Philadelphia University Faculty of Eng.& Tech. Department of Computer Engineering		Second Semester 2018/2019 Date:- 26/3/2019 Allowed time:-50 minutes

Engineering Analysis (630262) First Exam

Student Name:-…… **ID:-**……

Question:	Q1/25	Q2/25	Q3/25	Q4/25	Total/100
Points:					

Notes: All trigonometric functions are in radian scale.
Round your calculations to 4 significant digits

Question 1: Use **Bisection method** to approximate the root of the following equation using $x_s = 2$ and $x_e = 3$, with relative error $\varepsilon_{rel} < 0.03$. **25 points**

$$f(x) = 32e^{0.09x} - 39$$

Question 2: Use **False position method** to approximate the root of the following equation using $x_l = 3.2,$ and $x_u = 5.2$ with absolute error $\varepsilon_{abs} < 0.03.$ **25 points**

$$f(x) = ln(3x + 1) - x^2 + 4x$$

Question 3: Apply **three Newton-Raphson iterations** to approximate the root of the following equation using $x_0 = 4.5$.

25 points

$$f(x) = x^2\, ln(x) - 5x$$

Question 4: Choose the correct answer for the following questions. **25 points**

1- If x_7 is correct for 3 significant digits, then the relative error in x_7 is less than :

a) 5% b) 0.5% c) 0.05% d) None of the choices

2- Assume that the absolute error in x_4 is 0.1 , using bisection method, the absolute error in x_6 is:

a) 0.05 b) 0.025 c) 0.0125 d) Cannot be determined from the given

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3- If $f(x) = \sin^2(x)$ then the simplified Newton-Raphson formula is:

a) . $x_{i+1} = x_i - \frac{1}{2}\tan(x_i)$ b) . $x_{i+1} = x_i - \frac{1}{2}\sin(x_i)$

c) . $x_{i+1} = x_i - \frac{2\sin(x_i)\cos(x_i)}{\sin^2(x_i)}$ d) . None of the choices

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Use the following matrices to answer questions (4) and (5)

$$[A] = \begin{bmatrix} a_{11} & 1 \\ 0 & a_{22} \\ 1 & -3 \\ 2 & 4 \end{bmatrix} \qquad [B] = \begin{bmatrix} 3 & 1 & b_{13} \\ -2 & b_{22} & 4 \end{bmatrix} \qquad [C] = \begin{bmatrix} -1 & 1 \\ 3 & c_{22} \end{bmatrix}$$

4- Assume that $[D] = [A][B]$ then $d_{31} =$

a) -2 b) 9 c) -10 d) Not defined

5- If $|C| = 5$ then $c_{22} =$

a) 1 b) 0 c) -1 d) None of the choices