PRN:		Course Code :	USS113R

First Year **B. Sc.** End Semester Examination Winter 2023

Mathematics I

Day and Date: Friday, 15/12/2023 Max Marks: **50**

Time : 2.00 to 4.00PM Duration: **02** hrs

Instructions: 1. All questions are compulsory.

2. Use of non-programmable calculator is allowed.

		Marks	Bloom's Level	CO
Q.1	**Attempt any two from the following**			
a)	Find A^{-1} by adjoint method, where $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$.	06	L_3	CO1
b)	Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 3 & 0 & 5 \end{bmatrix}$ by using the row echelon form.	06	L_2	CO1
c)	Reduce the following matrix to normal form and hence find rank. $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$.	06	L_2	CO1
Q.2	**Attempt any two from the following**			
a)	State and prove Lagrange's mean value theorem.	06	L_1	CO2
b)	Verify Rolle's theorem for the following function $f(x) = \sin x + \cos x + 7, x \in [0,2\pi]$.	06	L_3	CO2
c)	Verify Cauchy's mean value theorem for the function $f(x) = x^2$ and $g(x) = x^3$ in $[1,2]$.	06	L_3	CO2
Q.3	**Attempt the following**			
a)	Find the square root of $z = -8 - 6i$	06	L_2	CO3
b)	If $5\sin hx - \cos hx = 5$ then find $\tan hx$.	07	L_2	CO3
	or			
b)	Use De-Moivre's theorem to simplify $\left(\cos\frac{\pi}{10} - i\sin\frac{\pi}{10}\right)^{15}$	07	L_2	CO3
Q.4	**Attempt the following**			
a)	Solve the following system of equations using matrix method : $x + y + z = 6, x - y + z = 2, 2x + y - z = 1.$	06	L_4	CO1
b)	If $y = a\cos(\log x) + b\sin(\log x)$ then prove that $x^2y_2 + xy_1 + y = 0$.	07	L_2	CO2
	or			
b)	Express $\frac{3+2i}{2-3i}$ in the standard form $x + iy$.	07	L_2	CO3

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