

University of Engineering and Technology
Lahore, Faisalabad Campus



Department Electrical, Electronics and Tele-communication Engineering
Subject: MA-346 Numerical Methods Final-term Exam (Spring Semester 2021)
Total Marks: 40 Time allowed: 90 minutes

NOTE: All questions are compulsory.

Q 1.

CLO2

A second degree polynomial passes through $(0,1)$, $(1,3)$, $(2,7)$ and $(3,13)$. Find the polynomial using Newton's forward difference formula.

(08)

Q 2.

CLO2

Compute $f''(0)$ and $f'(0.2)$ from the following tabular data.

(08)

x	0.0	0.2	0.4	0.6	0.8	1.0
f(x)	1.00	1.16	3.56	13.96	41.96	101.00

Q 3.

CLO2

Evaluate the integral $\int_{-2}^4 (1-x-4x^3+x^5)dx$ by using

(08)

- a single application of Simpson's 1/3 rule and
- multiple applications of the Simpson's 1/3 rule with $n=6$.

Q 4.

Solve the initial value problem

CLO3

$$\frac{dy}{dx} = 3x^2 + y, \quad y(0) = 4$$

(06)

for the range $0.1 \leq x \leq 0.4$, using Euler's method by taking $h = 0.1$.

Q 5.

CLO3

Solve the diffusion equation using Crank-Nicolson method:

(10)

$T_i = T_{ix}$, $0 \leq x \leq 1$, subject to the initial condition $T(x,0) = 0$ and the boundary conditions

$T(0,t) = 0$ and $T(1,t) = t$ for $t > 0$ after one-time step, by choosing $\Delta x = \frac{1}{4}$, $\Delta t = \frac{1}{8}$.