School of Engineering
B.TECH Mechanical Engineering
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem V - G3UB505B - Numerical Methods

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) Define Newton's backward difference interpolation formula. — K2 (2)

2) Define round off error also roundoff rule and round off the 0.77729, 0.0022218 numbers to four significant digits. — K1 (3)

3) Construct the third divided difference table with arguments 2, 4, 9, 10 of the function $f(x) = x^3 - 2x$. — K2 (4)

4) Estimate a root of using the Newton-Raphson method correct to three decimal places. — K2 (6)
$$x^3 - 9x + 1 = 0$$

5) From the following table of half- yearly premiums for policies maturing at different ages, estimate the premium for policies maturing at age of 62. — K3 (6)

Age :	45	50	55	60	65
Premium (in dollars) :	114.84	96.16	83.32	74.48	68.48.

6) Solve for a root of the equation $x - cosx = 0$ by using Bisection method. Perform six iterations. — K3 (9)

7) Examine pivoting and solve the following system of linear equations by Gauss Elimination method: $x + y + z = 1, \ 3x + y - 3z = 5, \ x - 2y - 5z = 10$ — K4 (8)

8) Analyse, if the following system of equations $20x + y - 2z = 17, \ 3x + 20y - z = -18, \ 2x - 3y + 20z = 25$ are diagonally dominant and hence solve this system of equations by using Gauss Seidel method. Perform four iterations: — K4 (12)

OR

The population of a town in decennial census were given in the following table. — K4 (12)

Year :	1911	1921	1931	1941	1951	1961
Population (in thousand) :	12	46	66	81	93	101

Estimate the population for the year 1918 and 1946 using Newton's forward and backward formulae and Analyse the results.