PRN:		Course Code :	U22PC102

First Year **B. Sc.** End Semester Examination Summer 2024

Mathematics-I

Day and Date: 25 MAY 2024, Sat Max Marks: **35**

Time : 02:00PM To 04:00PM Duration: **02** hrs

Instructions:
1. All questions are compulsory.
2. Assume suitable data wherever necessary and mention it clearly.
3. Use of non-programmable calculator is allowed.

Q.1	**Attempt the following Question.**	Marks	Bloom's Level	CO
a)	The rank of the matrix $A=\begin{bmatrix}1&2&3\\2&4&6\\3&6&9\end{bmatrix}$ is A. 0 B. 1 C. 2 D. 3	1	L1	CO1
b)	If for a system of equations $AX=0$ rank of A is less than number of unknowns then system has A. no solution B. non-trivial solution C. unique solution D. trivial solution	1	L1	CO1
c)	The system of linear equation $x-2y=4, 4x-8y=3$ has A. no solution B. non-trivial solution C. unique solution D. trivial solution	1	L3	CO1
d)	If the eigen values of A are $1,-1,5$ then eigen values of A^3 are A. $1,-1,25$ B. $1,-1,125$ C. $1,1,25$ D. $1,1,125$	1	L2	CO1
e)	If the function $f(x)$ is such that $f'(x)=0$ for all values of x in (a,b), then the function must be A. always zero B. constant C. increasing D. decreasing	1	L1	CO2
f)	The value of $\frac{1}{(\cos\theta-i\sin\theta)^2}$ is A. $\cos 2\theta+i\sin 2\theta$ B. $\cos 2\theta-i\sin 2\theta$ C. $-\cos 2\theta+i\sin 2\theta$ D. $-\cos 2\theta-i\sin 2\theta$	1	L3	CO3
g)	The exact value of $\sin h(ln2)$ A. $\frac{3}{4}$ B. $\frac{5}{4}$ C. $\frac{1}{2}$ D. 5	1	L3	CO4

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Q.2	**Attempt any one of the following.**				
a)	Find the rank of the following matrix by using normal form $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$.	7	L2	1
	OR			
b)	Test for consistency and if possible solve the equations given below $6x+y+z=-4;\quad 2x-3y-z=0;\quad x+7y+2z=-7.$	7	L3	2
Q.3	**Attempt any one of the following.**			
a)	Verify Rolle's theorem for $f(x)=\lvert x\rvert;\ [-2,2]$.	7	L2	3
b)	Verify Cauchy's Mean Value theorem for $f(x)=3x+2,\ g(x)=x^2+1;$ on $[1,4]$.	7	L2	3
Q.4	**Attempt any one of the following.**			
a)	Simplify $\dfrac{(\cos 2\theta - i\sin 2\theta)^5(\cos 3\theta + i\sin 3\theta)^6}{(\cos 4\theta + i\sin 4\theta)^7(\cos\theta - i\sin\theta)^6}$	7	L3	4
b)	Find all the values of $(-1)^{1/5}$.	7	L3	4
Q.5	**Attempt any one of the following.**			
a)	If x is real then prove that $\cosh^{-1}x=\log\left(x+\sqrt{x^2-1}\right)$.	7	L1	5
c)	Solve the equation $7\cosh x+8\sinh x=1$ for real values of x.	7	L2	5

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