	UNIT – I	
	CO- 1 – Differential Calculus	
1	The angle between the radius vector and tangent for the vector for the curve $r = ae^{\theta cot\alpha}$ is :	
	a) $\tan\alpha$	b) $\cot\alpha$
	c) α	d) θ
2	The radius of curvature of the curve $y = e^x$ at the point where it crosses the y-axis is:	
	a) $2\sqrt{2}$	b) $\sqrt{2}$
	c) 2	d) $\frac{\sqrt{2}}{2}$
3	The function $f(x) = x^2$ satisfy the Rolle's theorem in which of the following intervals:	
	a) [1, 2]	b) [0 ,1]
	c) $[-1, 1]$	d) none of these
4	The derivative of arc $\frac{ds}{dy}$ for the curve $x = f(y)$ is:	
	a) $\sqrt{1 + (\frac{dy}{dx})^2}$	b) $1 + (\frac{dy}{dx})^2$
	c) $1 + (\frac{dx}{dy})^2$	d) $\sqrt{1 + (\frac{dx}{dy})^2}$
5	If $\emptyset$ be the angle between the tangent and radius vector at any point on the curve, $r = f(\theta)$ then $tan\emptyset$ equals to:	
	a) $\frac{dr}{ds}$	b) $r\frac{d\theta}{ds}$
	c) $r\frac{d\theta}{dr}$	d) $\frac{d\theta}{dr}$
6	Curvature of a straight line is :	
	a) ∞	b) 0
	c) 1	d) none of these
7	If $f : R \rightarrow R$ is everywhere differentiable function such that f(0) = f(1) = f(2) then there exists	
	a) at least two values of $x \in [0\ 2]$ such that $f'(x) = 0$.	b) exactly two values of $x \in [0\ 2]$ such that $f'(x) = 0$
	c) at most two values of $x \in [0\ 2]$ such that $f'(x) = 0$	d) none of these
8.	The derivative of arc for the curve $y = f(x)$ is $\frac{ds}{dx} =$	

	a) $\sqrt{1+\left(\frac{dy}{dx}\right)^2}$	b) $1+\left(\frac{dy}{dx}\right)^2$
	c) $1+\left(\frac{dx}{dy}\right)^2$	d) $\sqrt{1+\left(\frac{dx}{dy}\right)^2}$
9.	If the angle between the radius vector and the tangent is constant, then the curve is:	
	a) $r = acos\theta$	b) $r^2 = a^2cos^2\theta$
	c) $r = ae^{b\theta}$	d) none of these
10.	The curvature of the curve $x = \mathrm{a}\cos t$, $y = \mathrm{a}\sin t$ is	
	a) $\frac{1}{a}$	b) $\frac{a}{2}$
	c) $\frac{\sqrt{\pi}}{2}$	d) a
11.	If $f : R \to R$ is such that it is continuous in [2 4] and differentiable in (1 3), $f(1) = f(2) = f(3) = f(4)$, then there exists	
	a) at least one value of $x \in (3,4)$ such that $f'(x) = 0$	b) at least two values of $x \in (1,3)$ such that $f'(x) = 0$
	c) at least two values of $x \in (2,4)$ such that $f'(x) = 0$	d) none of these
12.	The derivative of arc for the curve $x = f(t), y = g(t)$ is $\frac{ds}{dt} =$	
	a) $(\frac{dx}{dt})^2 + (\frac{dy}{dt})^2$	b) $\frac{dx}{dt} + \frac{dy}{dt}$
	c) $\sqrt{\frac{dx}{dt} + \frac{dy}{dt}}$	d) $\sqrt{(\frac{dx}{dt})^2 + (\frac{dy}{dt})^2}$
13.	If $r = a\theta$ and ϕ denote the angle between the radius vector and tangent, then $\tan\phi =$	
	a) $\frac{1}{\theta}$	b) θ
	c) r	d) $\frac{a}{\theta}$
14.	The radius of curvature of the curve $x = at^2, y = 2at$ at the origin is	
	a) $2a$	b) a
	c) 2	d) $\frac{a}{2}$
15.	If $f : R \to R$ is such that it is continuous in [3, 4] , differentiable in [1, 2] and $f(1) = f(2) = f(3) = f(4)$ then there exists	
	a) at least one value of x ∈ (1, 4) such that $f'(x) = 0$	b) at least three values of x ∈ (1, 4) such that $f'(x) = 0$

	c) at least two values of x ∈ (1, 4) such that $f'(x) = 0$	d) none of these
16.	The derivative of arc, $\frac{ds}{d\theta}$, for the curve $r = f(\theta)$ is :	
	a) $\sqrt{r^2 + (\frac{dr}{d\theta})^2}$	b) $\sqrt{r^2 + (\frac{d\theta}{dr})^2}$
	c) $\sqrt{1 + r^2(\frac{d\theta}{dr})^2}$	d) $\sqrt{1 + r^2(\frac{dr}{d\theta})^2}$
17.	The angle between the radius vector $r = a \sin\theta$ and tangent to the curve at any point is $\phi =$	
	a) $\frac{\theta}{2}$	b) θ
	c) 0	d) $\frac{\pi}{2}$
18.	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) $\frac{1}{2}$
19	If $g(x)$ is everywhere differentiable function such that $g(a) = g(b) = 0$ and if $f(x) = g(x) + x$ then there exists	
	a) at least one value of $x \in (a, b)$ such that $f'(x)$= 1	b) at least one value of $x \in (a, b)$ such that $g'(x) = 3$
	c) at least one value of $x \in (a, b)$ such that $f'(x)$= $g'(x)$	d) none of these
20.	The derivative of arc $\frac{ds}{dr}$, for the curve $\theta = f(r)$ is:	
	a) $\sqrt{r^2 + (\frac{dr}{d\theta})^2}$	b) $\sqrt{r^2 + (\frac{d\theta}{dr})^2}$
	c) $\sqrt{1 + r^2(\frac{d\theta}{dr})^2}$	d) $\sqrt{1 + r^2(\frac{dr}{d\theta})^2}$
21	If f : [1 4] $\rightarrow$ R is a differentiable function and $f(2) = f(3)$ then	
	a) $f'(c) = 0$ for some c ∈ (1 4)	b) $f'(c) = 0$ for some c ∈ (1 2)
	c) $f'(c) = 0$ for some c ∈ (3 4)	d) none of these
22.	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) $\cos x$
23	If $f(x)$ is everywhere differentiable function such that $f(0) = 1, f(1) = 3$ and if $f(2) = 5$ then there exists	
	a) at least two values of $x \in (0,3)$ such that $f'(x) = 2$	b) exactly two values of $x \in (0,3)$ such that $f'(x)= 2$
	c) at most two values of $x \in (0,3)$ such that $f'(x)= 2$	d) none of these
24	For the curve in polar form $\frac{r}{a} = e^{\theta}$ the value of $\frac{ds}{d\theta}$ is :	
	a) $2r$	b) $\sqrt{2}r$
	c) r^2	d) $r/2$
25	The angle between the radius vector and the tangent the curve $r = a\sin\theta$ at any point is:	
	a) θ	b) $\theta/2$
	c) $\theta/3$	d) $2\theta/3$
26	The curvature of the function $f(x) = x^3 - x + 1$ at $x = 1$ is:	
	a) $\frac{6}{5}$	b) $\frac{3}{5}$
	c) $\frac{6}{5^{3/2}}$	d) $\frac{3}{5^{3/2}}$
27	The function $f(x) = x^2$ satisfy the Rolle's theorem in which of the following intervals:	
	a) [1, 2]	b) [0 ,1]
	c) [−1, 1]	d) [-1 ,0]
28	The polar form of the cartesian equation $x^2 + y^2 = 9$ is :	
	a) $r^2 = 81$	b) $r \sin\theta = 9$
	c) $r = 9$	d) $r = 3$
29	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) $x = rsin\theta$
30	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) $\frac{(1-y_1{}^2)^{3/2}}{y_2}$

31	The value of c got by applying Lagrange's mean value theorem to the function $f(x) = x^2$ in [0 4] is:	
	a) 1	b) 2
	c) 3	d) 4
32	For the curve $y = x^2$ the value of $\frac{ds}{dx}$ at the point (1,1) is:	
	a) $\sqrt{5}$	b) 5
	c) $\sqrt{4}$	d) 4
33	For the polar curve $r = f(\theta)$, the relation between r and coordinates (x, y) is	
	a) $y = r\cos\theta$	b) $r = \sqrt{x^2 - y^2}$
	c) $r = \sqrt{x^2 + y^2}$	d) none of these
34	Two polar curves intersect orthogonally. Let ϕ_1 and ϕ_2 be respectively, the angles between the tangents and radius vector two curves with the tangents. If the value of $\tan\phi_1 = 1/3$ then:	
	a) $\tan\phi_2 = -1/3$	b) $\tan\phi_2 = 2/3$
	c) $\tan\phi_2 = -3$	d) $\tan\phi_2 = 3$
35	The radius of curvature of the circle $x^2 + y^2 = 4$ at any point on it is:	
	a) 2	b) $1/2$
	c) 4	d) $1/4$
36	Cauchy's Mean Value Theorem can be reduced to Lagrange's Mean Value Theorem by taking:	
	a) $g(x) = f(x)$	b) $g(x) = x$
	c) $g(x) = 0$	d) $g(x) = c,$ a constant
37	The curvature of a function $f(x)$ is zero, which of the following functions could be $f(x)$?	
	a) $ax + b$	b) $ax^2 + bx + c$
	c) $\sin x$	d) $\cos x$
38	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
39	Cauchy's mean value theorem can be applied to the functions $f(x) = x^3 - 2x^2$ and $g(x) = x^2$ in the interval	
	a) [−1 1]	b) [−2 1]

	c) [2 3]	d) none of these
40	For the curve $r = a\cos\theta$, the derivative of the arc, $\frac{ds}{d\theta}$ is	
	a) $a\sin\theta$	b) a
	c) a^2	d) $a\cos\theta$

CO- 2 – Partial Differentiation		
1.	If $f(x,y,z) = x^2 + xyz + z$, then the value of f_x at (1,1,1)	
	a) 0	b) 1
	c) 3	d) -1
2.	If $z = 3x^2y + 5y$ then $\frac{\partial^2 z}{\partial x \partial y}$ is :	
	a) $3xy$	b) $6x$
	c) $3x + 5$	d) $6xy$
3.	Which of the following is correct?	
	a) $\frac{\partial}{\partial x}(tan^{-1}\frac{y}{x}) = \frac{-y}{x^2+y^2}$	b) $\frac{\partial}{\partial x}(tan^{-1}\frac{y}{x}) = \frac{x}{x^2+y^2}$
	c) $\frac{\partial}{\partial x}(tan^{-1}\frac{y}{x}) = \frac{x-y}{x^2+y^2}$	d) $\frac{\partial}{\partial x}(tan^{-1}\frac{y}{x}) = \frac{x+y}{x^2+y^2}$
4.	The function $f(x,y) = x^2 + y^2 + 6x - 12$ has an extreme value at which one of the following intervals:	
	a) $(-3,0)$	b) (0,3)
	c) (0,0)	d) $(-3,-3)$
5.	If $f(x,y) = \sin(xy) + x^2 \, log(y)$, then f_{xy} at $(0, \pi/2)$	
	a) 33	b) 0
	c) 3	d) 1
6.	Which of the following is correct	
	a) $\frac{\partial}{\partial x}(\sin^{-1} xy) = \frac{y}{\sqrt{1-x^2y^2}}$	b) $\frac{\partial}{\partial x}(\sin^{-1} xy) = \frac{1}{\sqrt{1-x^2y^2}}$
	c) $\frac{\partial}{\partial x}(\sin^{-1} xy) = \frac{1}{\sqrt{1+x^2y^2}}$	d) $\frac{\partial}{\partial x}(\sin^{-1} xy) = \frac{y}{\sqrt{1+x^2y^2}}$
7	Given $f_{xx} = 6x,\ f_{xy} = 0,\ f_{yy} = 6y$ then nature of the stationary point at $(-1,2)$ is,	
	a) maximum	b) minimum
	c) saddle point	d) not an extreme
8	If $u = y^x$ then $\frac{\partial u}{\partial x}$ is	
	a) y^x	b) $y^x logy$
	c) $y^x logx$	d) xy^{x-1}
9	Which of the following is not a stationary point of $f(x,y) = x + y + \frac{1}{x} + \frac{1}{y}$?	
	a) (1,1)	b) (1,0)
	c) $(-1,1)$	d) $(1,-1)$

10	If $f(x,y,z) = x + y + z - \log z$, *then* $f_z(1,1,2)$	
	a) $1/2$	b) 1
	c) 2	d) 0
11	If $f(x,y,z) = \cos(xy) + \sin(y) + z$, then $f_x\left(\frac{1}{2}, \frac{\pi}{2}, 7\right)$	
	a) $-\frac{\pi}{2\sqrt{2}}$	b) $\frac{\pi}{4\sqrt{3}}$
	c) $-\frac{\pi}{4}$	d) $\frac{\pi}{\sqrt{2}}$
12	If $x = rcos\theta$, $y = rsin\theta$ then the value of $\frac{\partial(x,y)}{\partial(r,\theta)}$ is :	
	a) r	a) 1
	c) 0	c) r^2
13	Derivative of the function $f(x,y,z) = \sin x \sin y \sin z - \cos x \cos y \cos z$ w.r. t y is :	
	a) $f_y(x,y,z) = \sin x \cos y \sin z + \cos x \sin y \cos z$	b) $f_y(x,y,z) = \sin x \cos y \sin z + \cos x \sin y \sin z$
	c) $f_y(x,y,z) = \cos x \cos y \sin z + \cos x \sin y \cos z$	d) $f_y(x,y,z) = \sin x \cos y \sin z - \cos x \sin y \cos z$
14	If $u = y^x$ then $\frac{\partial u}{\partial y}$ is :	
	a) y^x	b) $y^x \log y$
	c) $y^x \log x$	d) xy^{x-1}
15	If $u = e^x \cos y$ and $v = e^x \sin y$ the value of $J\left(\frac{u,v}{x,y}\right)$ is :	
	a) e^{2x}	b) $\frac{e^{2x}}{2}$
	c) $\frac{-e^{2x}}{2}$	d) e^{-2x}
16	If $u = x^3 + y^3$, then $\frac{\partial^2 u}{\partial x \partial y}$ is :	
	a) -3	b) 3
	c) 0	d) $3x + 3y$
17	If $f(x,y,z) = e^{xyz}$ then $f_x(2,2,2)$ is:	
	a) $4e^8$	b) $2e^8$
	c) $8e^8$	d) e^8
18	If $x = uv$, $y = \frac{u}{v}$ then $\frac{\partial(x,y)}{\partial(u,v)}$ is :	
	a) $-2\,u/v$	b) $-2\,v/u$

	c) 0	d) 1
19	The derivative of the implicit function, $\tan^{-1} x = \tan^{-1} y$ is:	
	a) $\frac{1+x^2}{1+y^2}$	b) $\frac{1+x}{1+y}$
	c) $\frac{1+y}{1+x^2}$	d) $\frac{1+y^2}{1+x^2}$
20	If $f(x, y, z) = x^2 + xyz + z$ then f_x at (1,0,1)	
	a) 1	b) 2
	c) 3	d) 0
21	If $z = \log(x^2 + y^2)$ then $z_y(1,1)$ is	
	a) 1	b) 2
	c) 0	d) 3
22	If $f(x, y) = \sin(y + yx^2)$ the value of f_x at (0,1) is	
	a) 0	b) 1
	c) 67	d) 90
23	If $J_1 = \frac{\partial(u,v)}{\partial(x,y)}$, $J_2 = \frac{\partial(x,y)}{\partial(u,v)}$ then $J_1 J_2$ is	
	a) 2	b) 0
	c) 1	d) -1
24	If $f(x, y) = sin(x) + cos(y) + xy^2\ where\ x = cos(t);\ y = sin(t)$, then $\frac{df}{dt}$ at $t = {}^{\pi}/2$ is :	
	a) 2	b) -2
	c) 1	d) 0
25	The Jacobian of p, q, r w.r.t x, y, z given $p = x + y + z,\ q = y + z,\ r = z$ is	
	a) 0	b) 1
	c) 2	d) -1
26	If $f(x, y, z) = x^2 + y^2 + z^2$ then $f_{xx}(2,4,2)$ is :	
	a) 1	b) 2
	c) 4	d) 8
27	If $f(x)$ is a function such that $f_{xy} = 12xy^2$ then $f_{yyx} =$	
	a) $24xy$	b) $12y^2$
	c) $6x^2y^2$	d) $3x^2y^2$
28	The derivative of the implicit function, $\tan^{-1} x = \tan^{-1} y$ is:	

	a) $\frac{1+x^2}{1+y^2}$	b) $\frac{1+x}{1+y}$
	c) $\frac{1+y}{1+x^2}$	d) $\frac{1+y^2}{1+x^2}$
29	Given $u = x + y$, $v = xy$ then the Jacobian $\frac{\partial(u,v)}{\partial(x,y)}$ is :	
	a) $x + y$	b) 0
	c) $x - y$	d) 1
30	If $z = 6x^2y^2 + 8x^2$ then $\frac{\partial z}{\partial x}$ is :	
	a) $6y^2 + 16x$	b) $6x^2 + 8x^2$
	c) $12xy^2 + 16x$	d) $6x^2 + 6y^2 + 8x^2$
31	If $f(x)$ is a function such that $f_{xx} = 6xy^3$ then $f_{xyx} =$	
	a) $3xy^2$	b) $3x^2y^3$
	c) $6y^3$	d) $18xy^2$
32	If $f(x, y) = 2x^3 - 4y^2$, what is the value of f_x and f_y at (3,2)	
	a) $f_x = 54,\ f_y = -16$	b) $f_x = 16,\ f_y = -54$
	c) $f_x = 54,\ f_y = 0$	d) $f_x = -54\ f_y = -16$
33	If $u = x + y$ and $v = x - y$ the value of $J\left(\frac{u,v}{x,y}\right)$ is :	
	a) -2	b) 2
	c) 1	d) 0
34	If $f(x, y) = x^2y + x$ where $x = t$ and $y = t^2$ then the value of $\frac{df}{dt}$ when $t = 1$ is :	
	a) 2	b) 4
	c) 1	d) 5
35	If $f(x, y) = \sin(xy + x^3y)$ then f_x at (0,1) is:	
	a) 2	b) 5
	c) 1	d) 0
36	If $x = r\cos\theta$, $y = r\sin\theta$ then the value of $\frac{\partial(x,y)}{\partial(r,\theta)}$ is :	
	a) r	b) θ
	c) r^2	d) 1
37	If $z = 3xy + 4x^2$,then value of $\frac{\partial z}{\partial x}$ is	
	a) $3y + 8x$	b) $3x + 4x^2$
	c) $3xy + 8x$	d) $3y + 3x + 8x$

38	Given $f_{xx} = x^2,\ f_{xy} = 8,\ f_{yy} = y^2$, then the nature of the stationary point at $(\sqrt{2}, \sqrt{2})$ is,	
	a) Maximum	b) Minimum
	c) Saddle point	d) No maxima & minima
39	If $f(x,y) = x + y$, where $x = \sin t$; $y = \cos t$ then the value of $\frac{df}{dt}$ at $t = \pi/2$	
	a) 2	b) -2
	c) 1	d) 0