PRN:		Course Code :	U22PC102

First Year **B. Sc.** End Semester Examination Winter 2024 000617

Mathematics-I

Day and Date: Wed 11 1 DEC 2024 Max Marks: **35**

Time : 10:30AM To 12:30PM Duration: **02** hrs

Instructions: 1) All questions are compulsory.
2) Assume suitable data wherever necessary.
4) Non-programmable calculator is allowed.

Q.1	**Attempt the following**	**Marks**	**Bloom's Level**	**CO**
a)	Rank of matrix is (i)unique (ii) not unique (iii)different (iv) always one	01	L1	CO1
b)	Rank of identity matrix I_n is (i) n (ii)n+1 (iii) n+2 (iv) zero	01	L1	CO1
c)	The function $f(x)=\lvert x-1\rvert$ is not differentiable at (i)x=0 (ii)x=1 (iii)x=-1 (iv)x=2	01	L1	CO2
d)	$e^{i\theta}=\cos\theta+i\sin\theta$ is known as (i)Euler's theorem (ii) Euler's rule (iii)Euler's (iv) none of these	01	L1	CO3
e)	The value of $\frac{e^{i\theta}-e^{-i\theta}}{2i}$ is (i) $\cos\theta$ (ii) $\sin\theta$ (iii) $\tan\theta$ (iv) None of these	01	L1	CO3
f)	The value of $\frac{e^{i\theta}+e^{-i\theta}}{2}$ is (i) $\cos\theta$ (ii) $\sin\theta$ (iii) $\tan\theta$ (iv) None of these	01	L1	C04
g)	n^{th} roots of unity form a series (i)In G.P. (ii)In A.P (iii)In H.P. (iv)None of these	01	L1	C04

Q.2	**Attempt any one the following**			
a)	Find the rank of matrix by reducing to Echelon form $A=\begin{bmatrix}3 & 2 & -1\\ 4 & 2 & 6\\ 7 & 4 & 5\end{bmatrix}$	07	L2	CO1

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	b)	Find the rank of matrix by reducing to normal form $A=\begin{bmatrix} 0 & 1 & 2 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$	07	L3	CO1
Q.3		**Attempt any one the following**			
	a)	Test for consistency and solve the following system of equation $2x-y+3z=8, -x+2y+z=4, 3x+y-4z=0$	07	L2	CO1
	b)	Solve the given system of equation $x-4y+5z=0, 3x+2y+z=0, 2x-y+3z=0$	07	L2	CO1
Q.4		**Attempt any one the following**			
	a)	State and prove Rolles's theorem.	07	L3	CO2
	b)	State and prove Lagrange's Mean Value theorem.	07	L3	CO2
Q.5		**Attempt any one the following**			
	a)	Prove that i) $(\sin\theta+i\cos\theta)^n=\cos n\left(\frac{\pi}{2}-\theta\right)+i\sin n\left(\frac{\pi}{2}-\theta\right)$	07	L2	CO3
		d ii) $\left[\frac{1+\sin\phi+\cos\phi}{1+\sin\phi+\cos\phi}\right]^n=\cos\left(\frac{n\pi}{2}-n\phi\right)+i\sin\left(\frac{n\pi}{2}-n\phi\right)$			
	b)	Separate into real and imaginary part $\tan(\alpha+i\beta)$	07	L4	CO4

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