LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **MATHEMATICS**

FIRST SEMESTER – **NOVEMBER 2024**

UMT1MC01 – ALGEBRA

Date: 09-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A - K1 & K2 (CO1)

Q.No	Levels	Answer ALL the Questions (10 x 2 = 20)
1	K1	Determine a cubic equation whose roots are $-3, 1$ and 2.
2		Define multiple roots.
3		State the property II of Newton's Theorem on the sums of the power of the roots.
4		Find the eigen values of $\begin{pmatrix} 3 & 0 \\ 0 & 4 \end{pmatrix}$.
5		Define non singular matrix.
6	K2	State Fermat's Theorem.
7		Write the expansion of $\log(1+x)$.
8		Find the value of $\phi(5)$.
9		Write the expansion of e^x and e^{-x}.
10		State Strum's Theorem of equal roots.

SECTION B – K3 & K4 (CO2)

		Answer ALL the Questions (4 x 10 = 40)
11	K3	Find the equation $x^5+4x^3-x^2+11=0$ whose roots are diminished by 3.
		[OR]
12		State and prove the property I of Newton's Theorem on the sums of the power of the roots.
13		Using inverse of matrix method solve the system of equations $\begin{matrix} 2x+3y-5=0 \\ x-2y+1=0 \end{matrix}$.
		[OR]
14		State and establish De Gua's rule.
15	K4	Find a positive root of $x^3+24x-50=0$ correct to 4 decimal places using Horner's method.
		[OR]
16		State and prove Wilson's Theorem.
17		Obtain log7 to the base 10 by square roots only upto 5 decimal places.
		[OR]
18		Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$.

SECTION C – K5 & K6 (CO3)

	Answer ALL the Questions (2 x 20 = 40)
19	Find the equation by removing the second term of the equation $x^4+8x^3+x-5=0$.

20	K5	[OR] If α,β,γ are the roots of the equation $x^3+px^2+qx+r=0$, Find the equation whose roots are $\alpha^2,\beta^2,\gamma^2$.

21	K6	Diagonalise the matrix $\begin{pmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{pmatrix}$.
		[OR]
22		State and prove Lagrange's theorem. Sum to infinity the series $1+\frac{1+2}{2!}+\frac{1+2+2^2}{3!}+\frac{1+2+2^2+2^3}{4!}+\ldots$

$$$$$$$$$$$$$$$$