Subject Code: 22MA101BS	SET-I	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech I Sem Regular& Supply End Examinations, January-2024

Matrices & Calculus

Common to ECE, AIML, CSC, CSM, CSD, CSE, IT, CSIT

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

****

PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	Find the rank of the matrix $A=\begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 6\\ 3 & 6 & 9\end{bmatrix}$ by echelon form	1M	CO1	L2
	b	Write Gauss -Seidel Iteration Method	1M	CO1	L1
	c	Write any two properties of Eigen values	1M	CO2	L1
	d	State Cayley – Hamilton Theorem	1M	CO2	L1
	e	State Lagrange's mean value theorem.	1M	CO3	L1
	f	Define Gamma function	1M	CO3	L1
	g	Find the first order partial derivative of $\log(x^2+y^2)$	1M	CO4	L2
	h	Write the necessary conditions for maxima and minima	1M	CO4	L1
	i	Evaluate $\int_0^2\int_0^x y\,dy\,dx$	1M	CO5	L5
	j	Evaluate $\int_0^1\int_0^1\int_0^1 (x+y+z)\,dz\,dy\,dx$	1M	CO5	L5

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Find the rank of the matrix $A=\begin{bmatrix}1 & 2 & 1 & 0\\ -2 & 4 & 3 & 0\\ 1 & 0 & 2 & -8\end{bmatrix}$ by using echelon form	5M	CO1	L3
	b	Find the inverse of the matrix $A=\begin{bmatrix}1 & 3 & 3\\ 1 & 4 & 3\\ 1 & 3 & 4\end{bmatrix}$ by using Gauss-Jordon method	5M	CO1	L3

Subject Code: 22MA101BS	SET-I	HT NO:			7	R					

OR

3	a	Solve the system of equations $x + y + 2z = 4$, $2x - y + 3z = 9$, $3x - y - z = 2$ using Gauss elimination method.	5M	CO1	L5
	b	Solve the system of equations $8x + 3y + 2z = 13$, $x + 5y + z = 7$ $2x + y + 6z = 9$ using Gauss Seidel iteration method	5M	CO1	L5
4		Verify Cayley – Hamilton Theorem for the matrix $A=\begin{bmatrix} 3 & 4 & 1 \\ 2 & 1 & 6 \\ -1 & 4 & 7 \end{bmatrix}$ and hence find A^{-1} and A^4	10M	CO2	L3

OR

5		Reduce the quadratic for $3x^2 - 2y^2 - z^2 - 4xy + 8xz + 12yz$ to canonical form by an orthogonal transformation.	10M	CO2	L2
6	a	Verify Rolle's theorem for the $f(x) = e^{-x} \sin x \ in (0, \pi)$	5M	CO3	L3
	b	Verify Cauchy's mean value theorem for the function $f(x) = x^2$ *and* $g(x) = x^3$ *in* $[1,2]$	5M	CO3	L3

OR

7	a	Obtain Taylor's series expansion for the function $f(x) = \cos x$ in powers of $(x - \frac{\pi}{4})$	5M	CO3	L3
	b	Show that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$	5M	CO3	L3
8	a	If $u = f(y-z, z-x, x-y)$ then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$	5M	CO4	L2
	b	If $u = x^2 - 2y$, $v = x + y + z$ and $w = x - 2y + 3z$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$	5M	CO4	L2

OR

9		Find the volume of the largest parallelopiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$	10M	CO4	L2
10	a	Evaluate $\int_0^{4a} \int_{x^2/4a}^{\sqrt{2ax}} dx\,dy$ by change of order of integration.	5M	CO5	L5
	b	Find the area of the cardiod $r = a(1 - \cos\theta)$	5M	CO5	L2

OR

11		Find the volume of the sphere $x^2 + y^2 + z^2 = a^2$	10M	CO5	L2

CO : Course Outcomes BL : Bloom's Taxonomy Levels L 1 : Remembering

L 2 : Understanding L 3 : Applying L 4 : Analysing L 5 : Evaluating L 6 : Creating

*****