Philadelphia University   **Student Name:**

Faculty of Engineering   **Student Number:**
Dept. of Electrical Engineering
Incomplete Final Exam, Second Semester: 2023/2024

Course Title: Engineering Analysis (2)	Date: 22/10/2024
Course No: (610262)	Time Allowed: 2 Hours
Lecturer: Dr. Mohammed Mahdi	No. of Pages: 4

Q1 / 10	Q2 / 10	Q3 / 10	Q4 / 10	Total / 40

Question 1: Multiple Choice Questions   .   (10 Marks)

1. Using **false position** iterative method, the **first iteration** root approximation of $f(x) = -x^2 + 4x$ in the interval $(1, 2)$ **approximately** is:

   A) 2.6667   B) 26.667   C) 0.2666

2. Using **Newton-Raphson** iterative method, the **first iteration** root approximation of the equation $f(x) = x^2 - 5x$ with xo=4.5 **approximately** is:

   A) 28.055   B) 2.8055   C) 0.2805

3. Assume that the absolute error in x_4 is 0.1 , using bisection method, the absolute error in x_6 is:

   A) 0.025   B) 0.05   C) 0.0125

4. If $f(x) = \sin\ (x)$ then the simplified Newton-Raphson formula is:

   A) $x_{i+1} = x_i - \tan(x_i)$ B) $x_{i+1} = x_i - \frac{1}{2}\tan(x_i)$

   C) $x_{i+1} = x_i - \frac{1}{2}\sin(x_i)$ D) none of choices

Question 2:   (10 Marks)

Objectives: This question is about interpolation

Given the points $(-2, 1)\ (0, -1)$

A) Use first order **Lagrange interpolation**, to approximate $f(-1)$.   (5 Marks)   ans 0

B) Use first order **Newton polynomial**, to approximate $f(-1)$.   (5 Marks)   ans. 0

Objectives: This question is about matrices.

Use the following matrices to answer parts 1 and 2 below:

$$[A] = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \end{bmatrix} \qquad [B] = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & 1 \end{bmatrix} \qquad [C] = \begin{bmatrix} -1 & -1 \\ 2 & c_{22} \end{bmatrix}$$

1.   Find $[D] = [A][B]$ (3 Marks)

2.   If $|C| = 10$ find c_{22} . (2 Marks)

3. If matrix A $= \begin{bmatrix} 0 & 1 \\ -3 & -2 \end{bmatrix}$ find the Eigen values of A^{-1}.   (5 Marks)

Question 4: (10 Marks)

Objectives: This question is about numerical integration and non-linear regression.

Given the integration $\int_{1.3}^{3.7} (x + \frac{1}{x})^2 dx$ it is required to:

A) Find the approximated result using composite trapezoidal rule with h=0.6. (5 Ms)

21.454

B) Given the following data, find the related exponential model $f(x) = C\, e^{Dx}$. (5 Marks)

ans; A=D=1.2137, B= -1.0753, C=0.34119

x	y
0.5	0.5
1.3	2.3
3	11.7