Name:

ID :

PRINCIPLES OF EE1

Homework #4

IMPORTANT: You should write on **A4 paper** that contains a full and detailed description of all the work done on the homework. Then you must submit the test hand-written by scanning and uploading the file in **pdf** form on Blackboard (Assignment Session). *Tip: You draw a bounding box or highlight for your final answer. Ex: Y = ABC + AC =* $\boxed{ABC}$

Problem 1: (25 marks) Perform some operations below.

In rectangular form:

a. $(4.2 + j6.8) + (7.6 + j0.2)$

b. $(4 \times 10^{-6} + j76) + (7.2 \times 10^{-7} - j5)$

c. $42\angle 45^0 + 62\angle 60^0 - 70\angle 120^0$

In polar form:

d. $(400 - j200)(-0.01 - j0.5)(-1 + j3)$

e. $\frac{-4.5-j6}{0.1-j0.8}$

f. $\frac{42\angle 10^0}{7\angle 60^0}$

g. $\frac{8\angle 60^0}{(2\angle 0^0)+(100+j400)}$

h. $\frac{(6\angle 20^0)(120\angle -40^0)(3+j8)}{(2\angle -30^0)}$

Problem 2: **(25 marks)**

The maximum amplitude of a sinusoidal current is $40A$. The current passes through one complete cycle in $0.5\ ms$. The magnitude of the initial current is $10\ A$. Finding the characteristics of a Sinusoidal Current via questions as below:

a. What is the frequency (in Hz) of the current?

b. What is the frequency in rad/s?

c. Write the expression for $i(t)$ using the cosine function. Express ϕ in degrees.

d. What is the rms value of the current?

Problem 3: **(25 marks)**

Determine the total input impedance Z_{in} of the following circuit

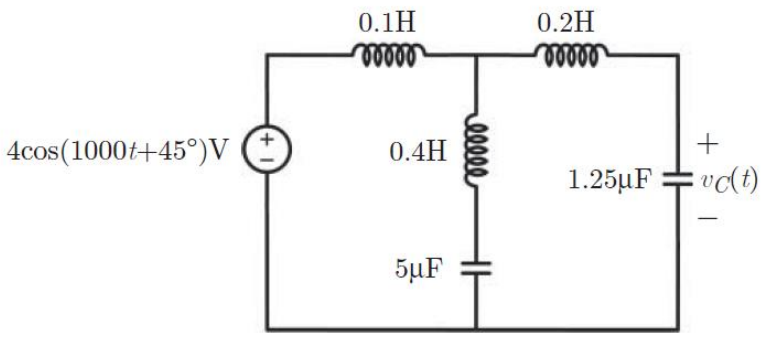

Figure 1

Problem 4: **(25 marks)**

In the following circuit, the voltage source is $v_s(t) = 3\sqrt{2}\,cos(2000t\ +\ 45^0)V$

a/ Find $v_L(t)$ in steady state.

b/ Compare phase angle between $v_L(t)$ and voltage source, state which one is leading?

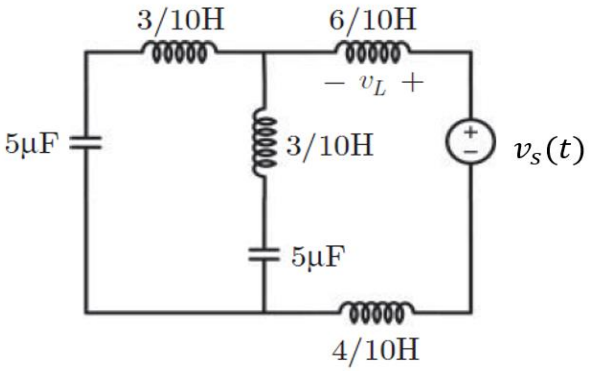

Figure 2