SHRI RAMSWAROOP MEMORIAL UNIVERSITY
End Semester Examination (2021-22)-Odd Semester

B. Tech (BT) - I Year (I Sem)	
Course Name: Elementary Mathematics-I	Code: BMA1002
Time: 02 Hours	Max Marks: 60

Note: Please read instructions carefully:

   a) *The question paper has 03 sections and it is compulsory to attempt all sections.*

   b) *All questions of Section A are compulsory; questions in Section B and C contain choice.*

Section A: Very Short Answer type Questions Attempt all the questions.	BL	CLO	Marks (10)
1. Find the value of x, when $\begin{vmatrix} 4 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 5 & 2 \\ 4 & 1 \end{vmatrix}$	BL2	CLO1	02
2. Evaluate $\lim\limits_{x \to a} \dfrac{x^3 - a^3}{x - a}$	BL2	CLO3	02
3. Find the first derivative of $\sin(\log x)$.	BL1	CLO3	02
4. Find the value of P(A) for the set, A = {a, b, c}.	BL2	CLO1	02
5. Show that $f(x) = 2x + 7$ is a strictly increasing function on R.	BL1	CLO3	02
Section B: Short Answer Type Questions Attempt any 03 out of 06 questions.	BL	CLO	Marks (30)
1. Evaluate $\begin{vmatrix} 9 & 9 & 12 \\ 1 & -3 & -4 \\ 1 & 9 & 12 \end{vmatrix}$	BL2	CLO2	10
2. If α and β are the roots of the equation $ax^2 + bx + c = 0$, find the value of $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2}$	BL2	CLO1	10
3. If $y = e^x(\sin x + \cos x)$, prove that $\dfrac{d^2 y}{dx^2} - 2\dfrac{dy}{dx} + 2y = 0$	BL3	CLO3	10
4. Verify Rolle 's theorem for $f(x) = \sin x + \cos x$ in $\left[0, \dfrac{\pi}{2}\right]$.	BL4	CLO3	10
5. Find the value of x in given expression $x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$	BL2	CLO1	10
6. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find k so that $A^2 = kA - 2I$.	BL2	CLO2	10

Section C: Long Answer Type Questions/Case Study Attempt any 01 out of 04 questions.	BL	CLO	Marks (20)
1. Using matrices, solve the following system of linear equation $$2x + 5y = 1$$ $$3x + 2y = 7.$$	BL2	CLO2	20
2. If $x = a(t + \sin t)$ and $y = a(1 - \cos t)$ then find $\dfrac{d\,y}{d\,x}$	BL2	CLO3	20
3. Evaluate $\displaystyle\int_0^1 \dfrac{dx}{\sqrt{x+2}}$	BL3	CLO4	20
4. Find maxima and minima of the function $f(x) = x^3 + 3x^2 + 2x + 1$.	BL1	CLO3	20