CLO-4 Remember)
20	The radius of curvature of the parabola $y^2 = 12x$ at $(3, 6)$ is	1 Mark	
	(a) $12\sqrt{2}$ (b) $2\sqrt{2}$ (c) $10\sqrt{2}$ (d) $\sqrt{2}$	Ans (a)	(CLO-4 Remember)
21	The radius of curvature of the curve $y = 4 \sin x$ at $x = \frac{\pi}{2}$ is	1 Mark	
	(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $-\frac{1}{3}$	Ans (c)	(CLO-4 Remember)
22	The envelope of family of lines $y = mx + am^2$ (where m is the parameter) is	1 Mark	
	(a) $x^2 + 2ay = 0$ (b) $x^2 + 4ay = 0$ (c) $y^2 + 2ax = 0$ (d) $x^2 + 4ax = 0$	Ans (b)	(CLO-4 Remember)

23	The envelope of the family of lines $\frac{x}{t} + yt = 2c$, t being the parameter is	1 Mark	
	(a) $x^2 + y^2 = c^2$ (b) $xy = c^2$ (c) $x^2 y^2 = c^2$ (d) $x^2 - y^2 = c^2$	Ans (b)	(CLO-4 Remember)
24	The radius of curvature at any point on the curve $r = e^\theta$ is	1 Mark	
	(a) $\frac{\sqrt{2}}{r}$ (b) $\frac{r}{\sqrt{2}}$ (c) r (d) $\sqrt{2} r$	Ans (d)	(CLO-4 Remember)
25	The radius of curvature in Cartesian coordinates is	1 Mark	
	(a) $\rho = \frac{(1 + y_1^2)^{\frac{3}{2}}}{y_2}$ (b) $\rho = \frac{(1 - y_1^2)^{\frac{3}{2}}}{y_2}$ (c) $\rho = \frac{(1 + y_1^2)^{\frac{2}{3}}}{y_2}$ (d) $\rho = \frac{(1 + y_1^2)^{\frac{3}{2}}}{y_1}$	Ans (a)	(CLO-4 Remember)
26	The envelope of $ty - x = at^2$, t is the parameter is	1 Mark	
	(a) $x^2 = 4ay$ (b) $y^2 = 4ax$ (c) $x^2 + y^2 = 1$ (d) $x^2 - y^2 = 1$	Ans (b)	(CLO-4 Remember)
27	The radius of curvature in polar coordinates is	1 Mark	
	(a) $\rho = \frac{(r^2 + r'^2)^{\frac{3}{2}}}{r^2 - rr' + 2r'^2}$ (b) $\rho = \frac{(r^2 - r'^2)^{\frac{3}{2}}}{r^2 - rr' + 2r'^2}$ (c) $\rho = \frac{(r^2 - r'^2)^{\frac{3}{2}}}{r^2 - rr' + 2r'^2}$ (d) $\rho = \frac{(r^2 + r'^2)^{\frac{3}{2}}}{r^2 - rr'' + 2r'^2}$	Ans (d)	(CLO-4 Remember)

28	The radius of curvature in parametric coordinates is	1 Mark	
	(a) $\rho = \frac{\left(x'^2 + y'^2\right)^{\frac{3}{2}}}{x'y'' - y'x''}$ (b) $\rho = \frac{\left(x'^2 + y'^2\right)^{\frac{3}{2}}}{x'y'' + y'x''}$ (c) $\rho = \frac{\left(x'^2 - y'^2\right)^{\frac{3}{2}}}{x'y'' - y'x''}$ (d) $\rho = \frac{\left(x'^2 - y'^2\right)^{\frac{3}{2}}}{x'y'' + y'x''}$	Ans (a)	(CLO-4 Remember)
29	The equation of circle of curvature at any point (x, y) with center of curvature (\bar{x}, \bar{y}) and radius of curvature ρ is	1 Mark	
	(a) $(x + \bar{x})^2 + (y + \bar{y})^2 = \rho^2$ (b) $(x - \bar{x})^2 + (y - \bar{y})^2 = \rho^2$ (c) $(x - \bar{x})^2 - (y + \bar{y})^2 = \rho^2$ (d) $(x + \bar{x})^2 + (y + \bar{y})^2 = \rho^2$	Ans (b)	(CLO-4 Remember)
30	The curvature at any point of the circle is equal to____ of its radius	1 Mark	
	(a) same (b) ellipse (c) reciprocal (d) constant	Ans (c)	(CLO-4 Remember)
31	The parametric equations of rectangular hyperbola $xy = c^2$ is	1 Mark	
	(a) $x = ct, y = \frac{c}{t}$ (b) $x = ct, y = t$ (c) $x = \frac{c}{t}, y = t$ (d) $x = ct, y = \frac{1}{t}$	Ans (a)	(CLO-4 Remember)
32	The value of $\Gamma\left(\frac{1}{2}\right)$ is	1 Mark	
	(a) π (b) $\frac{\pi}{2}$ (c) $\sqrt{\pi}$ (d) $\frac{\sqrt{\pi}}{2}$	Ans (c)	(CLO-4 Remember)

33	The series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if	1 Mark	
	(a) $p = 0$ (c) $p > 1$	(b) $p = 1$ (d) $p < 1$	Ans (c) (CLO-4 Remember)
34	As per D' Alembert's ratio test, if $\sum u_n$ is a series of positive terms and $\lim_{n \rightarrow \infty} \frac{u_{n+1}}{u_n} = l$, then the series is convergent, if	1 Mark	
	(a) $l = 0$ (c) $l > 1$	(b) $l = 1$ (d) $l < 1$	Ans (d) (CLO-4 Remember)
35	If n is a positive integer, then $\Gamma(n+1) =$	1 Mark	
	(a) $(n+1)!$ (c) $2n!$	(b) $n!$ (d) $(n-1)!$	Ans (b) (CLO-4 Remember)
36	The series $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots$ is	1 Mark	
	(a) convergent (c) oscillating	(b) divergent (d) monotonic	Ans (b) (CLO-4 Remember)