Assignment #2 (Mar. 12, 2020)

ME46002 Numerical Methods for Engineers
(Deadline for submission: 26 March 2020, 11:30 pm)

Note: In the Blackboard subject website, click 'Assessments' at the left menu; then click 'Assignment #2'. In the '**ASSIGNMENT SUBMISSION**', submit your solution and answers in PDF format as an attached file.

(Each question carries 15 marks)

Question 1. Solve the following simultaneous equations by naive Gaussian elimination.

$$2x_1 + x_2 - x_3 = -1$$
$$x_1 + 3x_2 + 2x_3 = 13$$
$$x_1 - x_2 + 4x_3 = 11$$

Question 2. Solve the following simultaneous equations by LU decomposition.

$$x_1 + 2x_2 + 4x_3 + x_4 = 21$$
$$2x_1 + 8x_2 + 6x_3 + 4x_4 = 52$$
$$3x_1 + 10x_2 + 8x_3 + 8x_4 = 79$$
$$4x_1 + 12x_2 + 10x_3 + 6x_4 = 82$$

Question 3. Solve the following simultaneous equations by Gaussian-Jordan elimination.

$$x_1 + x_2 - x_3 = -3$$
$$6x_1 + 2x_2 + 2x_3 = 2$$
$$-3x_1 + 4x_2 + x_3 = 1$$

Question 4. Use the Gauss-Seidel method to solve the following system until the percent relative error falls below $\varepsilon_s = 5\%$.

$$2x_1 - 6x_2 - x_3 = -38$$
$$-3x_1 - x_2 + 7x_3 = -34$$
$$-8x_1 + x_2 - 2x_3 = -20$$