Name. _____	**Printed Pages:02**
Student Admn. No.: _____	

School of Basic and Applied Sciences
Backlog Examination, June 2023

[Programme: B. Tech] [Semester:] [Batch:]

Course Title: Numerical Methods	**Max Marks: 100**
Course Code: MATH3010	**Time: 3 Hrs.**

Instructions:
1. *All questions are compulsory.*
2. *Assume missing data suitably, if any.*

		K Level	COs	Marks
	SECTION-A (15 Marks) 5 Marks each			
1.	If $u = e^{xyz}$ and errors in x, y, z be 0.01, compute the maximum absolute and relative error in u, when $x=1, y=1, z=1$	K1	CO-1	5
2.	Solve the following system of linear equations by Gauss elimination method: $x+y+z=9,\ \ 2x-3y+4z=13,\ \ 3x+4y+5z=40$	K2	CO-2	5
3.	Construct the divided difference table for $f(x) = x^2 + 4x + 5$ for x= 1,3,5,7.	K1	CO-1	5
	SECTION-B (40 Marks) 10 Marks each			
4.	Using Secant method, compute the real root of $\cos x - xe^x = 0$. Perform four iterations.	K3	CO-3	10
5.	Test if the following system of equations is diagonally dominant and hence solve this system of equations by using Gauss Seidel method. Perform four iterations: $20x + y + z = 54,\ x + 20y + z = 27,\ x + y + 20z = 24.$	K4	CO-4	10
6.	Using Runge-Kutta fourth order method, find y(1), where $\frac{dy}{dx} = -xy$ and $y(0) = 1$. Use h=0.5.	K3	CO-2	10
7.	The ideal gas law PV = nRT is a basic concept covered in introductory chemistry classes. More accurate P–V–T relationships of gases are available· like the following Beattie–Bridgeman equation $$P = \frac{RT}{V} + \frac{a_1}{V^2} + \frac{a_2}{V^3} + \frac{a_3}{V^4}$$ Find the value of V if for a particular gas, a1 = –1·06, a2 = 0·057, a3 = –0·00011 and RT=24.03, P=25. OR Using Euler's method, find an approximate value of y corresponding to x=2, given that $\frac{dy}{dx} = x + 2y$ and $y(1) = 1$.	K4	CO-3	10
	SECTION-C (45 Marks) 15 Marks each			
8.	The velocity distribution of a fluid near a flat surface is given below: x: 0.1 0.3 0.5 0.7 0.9 v: 0.72 1.81 2.73 3.47 3.98. x is the distance from the surface(cm) and v is the velocity(cm/sec). Using a	K5	CO-2	15

	suitable Interpolation formula Compute the velocity at x=0.2 and x= 0.8.			
9.	Using Romberg Integration, evaluate $\int_0^1 \frac{dx}{1+x}$ correct upto 4 decimal places.	K4	CO-3	15
10	A train is moving at the speed of 30m/s suddenly the brakes are applied. The speed of the train per second after t seconds is given by (Time t) : 0 5 10 15 20 25 30 35 40 45 (speed v) :30 24 19 16 13 11 10 8 7 5 Apply Simpson 3/8 Rule to determine the distance covered by the train in 45 seconds. OR Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's 1\3rd rule.	K6	CO-4	15