NITTE (Deemed to be University) | NMAM INSTITUTE OF TECHNOLOGY

MULTIPLE CHOICE QUESTIONS

Sem: I	**Branch: CSE/AIML**
Course code: MAT103	**Course Title: CALCULUS AND DIFFERENTIAL EQUATIONS**

MAT103

UNIT-I- Differential Calculus		
1.	If φ be the angle between the tangent and radius vector at any point on the curve, $r = f(\theta)$ then $\tan\varphi$ equals to:	
	a) $\frac{dr}{ds}$	b) $r\frac{d\theta}{ds}$
	c) $r\frac{d\theta}{dr}$	d) $\frac{d\theta}{dr}$
2.	Curvature of a straight line is :	
	a) ∞	b) 0
	c) 1	d) none of these
3.	The angle between the radius vector $r = a\sin\theta$ and tangent to the curve at any point is $\varphi =$	
	a) $\frac{\theta}{2}$	b) θ
	c) 0	d) $\frac{\pi}{2}$
4.	The radius of curvature of the curve $y = x^2$ when $x = 0$ is :	
	a) $\frac{1}{\sqrt{2}}$	b) $\sqrt{2}$
	c) 2	d) $\frac{1}{2}$
5.	The polar form of the cartesian equation $x^2 + y^2 = 9$ is :	
	a) $r^2 = 81$	b) $r^2 = 18$
	c) $r = 9$	d) $r = 3$
6.	The radius of curvature of the curve $y = e^x$ at the point $(0, 1)$ is:	
	a) $2\sqrt{2}$	b) $\sqrt{2}$
	c) 2	d) $\frac{\sqrt{2}}{2}$
7.	For the polar curve $r = f(\theta)$, the relation between θ and coordinates (x, y) is:	

	a) $tan\theta = \frac{x}{y}$	b) $tan\theta = \frac{y}{x}$
	c) $x = rcos\theta$	d) $x = rsin\theta$
8.	The radius of curvature for the curve $y = f(x)$ is $\rho =$	
	a) $\frac{(1+{y_2}^2)^{3/2}}{y_1}$	b) $\frac{(1+{y_1}^2)^{3/2}}{y_2}$
	c) $\frac{(1+{y_1}^2)^{2/3}}{y_2}$	d) $\frac{(1-{y_1}^2)^{3/2}}{y_2}$
9.	The Maclaurin's series expansion of the function $f(x) = e^x$ is:	
	a) $1 - x - \frac{x^2}{2} - \frac{x^3}{6} + \cdots$	b) $1 - x + \frac{x^2}{2} - \frac{x^3}{6} + \cdots$
	c) $1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \cdots$	d) $-1 + x - \frac{x^2}{2} + \frac{x^3}{6} - \cdots$
10.	The radius of curvature at any point of the circle $x^2 + y^2 = 16$ is:	
	a) 4	b) 12
	c) 16	d) 6
11.	If φ be the angle between the tangent and radius vector at any point on the curve, $r = f(\theta)$ then $\cot\varphi$ is equals to:	
	a) $r\frac{dr}{d\theta}$	b) $\frac{1}{r}\frac{dr}{d\theta}$
	c) $r\frac{d\theta}{dr}$	d) $\frac{1}{r}\frac{d\theta}{dr}$
12.	The Taylor's series expansion of the function $f(x)$ about the point $x = a$ is:	
	a) $f(a) + (x-a)\frac{f'(a)}{1!} + (x-a)^2\frac{f''(a)}{2!} + \cdots$	b) $f(a) - (x-a)\frac{f'(a)}{1!} - (x-a)^2\frac{f''(a)}{2!} - \cdots$
	c) $f(a) + (x+a)\frac{f'(a)}{1!} + (x+a)^2\frac{f''(a)}{2!} + \cdots$	d) $f(x) + (x+a)\frac{f'(x)}{1!} + (x+a)^2\frac{f''(x)}{2!} + \cdots$
13.	If the curvature of a function $f(x)$ is zero, then which of the following functions could be $f(x)$?	
	a) $ax + b$	b) $ax^2 + bx + c$
	c) $\sin x$	d) $\cos x$
14.	The angle between the radius vector and tangent for the vector $r = ae^{\theta cot\alpha}$ is :	
	a) $\tan\alpha$	b) $\cot\alpha$
	c) α	d) θ
15.	The angle between the radius vector and tangent for the vector $r = a\theta$ is	

	a) $\tan^{-1}\frac{1}{\theta}$	b) $\tan^{-1}\theta$
	c) r	d) $\frac{a}{\theta}$
16.	The radius of curvature to the curve $x = at^2, y = 2at$ when $t = 0$ is	
	a) $2a$	b) a
	c) 2	d) $\frac{a}{2}$
17.	The radius of curvature for the curve $x = f(t), y = g(t)$ is ρ	
	a) $\frac{(x'^2+y'^2)^{3/2}}{x'y''+y'x''}$	b) $\frac{(x'^2-y'^2)^{3/2}}{x'y''-y'x''}$
	c) $\frac{(x'^2+y'^2)^{2/3}}{x'y''+y'x''}$	d) $\frac{(x'^2+y'^2)^{3/2}}{x'y''-y'x''}$
18.	The curvature of the function $f(x) = x^3 - x + 1$ at $x = 1$ is ___________	
	a) $\frac{6}{5}$	b) $\frac{6}{5}$
	c) $\frac{6}{5^{3/2}}$	d) $\frac{3}{5^{3/2}}$
19.	The radius of curvature for the curve $r = f(\theta)$ is $\rho =$_____________	
	a) $\frac{(r^2+r_1{}^2)^{3/2}}{r^2+2r_1{}^2-rr_2}$	b) $\frac{(r^2+r_1{}^2)^{3/2}}{r^2-2r_1{}^2-rr_2}$
	c) $\frac{(r^2-r_1{}^2)^{3/2}}{r^2+2r_1{}^2-rr_2}$	d) $\frac{(r^2+r_1{}^2)^{2/3}}{r^2+2r_1{}^2-rr_2}$
20.	If the curvature of a curve increases then , the radius of curvature	
	a) increases	b) decreases
	c) constant	d) none of these