DHANAMANJURI UNIVERSITY
JUNE - 2023

Name of Programme : B.A/B.Sc. Mathematics(Honours)
Semester : 4th
Paper Type : Core X (theory)
Paper code : CMA-210
Paper Tiltle : Numerical Method
Full Marks : 50
Pass Marks : 20
Duration : 2 Hours

The figures in the margin indicate full marks for the questions.
Answer only 5 (five) from the following questions:

1. If $f(x)$ is a polynomial of degree n in x then prove that $\Delta^n f(x) =$ Constants and $\Delta^{n+1} f(x) = 0$. Also find the relation between operator E of finite differences and differential operator D of Differential Calculus. 10

2. If l_x represent the number of persons living at ages x in a life table, find an accuracy as the data will permit the value of l_{47}. Given that $l_{20} = 512$, $l_{30} = 439$, $l_{40} = 346$, $l_{50} = 243$. 10

3. Establish Newton's divided difference formula for unequal interval. 10

4. From the following data find the value of x for which $f(x)$ is minimum and find minimum $f(x)$:

x	0.60	0.65	0.70	0.75
$f(x)$	0.6221	0.6155	0.6138	0.6170

10

5. Deduce the formulae for Trapezoidal rule and Simpson's $\frac{1}{3\text{rd}}$ rule from the general quadrature formula for equal interval. 10

6. Using Euler's method, find $y(0.5)$ for the differential equation $\frac{dy}{dx} = y^2 - x^2$ with $y = 1$ when $x = 0$. 10

7. Find a root of equation $x^3 - x - 1 = 0$ by using false position method for the root lying between 1 and 2. 10

8. Find the cube root of 17 correct to four decimal places by Newton's method. 10

9. Solve the following system of equations by LU Decomposition method.

$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 2z = 810$$

10. Find the solution of the system of equations by Gauss – Seidel method 10

$$83x + 11y - 4z = 95$$
$$7x + 52y + 13z = 104$$
$$3x + 8y + 29z = 71$$