GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Master of Science in Mathematics
Semester End Examination - Nov 2023

Duration : 180 Minutes
Max Marks : 100

Sem III - MSCM403 - Applied Numerical Analysis

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Write Milne's Predictor and Corrector formula. K1 (2)

2) The population of a town in decennial census were given in the following table. K2 (4)

Year :	1921	1931	1941	1951	1961
Population (in thousand) :	46	66	81	93	101

Estimate the population for the year 1955 using Newton's backward and forward formula.

3) Apply Muller's method to find the root of the equation $x^3 - 2x - 1 = 0$ correct to two decimal places K2 (6)

4) Find $f'(0)$ from the following table: K3 (9)

x	0	1	2	3	4	5
f(x)	4	8	15	7	6	2

5) Solve the initial value problem $\frac{dy}{dx} = 1 + xy^2, y(0) = 1$ For $x = 0.4$ by using milne's method, when it is given that K3 (9)

X:	0.1	0.2	0.3
Y:	1.105	1.223	1.355

6) Find the largest Eigen value and corresponding Eigen vector of the matrices taking $[1, 0, 0]^T$ as initial Eigen vector: $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ K5 (10)

7) A river is 80 feet wide. The depth d in feet at a distance x feet from one bank is given by the following table: K4 (12)

x:	0	10	20	30	40	50	60	70	80
d:	0	4	7	9	12	15	14	8	3

Find approximately the area of cross section.

8) For the following data : K5 (15)

x	$f(x)$	$f'(x)$
0.5	4	-16
1	1	-2

Find the Hermite interpolating polynomial

9) Use the Given's method to find the Eigen values of the tridiagonal matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -1 \\ 2 & -1 & 1 \end{bmatrix}$ K5 (15)

10) Solve $\nabla^2 u = 0$ for the following mesh with boundary values, up to fifth iteration, as shown K6 (18)