Bahria University, Islamabad Campus

Department of Computer Science

Final Term Examination

Class/Section: BSCS 6(A,B)

(SPRING 2023 Semester)

Paper Type: Descriptive

Course: NUMERICAL ANALYSIS		Date: 3-7-23
Course Code: GSC-320		Session: I
Faculty's Name: Ambrina Kanwal		Max Marks: 50
Time Allowed: 2hours & 30 minutes		Total Pages: 2

INSTRUCTIONS:

I. All questions are compulsory.
II. There are total fve questions.
III. Construct the table for all entries/ solutions
IV. Calculators are allowed but programmable calculators are not allowed.

Student's Name: _____ Enroll No: _____
(USE CAPITAL LETTERS)

Question # 1 (10 Marks)(CLO-2)

a. Solve the linear system by Guass-Seidel method and construct the table for all solutions. (Apply five iterations only).

$$2x - y + z = -1$$

$$2x + 2y + 2z = 4$$

$$-x - y + 2z = -5$$

b. Use the method of false position to find solutions for the following problem and construct a table of results. (Apply five iterations only).

$$f(x) = 2x + 3\cos x - e^x = 0 \text{ for the interval } 0 \leq x \leq 1$$

Question # 2 (10 Marks) (CLO-2)

The upward velocity of a rocket is given as a function of time

$t_0 = 10,\ v(t_0) = 227.04$
$t_1 = 15,\ v(t_1) = 78.362$
$t_2 = 20,\ v(t_2) = 35.517$
$t_3 = 22.5,\ v(t_3) = 602.97$

a. Construct the divided difference table
b. Determine the value of the velocity at $t = 16$ seconds with third order polynomial interpolation using Newton's divided difference polynomial method

Enrollment Number: _____

Question # 3 (10 Marks) (CLO-3)

The following data give approximations to the integral

$$M = \int_0^{\pi} \sin x \, dx.$$

$$N_1(h) = 1.570796, \quad N_1\left(\frac{h}{2}\right) = 1.896119, \quad N_1\left(\frac{h}{4}\right) = 1.974232, \quad N_1\left(\frac{h}{8}\right) = 1.993570.$$

Construct an extrapolation table to determine $N_4(h)$, and compare your results with the actual solution.

Question # 4 (10 Marks) (CLO-4)

Use the most accurate three-point formulas to determine the derivatives for each point of x in the following table

x	f(x)
7.4	−68.3193
7.6	−71.6982
7.8	−75.1576
8.0	−78.6974

The data was taken from the following function **f (x) = x ln x**. Compute the actual errors.

Question # 5 (10 Marks) (CLO-5)

Use the Composite Simpson's rule with 8 sub-divisions of the given interval [3,5], to approximate the integral, also find the actual integral to compute the actual error

$$\int_3^5 \frac{1}{\sqrt{x^2 - 4}}$$

End of the Question Paper