RV Educational Institutions
RV College of Engineering

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi | Approved by AICTE, New Delhi

AIML 7

DEPARTMENT OF MATHEMATICS

Course: Fundamentals of Linear Algebra, Calculus and Statistics	**CIE-I (QUIZ & TEST)**	**Maximum marks: 10+50=60**
Course code: 22MA11C	**First semester 2022-2023** **Chemistry Cycle** **Branch: AI, BT, CD, CS, CY, IS, SPARK-C**	**Time: 9.15am to 11.15am** **Date: 17-01-2023**

Instructions to candidates:

*i. **Part A must be answered within the first two pages of the Booklet.***
*ii. **Answer all questions.***

Q.No	PART- A	M	BT	CO
1.1	The rank of the Matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{bmatrix}$ for $a = b \neq c$ is __________.	2	2	1
1.2	The value of p for which the following set of equations will have no solution is ______. $2x + 3y = 5$, $3x + py = 10$	2	2	1
1.3	If $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$, then eigenvalues of A^{-1} are _______.	2	2	2
1.4	The transformation of the Lemniscate $r^2 = 2\cos 2\theta$ in cartesian system is_______________.	2	1	2
1.5	If $x = at^2$ and $y = 2at$, then the radius of curvature ρ for the given curve is_______.	2	2	2

Q.No	PART -B	M	BT	CO
1	Test the consistency of the following system $3.0x_1 + 2.0x_2 + 2.0x_3 - 5.0x_4 = 8.0$, $0.6x_1 + 1.5x_2 + 1.5x_3 - 5.4x_4 = 2.7$, $1.2x_1 - 0.3x_2 - 0.3x_3 + 2.4x_4 = 2.1$. Solve if the system is consistent.	10	3	1
2	The currents $i_1,\ i_2,\ i_3$ in the paths of an electrical network follow the linear equations $i_1 - i_2 + i_3 = 0, 3i_1 + 2i_2 = 7, 2i_2 + 4i_3 = 8$. Determine $i_1,\ i_2,\ i_3$ using Gauss-Jordan elimination method.	10	3	4
3	Employ the Rayleigh's Power method to estimate the dominant eigenvalue and its associated eigen vector for the matrix $A = \begin{bmatrix} 3 & 2 & 3 \\ 2 & 6 & 6 \\ 3 & 6 & 3 \end{bmatrix}$ by taking $[1 \quad 1 \quad 1]^T$ as initial eigenvector. Perform 6 iterations. (Consider 4 decimal places)	10	2	2
4 (a)	The temperature u_1, u_2, u_3 of a metal plate under some circumstances is given by: $u_1 - 8u_2 + 3u_3 + 4 = 0$, $2u_1 + u_2 + 9u_3 = 12$, $8u_1 + 2u_2 - 2u_3 = 8$. Solve for the temperatures using Gauss- Seidel iterative method. Carry out 3 iterations. (Consider 4 decimal places)	6	3	3
4(b)	Show that the curves $r = a\theta$ and $r = \frac{a}{\theta}$ intersect orthogonally.	4	2	2
5	Find the circle of curvature of $b^2x^2 + a^2y^2 = a^2b^2$ at a point of its intersection with the y-axis.	10	2	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	14	20	16	10	2	32	26	--	-	-