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

M.Sc. (Chemistry) – I Year (I Sem)

Course Name: Elementary Mathematics	Code: MMA1007
Time: 02 Hours	Max Marks: 60

University Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

(To be filled by the Student)

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.	Solve for x: $\dfrac{x-2}{x-1} = \dfrac{x+4}{2x+2}$.	BL3	CLO1	02
2.	Find $\lim\limits_{x \to 2}\left(\dfrac{x-2}{x^2-5x+6}\right)$	BL1	CLO2	02
3.	Write the order & degree of following differential equation, $\dfrac{d^3y}{dx^3} = \left(1+\left(\dfrac{dy}{dx}\right)^2\right)^{\frac{5}{2}}$	BL1	CLO3	02
4.	Solve $\int (x^3 - 4x^2 + 3\log x)dx$	BL3	CLO2	02
5.	If $u = x^2 + 2xy - y^2$ calculate the value of $\dfrac{\partial u}{\partial x}$ and $\dfrac{\partial u}{\partial y}$.	BL3	CLO4	02
Section B: Short Answer Type Questions Attempt any 03 out of 05 questions.		BL	CLO	Marks (30)
1.	Calculate the highest integral value of 'k' for which the quadratic equation $x^2 - 6x + k = 0$ have two real and equal roots?	BL3	CLO1	10
2.	If $y = \log\sin(e^x + 5x + 8)$, calculate $\dfrac{dy}{dx}$.	BL3	CLO2	10
3.	If $e^x + e^y = e^{x+y}$, prove that $\dfrac{dy}{dx} = -e^{y-x}$.	BL5	CLO3	10
4.	Construct a partial differential equation by eliminating the arbitrary functions f and g from the equation $y = f(x - it) + g(x + it)$.	BL3	CLO3	10
5.	Calculate $\int x \sin x \, dx$	BL3	CLO4	10

Section C: Long Answer Type Questions Attempt any 01 out of 04 questions.	BL	CLO	Marks (20)
1. If α and β are the roots of the equation $ax^2 + bx + c = 0$, calculate the value of (a) $\alpha^2 - \beta^2$ (b) $\alpha^2 + \beta^2$ (c) $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2}$ (d) $\left(\dfrac{\alpha}{\beta} - \dfrac{\beta}{\alpha}\right)^2$	BL3	CLO1	20
2. If the function $f(x) = \begin{cases} 3ax + b, & for\ x > 1 \\ 11, & for\ x = 1 \\ 5ax - 2b, & for\ x < 1 \end{cases}$ is continuous at $x = 1$, calculate the values of a and b.	BL3	CLO2	20
3. If $\dfrac{dy}{dx} + 2y\tan x = \sin x$ and $y = 0$ for $x = \dfrac{\pi}{3}$, prove that maximum value of y is $\dfrac{1}{8}$.	BL5	CLO4	20
4. Solve $(x^2 - yz)p + (y^2 - zx)q = (z^2 - xy)$, where $p = \dfrac{\partial z}{\partial x}$ and $q = \dfrac{\partial z}{\partial y}$.	BL3	CLO3	20