جامعة الإسكندرية
امتحان نهاية الفصل الدراسي الثاني (يناير ٢٠١٦)

Course Title and Code Number:	اسم المقرر والرقم الكودي له:
Principles and Applications of Electrical Engineering (05211)	مبادئ الهندسة الكهربية وتطبيقاتها (05211)
Second Year (Agricultural Engineering)	السنة الدراسية الثانية (هندسة زراعية)
Time Allowed: Two hours	الزمن: ساعتين

Attempt All Questions (Each Question is 25 marks): **(180 marks)**

1. Determine $i_3(t)$ in the circuit shown in Figure 1, if

$$i_1(t) = 141.4 \ \cos(\omega t + 2.356) \ \text{mA}$$

$$i_2(t) = 50 \ \sin(\omega t - 0.927) \ \text{mA}$$
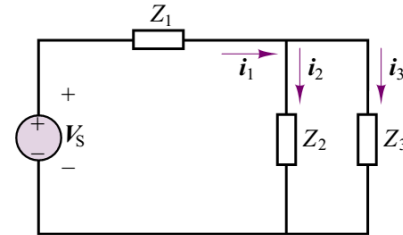
$$\omega = 377 \ \text{rad/s}$$

Figure 1

2. Determine the frequency so that the current I_i and the voltage V_o in the circuit of Figure 2 are in phase

$$Z_s = 13,000 + j\omega 3 \ \Omega$$

$$R = 120 \ \Omega$$

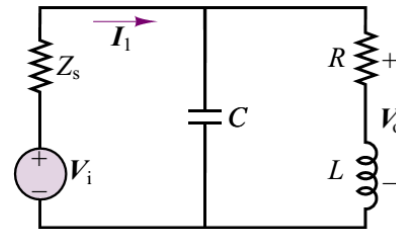$$L = 19 \ \text{mH} \qquad C = 220 \ \text{pF}$$

Figure 2

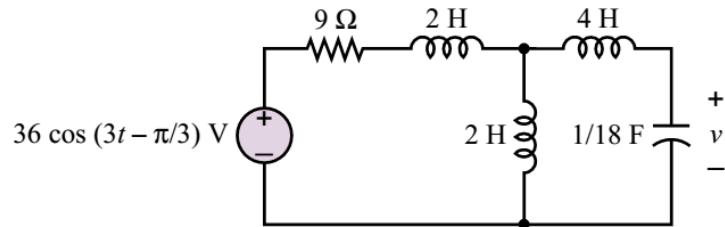3. Using phasor techniques, solve for the voltage v in the circuit shown in Figure 3

Figure 3

4. Determine the Thevenin equivalent circuit as seen by the load shown in Figure 4, if:
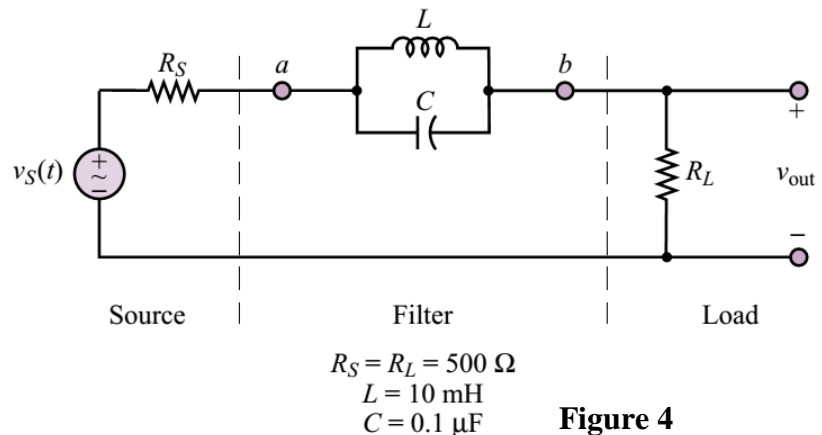
$$v_S(t) = 10 \cos(1,000t).$$

$R_S = R_L = 500 \ \Omega$
$L = 10 \ \text{mH}$
$C = 0.1 \ \mu\text{F}$ **Figure 4**

5. Solve for $i(t)$ in the circuit of Figure 5, using phasor techniques, if $v_S(t) = 2 \cos(2t)$, $R_1 = 4\Omega$, $R_2 = 4\ \Omega$, $L = 2H$, and $C = 0.25F$.
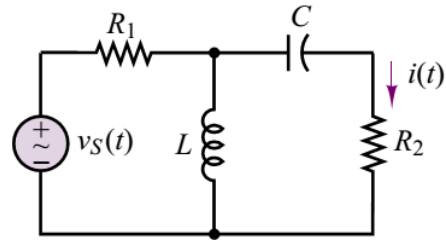

Figure 5

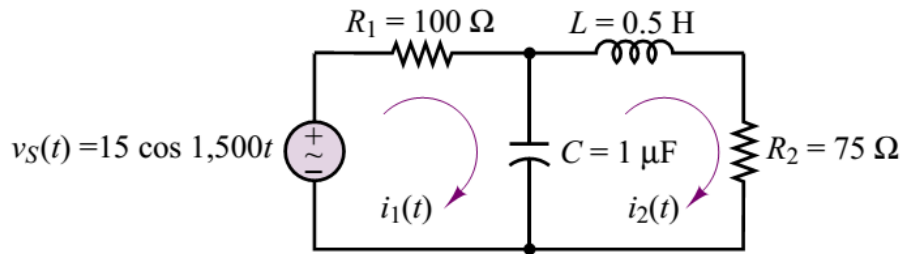6. Using mesh current analysis, determine the currents $i_1(t)$ and $i_2(t)$ in the circuit shown in Figure 6.

$v_S(t) = 15 \cos 1,500t$

$R_1 = 100\ \Omega$ $L = 0.5\ H$

$C = 1\ \mu F$ $R_2 = 75\ \Omega$

Figure 6

7. Using node voltage methods, determine the voltages $v_1(t)$ and $v_2(t)$ in the circuit shown in Figure 7.

$i_S(t) = 40 \cos 100t$ A

$R_1 = 10\ \Omega$
$R_2 = 40\ \Omega$
$C = 500\ \mu F$
$L = 0.2\ H$

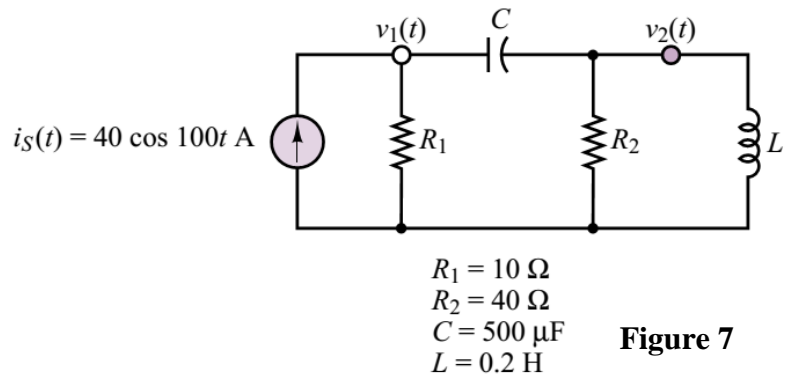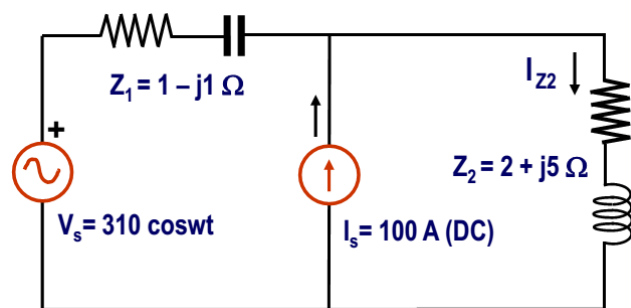**Figure 7**

8. Find the steady-state current waveform flowing in impedance Z_2 in the following circuit by using the Principle of Superposition

$Z_1 = 1 - j1\ \Omega$

$I_{Z2} \downarrow$

$Z_2 = 2 + j5\ \Omega$

$V_s = 310 \cos wt$

$I_s = 100$ A (DC)

Good Luck
     *Examiner: **Dr. Mohammed Morsy***