G.S.Mandal's

Marathwada Institute of Technology, Aurangabad

Department of Basic Sciences and Humanities

QUESTION BANK

Title of the Subject: Engineering Mathematics-I	
Title of the Unit: Linear Algebra-Matrices	**Unit No:- 1**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	If the rank of A is 2 then rank of A transpose is a)2 b)0 c)4 d) None of these	**1**
2	If the rank of A is 2 and the rank of B is 3 then the rank of AB is a)2 b)3 c)6 d) Depends on matrix AB	**1**
3	The rank of the matrix $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$ is equal to a)2 b)3 c)1 d) None of these	**1**
4	The Eigen values of a triangular matrix are a) The elements of its principal diagonal b) The elements of its non diagonal c) 0 d) None of these	**1**
5	Solving the equations $x + 2y + 3z = 0, 3x + 4y + 4z = 0, 7x + 10y + 12z = 0$, we get a) $x = y = z = 0$ b) $x = y = z = 1$ c) $x = 1, y = 2, z = 3$ d) None	**1**
6	The eigen values of $A = \begin{bmatrix} 1 & 1 \\ 2 & 5 \end{bmatrix}$ are the roots of equation a) $\lambda^2 - 6\lambda + 3 = 0$ b) $\lambda^2 + 6\lambda + 3 = 0$ c) $\lambda^2 - 6\lambda - 3 = 0$ d) None	**1**

7	A square matrix A is said to be Orthogonal if a) $A = A^2$ b) $A' = A^{-1}$ c) $AA^{-1} = I$ d) None of these	1
8	The product of eigen values of a matrix $A = \begin{bmatrix} 2 & -3 \\ 4 & -2 \end{bmatrix}$ is a) 8 b)4 c)1 d) None of these	1
9	IF $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ then $A(adjA)$ is equal to a) $\begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 10 \\ 10 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 10 & 1 \\ 1 & 10 \end{bmatrix}$ d) None of these	1
10	If a matrix $A = \begin{bmatrix} x & 2 \\ 1 & x-1 \end{bmatrix}$ is singular then x is equal to a) 2,-1 b)3,1 c)0,1 d) None of these	1

Short Answer Question

Question No.	Question Description	Expected Marks
1	Find the rank of $\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$ by converting to normal form.	2
2	Find rank of A=$\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & 1 \end{bmatrix}$	2
3	Define normal form of matrix.	2
4	Find eigen values of matrix A , where: A=$\begin{bmatrix} 1 & 2 \\ 5 & 4 \end{bmatrix}$	2
5	Obtain characteristic equation of matrix A=$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$	2
6	If the matrix form of system of non-homogeneous linear equation is $AX = D$ & $C = [A/D]$ then, discuss the condition of consistency of given system	2
7	Define rank of matrix and find rank by converting matrix A into canonical form $\begin{bmatrix} 1 & -1 & 2 \\ 4 & 2 & -1 \\ 2 & 2 & -2 \end{bmatrix}$.	2
8	Find Eigen values for $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$	2
9	Check the consistency $x + y + 3z = 0, x - y + z = 0, -x + 2y = 0$	2
10	Find rank of A=$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 8 & 12 \\ -1 & 7 & 3 \end{bmatrix}$	2

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Determine the values of α & β, such that system of equation : $x+y+z=6, x+2y+3z=10; x+2y+\alpha z=\beta$ has (i) no solution; (ii) unique solution (iii) infinite number of solution	**5**
2	find the value of k so that the system has the non-trivial solution $8\mathrm{x}-4\mathrm{y}-6\mathrm{z}=0; 3\mathrm{x}+\mathrm{y}-\mathrm{kz}=0; 2\mathrm{x}+4\mathrm{y}-\mathrm{z}=0$.	**5**
3	Discuss the consistency of equation and hence solve $x+2y+3z=14, 2x-y+3z=8, 3x+y-4z=0$	**5**
4	Find the rank of the matrix: $\begin{bmatrix} 3 & 1 & 4 & 6 \\ 2 & 1 & 2 & 4 \\ 4 & 2 & 5 & 8 \\ 1 & 1 & 2 & 2 \end{bmatrix}$	**5**
5	Find the Eigen vector for the lowest Eigen value for $\begin{bmatrix} 0 & -1 & -2 \\ 2 & 3 & 2 \\ 1 & 1 & 3 \end{bmatrix}$.	**5**
6	Solve: $2x-2y+5z+3w=0; 4x-y+z+2w=0; 3x-7y+3z+4w=0; x-3y+3z+3w=0$	**5**
7	Use Gauss –Jordan method to find inverse of the matrix $\begin{bmatrix} 8 & 4 & -3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$	**5**
8	Test the consistency and solve if possible: $x+y+z=6; \quad x-y+2z=5;$ $3x+y+z=8; \quad 2x-2y+3z=7$.	**5**

9	Using the CALEY-HAMILTON theorem find the inverse of matrix : $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$	**5**
10	Find the rank of the matrix by reducing to normal form A= $\begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$	**5**

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QUESTION BANK

Title of the Subject: Engineering Mathematics-I	
Title of the Unit: Partial Differentiation	**Unit No:- 2**

Multiple Choice Questions

Question No.	**Question Description**	**Expected Marks**
1	If $u = x^3 + y^3$ then $\frac{\partial^2 u}{\partial x \partial y}$ is equal to a) 0 b)3 c)-3 d) None of these	**1**
2	If $u = x^y$ then $\frac{\partial u}{\partial y}$ is equal to a) $x^y \, logx$ b)0 c) $y \, x^{y-1}$ d) None of these	**1**
3	If $z = \log(x^3 + y^3 - x^2y - xy^2)$, then $x\frac{\partial z}{\partial x} + \, y\frac{\partial z}{\partial y}$ is equal to a) 3 b)2 c)0 d) None of these	**1**
4	$u = \frac{\sqrt{x} - \sqrt{y}}{\sqrt{x} + \sqrt{y}}$ is a homogeneous function of degree a) 0 b)1 c) $\frac{1}{2}$ d) None of these	**1**

5	If $u = \cos^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{y}{x}\right)$, then $x^2 u_{xx} + 2xy\, u_{xy} + y^2 u_{yy}$ is equal to a) u b) $2u$ c) 0 d) None of these	1
6	If $u = log\left(\frac{x^2}{y}\right), then\ x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to a) u b) $2u$ c) 1 d) None of these	1
7	If u is a function of x and y , and y is the function of x, then which of the following is true? a) $\frac{du}{dx} = \frac{\partial u}{\partial t} + \frac{\partial u}{\partial y}\frac{dy}{dx}$ b) $\frac{du}{dx} = \frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}\frac{dy}{dx}$ c) $\frac{du}{dx} = \frac{\partial u}{\partial x} + \frac{\partial u}{\partial t}\frac{\partial t}{\partial x}$ d) None	1
8	If $u = f\ (x, y) = c$, then) $\frac{dy}{dx}$ is equal to a) $-\frac{fx}{fy}$ b) $-\frac{fy}{fx}$ c) $\frac{fx}{fy}$ d) None of these	1
9	If $u = f\ (\frac{y}{x})$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to a) $2u$ b) u c)0 d) None of these	1
10	If $z = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right), then\ x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y}$ is equal to a) 0 b) $tanz$ c) $2\,tanz$ d) None of these	1

Short Answer Question

Question No.	Question Description	Expected Marks
1	If $u = x.log(xy)$ where $x^3 + y^3 + 3xy = 1$. Find $\frac{du}{dx}$	2
2	If $u = (x^2 + y^2 + z^2)$ Prove that, $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 2$ u .	2
3	If $u = (\ 1 - 2xy + y^2\ )^{\frac{-1}{2}}$ Find $\frac{\partial u}{\partial x}$	2
4	If $u = (\ 1 - 2xy + y^2\ )^{\frac{-1}{2}}$ Find $\frac{\partial u}{\partial x}$	2
5	If $u = \log\,(x^2 + y^2)$. Prove that, $\frac{\partial^2 u}{\partial x.\partial y} = \frac{\partial^2 u}{\partial y.\partial x}$	2
6	Find $\frac{dz}{dt}$ if $z = xy^2 + x^2y, x = at^2, y = 2at$	2
7	State Euler’s theorem for a function u of two variables	2
8	u = $\frac{x^3+y^3}{y\sqrt{x}}$ is a homogeneous function of degree n=...........	2
9	Find $\frac{dy}{dx}$, if $x^4 + y^4 = 5a^2xy$	2

10	$If\ u = x^2 + y^2 + z^2\ where\ x = e^t, y = e^t\,sint, z = e^t\,cost$ Find $\frac{du}{dt}$	2

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Prove Euler's theorem for a function u of two variables	5
2	If $u = \log(tanx + tany + tanz)$ then prove that, $sin2x\frac{\partial u}{\partial x} + sin2y\frac{\partial u}{\partial y} + sin2z\frac{\partial u}{\partial z} = 2.$	5
3	If $z(x+y) = x^2 + y^2$ then show that, $\{\frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}\}^2 = 4\left[1 - \frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}\right].$	5
4	If $u = ax + by, v = bx - ay,$ then find the value of $(\frac{\partial x}{\partial u})_v \cdot (\frac{\partial x}{\partial v})_u.$	5
5	If $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ Prove that, $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x.\partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{-sinu.cos2u}{4cos^3 u}$	5
6	If $z = f(u,v), where\ u = xcos\theta - ysin\theta, v = xsin\theta + ycos\theta, show\ that$ $x\frac{\partial Z}{\partial x} + y\frac{\partial Z}{\partial y} = u\frac{\partial Z}{\partial u} + v\frac{\partial Z}{\partial v}$	5
7	If $u = \log(x^3 + y^3 - x^2y - xy^2),$ Prove that, $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x.\partial y} + y^2\frac{\partial^2 u}{\partial y^2} = -3.$	5
8	If $z = f(x,y), x = e^u + e^v, y = e^u - e^v$.Prove that, $\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y}.$	5
9	Find $\frac{dy}{dx}$, if $x^4 + y^4 = 5a^2xy$	5
10	$If\ u = x^2 + y^2 + z^2\ where\ x = e^t, y = e^t\,sint, z = e^t\,cost$ Find $\frac{du}{dt}.$	5

QUESTION BANK

Title of the Subject: Engineering Mathematics-I	
Title of the Unit: Applications of Partial Differentiation	Unit No:- 3

Multiple Choice Questions

Question No.	Question Description	Expected Marks
1	If $J_1 = \frac{\partial(u,v)}{\partial(x,y)}$ and $J_1 = \frac{\partial(x,y)}{\partial(u,v)}$ then $J_1 J_2$ is equal to a) 1 b) -1 c) 0 d) None of these	1
2	If $r = \frac{\partial^2 f}{\partial x^2}$, $s = \frac{\partial^2 f}{\partial x \, \partial y}$ and $= \frac{\partial^2 f}{\partial y^2}$, then the condition for saddle point is a) $rt - s^2 < 0$ b) $rt - s^2 > 0$ c) $rt - s^2 = 0$ d) None of these	1
3	If $x = uv , y = \frac{u}{v}$ then $J =$......... a) $\frac{-2u}{v}$ b) $\frac{2u}{v}$ c) $\frac{u}{v}$ d) 0	1
4	If $x = rcos\theta$, $y = rsin\theta$ then the Jacobian of the given transformation is a) $2r$ b) r c) $\frac{1}{r}$ d) 0	1
5	The stationary point of the function $f\ (x, y) = x^3 + 3x^2y - 15x^2 - 15y^2 + 72x$ are a) $(0,3) and\ (6,0)$ b) $(4,0) and\ (6,0)$ c) $(4,0) and\ (0,3)$ d) None	1
6	The first two terms of Maclaurin's series expansion of $f\ (x, y) = e^x siny$ is a) $y + xy$ b) $xy + \frac{x^2}{2}$ c) $2\,x^2y + xy$ d) None of these	1
7	The second term of Taylor's series expansion of $f\ (x, y) = e^{xy}$ at (1,1) is a) e b) $e\ [(x-1) + (y-1)]$ c) $\frac{e^2}{2}$ d) None of these	1
8	The minimum value of the function $f\ (x, y) = x^3 + y^3 - 3xy$ is a) -1 b) 1 c) 2 d) None of these	1

9	If $r = \frac{\partial^2 f}{\partial x^2}$, $s = \frac{\partial^2 f}{\partial x \partial y}$ and $= \frac{\partial^2 f}{\partial y^2}$, then the condition for maxima and minima is a) $rt - s^2 < 0, rt - s^2 > 0$ b) $rt - s^2 > 0, rt - s^2 < 0$ c) $rt - s^2 = 0$ d)None	1
10	The value of $\frac{\partial(u,v)}{\partial(u,v)}$ is equal to a) 1 b) 0 c) 2 d) None of these	1

Short Answer Question

Question No.	Question Description	Expected Marks
1	If $x = rcos\theta$, $y = rsin\theta$ $then\ Find\ the\ value\ of\ J^*$.	
2	If $x = e^u cosv , y = e^u sinv$ $Find\ the\ value\ of\ J$.	
3	If $x = v^2 + w^2 , y = w^2 + u^2 , z = u^2 + v^2$ $Find\ the\ value\ of\ J$.	
4	Write Taylor's series expansion formula for $f(x, y)$ at (a, b).	
5	Write Maclaurin's series expansion formula for $f(x, y)$.	
6	If $x = a(u + v)$, $y = b(u - v)$ then $Find\ the\ value\ of\ J$.	
7	Expand $f(x, y) = e^{x+y}$ by Maclaurin's theorem	
8	Find only stationary points for the function $f(x, y) = x^2 + y^2 + 6x + 12$	
9	Find only stationary points for the function $f(x, y) = x^3 + 3 - 3axy$	
10	Write the formula for voume of largest rectangular parallelepiped and greatest rectangular parallelepiped.	

Long Answer Question

Question No.	Question Description	Expected Marks
1	If $F = xu + v - y , G = u^2 + vy + w$, $H = zu - v + vw$, $Comput$ $\frac{\partial(F,G,H)}{\partial(u,v,w)}$	5
2	If $x = a\ cos\xi cosh\eta$ and $y = a\ sinh\xi sin\eta$, $show\ that$ $\frac{\partial(x,y)}{\partial(\xi,\eta)} = \frac{a^2}{2}(cosh2\xi - cos2\eta)$	5
3	If $x = rcos\theta$, $y = rsin\theta$, Verify that $\frac{\partial(x,y)}{\partial(r,\theta)} \cdot \frac{\partial(r,\theta)}{\partial(x,y)} = 1$	5
4	Expand $f(x, y) = sinx\ siny$ as far as terms of third degree.	5

5	Expand $f(x,y) = e^x \, siny$ at $(-1, \frac{\pi}{4})$ as far as terms of third degree.	5
6	Discuss the maxima and minima of function $f(x,y) = x^3y^2(1-x-y)$	5
7	Find the maximum and minimum value of the function $f(x,y) = cosx + cosy + \cos(x+y)$	5
8	Find the minimum value of the function $f(x,y,z) = x^2 + y^2 + z^2$ when $xyz = a^3$	5
9	Find the maximum and minimum distances of the point $(3,4,12)$ from the sphere $x^2 + y^2 + z^2 = 1$	5
10	Find the minimum value of the function $f(x,y,z) = x^m y^n z^p$ when $x + y + z = a$	5

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QUESTION BANK

Title of the Subject: Engineering Mathematics-I	
Title of the Unit: Reduction Formulae and Curve Tracing	**Unit No:- 4**

Multiple Choice Questions

Question No.	Question Description	Expected Marks
1	$\int_0^{\frac{\pi}{2}} sin^2 x . dx =$..... a) $\frac{\pi}{4}$ b) 0 c) 2 d) None of these	1
2	A curve $xy = c$ is symmetric about a) Y-axis b) $Y = X$ c) X-axis d) X=2a	1
3	The equation of the asymptote to the curve $y = \frac{x}{(1+x^2)}$ is	1

	a) $x=0$ b) $x=\pm 1$ c) $y=0$ d) $y=x$	
4	The curve $x=a\cos^3\theta, y=a\sin^3\theta$ is symmetric about a) Y-axis b) $Y=X$ c) X-axis d) X=a	1
5	The curve $r=a\sin 3\theta$,is symmetrical about a) Initial line b) Pole c) $\theta=\pi$ d) $\theta=\pi/2$	1
6	The equation of the tangents at origin for the curve $y^2(a-x)=x^3$ is/are a) $x=0$ b) $y=0$ c) $x=0, y=0$ d) $x=a$	1
7	Find $\frac{dy}{dx}$ at $\theta=0$, for the curve $x=a(\theta+\sin\theta), y=a(1-\cos\theta)$ a) 1 b) -1 c) 0 d) ∞	1
8	Find the point of intersections with X-axis for the curve $y^2(4-x)=x(x-2)^2$ is/are a) $(0,0)$ b) $(0,2)$ c) $(0,4)$ d) $(0,0)$ and $(0,2)$	1
9	For the curve $a^2x^2=y^3(2a-y)$ at the origin is a) Node point b) singular point c) Cusp point d) $y=\pm a$	1
10	The equation of the asymptote to the curve $y^2(x^2-1)=x$ is a) $x=0$ b) $x=\pm 1$ c) $y=0$ d) X=2a	1

Short Answer Question

Question No.	Question Description	Expected Marks
1	Find the asymptote to curve $a^2x^2=y^2(x^2+a^2)$.	2
2	Find the region of existence to curve $x^2(2a-y)=y^3$	2
3	The curve $x^{\frac{1}{2}}+y^{\frac{1}{2}}=a^{\frac{1}{2}}$ is symmetric about ……………	2
4	1) Find the asymptote to curve $xy^2=4a^2(2a-x)$.	2
5	The curve $x=a\cos t$, $y=a\sin t$ is symmetric about………..	2

6	Find the points of intersection of the curve $a^2x^2 = y^3(2a - y)$	2
7	The curve cycloid $x = a(\theta + sin\theta), y = a(1 + cos\theta)$ is symmetric about ……	2
8	Find the region of existence to curve $y^2(a + x) = x^2(a - x)$.	2
9	Evaluate: $\int_0^{\frac{\pi}{2}} sin^3\theta\ cos^4\theta . d\theta$	2
10	Evaluate: $\int_0^{\frac{\pi}{4}} sin^4 2x\ \ dx$	2

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Trace the curve $a^4y^2 = x^2(a^2 - x^2)$ with full justification	5
2	Trace the curve $y^2(x + a) = x^2(3a - x)$.	5
3	Trace the cycloid $x = a(\theta + sin\theta), y = a(1 - cos\theta)$.	5
4	Trace the curve $y = c \cosh\left(\frac{x}{c}\right)$	5
5	Trace the curve $y(x^2 + 4a^2) = 8a^3$	5
6	Trace the curve $x\,y^2 = 4a^2(2a - x)$.	5
7	Trace the curve $y^2(a^2 - x^2) = x^2(a^2 + x^2$	5
8	Trace the curve $x^{\frac{1}{2}} + y^{\frac{1}{2}} = a^{\frac{1}{2}}$	5

9	$Evaluate: \int_0^{\pi} x\sin^5 x\cos^4 x\ dx$	5
10	Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sin^4\theta}{(1+\cos\theta)^2}.d\theta$	5

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QUESTION BANK

Title of the Subject: Engineering Mathematics-I	
Title of the Unit: Multiple Integrals	**Unit No:- 5**

Multiple Choice Questions

Question No.	**Question Description**	**Expected Marks**
1	$\int_1^2\int_0^x dx.dy = \cdots \ldots..$ a) $\frac{3}{2}$ b) $\frac{1}{2}$ c) -1 d) 3	1
2	Area of the closed region bounded by two Cartesian curves is given by, a) Area=$\int\int dx\,dr$ b) Area= $\int\int dx\,dy$ c) Area=$\int\int x\,dx\,dy$ d) None of these	1
3	The polar form of the integral. $\int_y^a\int_0^a dx.dy$ $is.$ a) $\int_0^{\frac{\pi}{2}}\int_0^{a\cos\theta} r.dr.d\theta$ b) $\int_0^{\frac{\pi}{4}}\int_0^{a\cos\theta} r.dr.d\theta$ c) $\int_0^{\frac{\pi}{4}}\int_0^{a\sec\theta} r.dr.d\theta$ d) None of these	1
4	$\int_1^2\int_0^{3y} y.dx.dy = \cdots \ldots..$ a) 3 b) 5 c) 7 d) 9	1

5	For $\int_0^{\infty}\int_x^{\infty} f(x,y)\,dx.dy$ by change of order of integration we get, a) $\int_x^{\infty}\int_0^{\infty} f(x,y)\,dx.dy$ b) $\int_0^{\infty}\int_0^{x} f(x,y)\,dx.dy$ c) $\int_0^{\infty}\int_0^{y} f(x,y)\,dx.dy$ d) $\int_0^{\infty}\int_0^{\infty} f(x,y)\,dx.dy$	**1**
6	For $\int_0^{a}\int_0^{y} f(x,y)\,dx.dy$,the change of order is a) $\int_0^{y}\int_0^{a} f(x,y)dx.dy$ b) $\int_0^{a}\int_x^{a} f(x,y)\,dx.dy$ c) $\int_0^{a}\int_a^{x} f(x,y)\,dx.dy$ d) $\int_0^{a}\int_a^{y} f(x,y)dx.dy$	**1**
7	Area of the closed region bounded by two Polar curves is given by, a) Area=$\int\int dr\,d\theta$ b) Area=$\int\int dx\,dy$ c) Area=$\int\int x\,dr\,d\theta$ d) None of these	**1**
8	$\int_0^{\frac{\pi}{2}}\int_0^{sin\theta} r\,dr\,d\theta = \cdots\ldots.$ a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{8}$ d) 0	**1**
9	$\int\int dx\,dy$ gives a) Area of region b) Perimeter of region c) Volume of a region d) None of these	**1**
10	The value of integral $\int_0^{1}\int_0^{2}\int_0^{3} x^2dx.dy.dz$ is a) 2/3 b) 4/3 c) $3/2$ d) $1/3$	**1**

Short Answer Question

Question No.	Question Description	Expected Marks
1	Evaluate $\int_0^{1}\int_0^{y} x.dxdy$	**2**
2	Show the region of integration for $\int_0^{1}\int_x^{x^2} f(x,y).dxdy$	**2**
3	Change the order of integration $\int_0^{1}\int_0^{x} f(x,y).dxdy$	**2**
4	Evaluate $\int_0^{\pi}\int_0^{sin\theta} r^3.drd\theta$	**2**
5	Evaluate$\int_0^{1}\int_0^{x}\int_0^{x-y} dxdydz$	**2**
6	Find the limits of inner and outer integral of $\int\int x^2y^2dx\,dy$ over the first quadrant of the circle $x^2 + y^2 = 4$.	**2**
7	Evaluate$\int_0^{1}\int_0^{2}\int_0^{3} xyzdxdydz$	**2**

8	Shade the region of integration for $\int_0^1 \int_0^x f(x,y).dxdy$	**2**
9	Change the integration in polar form: $\int_0^a \int_0^{\sqrt{a^2-x^2}} sin\left[\frac{\pi}{a^2}(a^2-x^2-y^2)\right]$dx dy	**2**
10	Evaluate : $\int_0^{\pi} \int_0^{a} r sin\theta$ dr dθ	**2**

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Evaluate: $\int\int xy\, dx\, dy$ over the area bounded by parabola $y = x^2$ & $y^2 = -x$	**5**
2	Evaluate $\int\int(x^2 - y^2)dx\, dy$ over the area of the triangle whose vertices are at the points$(0,1)$, $(1,1)$& $(1,2)$.	**5**
3	Evaluate $\int\int r^2\ dr\, d\theta$ between the circles: $r = 2\sin\theta$ & $r = 4\sin\theta$.	**5**
4	Evaluate by changing to polar form $\int_0^{\frac{a}{\sqrt{2}}} \int_y^{\sqrt{a^2-y^2}} \log(x^2+y^2)\, dx\, dy; (a > 0)$	**5**
5	Change the order of integration : $\int_0^a \int_0^{\frac{a^2}{x}} f(x,y)dx\, dy$	**5**
6	Express the following double integral as a single term integral & hence evaluate:$\int_{-3}^{2} \int_{2-y}^{5} dx\, dy + \int_2^7 \int_{y-2}^{5} dx\, dy$	**5**
7	Change the order of integration:$\int_0^2 \int_{1-y}^{1+y} f(x,y)dx\, dy$	**5**
8	Evaluate $\int_0^{\log 2} \int_0^{x} \int_0^{x+y} e^{x+y+z}\, dx\, dy\, dz$	**5**
9	Evaluate : $\int\int\int \frac{dx\, dy\, dz}{(x+y+z+1)^3}$ over the volume of tetrahedrons bounded by coordinate planes & the plane $x + y + z = 7$	**5**
10	Evaluate $\int_{-1}^{1} \int_0^{x} \int_{x-z}^{x+z} (x+y+z)\, dx\, dy\, dz$	**5**