



**UNIVERSITI KUALA LUMPUR  
Malaysia France Institute**

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**FINAL EXAMINATION  
JANUARY 2014 SESSION**

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**SUBJECT CODE** : FEB 10202 / FEB 10102  
**SUBJECT TITLE** : ELECTRICAL PRINCIPLES / ELECTRICAL FUNDAMENTAL  
**LEVEL** : BACHELOR  
**TIME / DURATION** : 2.0 HOURS  
**DATE** :

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper CAREFULLY.
  2. This question paper is printed on both sides of the paper.
  3. Please write your answers on the answer booklet provided.
  4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
  5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer three (3) questions only.
  6. Answer all questions in English.
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**THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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**SECTION A (Total: 40 marks)**

**INSTRUCTION: Answer ALL questions.**

**Please use the answer booklet provided.**

**Question 1**

- (a) If it takes 35 J of energy to move a charge of 5 C from one point to another, calculate the voltage between the two points. (2 marks)
  
- (b) Determine the color codes of the following resistors.
  - (i)  $820 \pm 10\% \Omega$  (2 marks)
  - (ii)  $2.7 \text{ M}\pm 5\% \Omega$  (2 marks)

**Question 2**

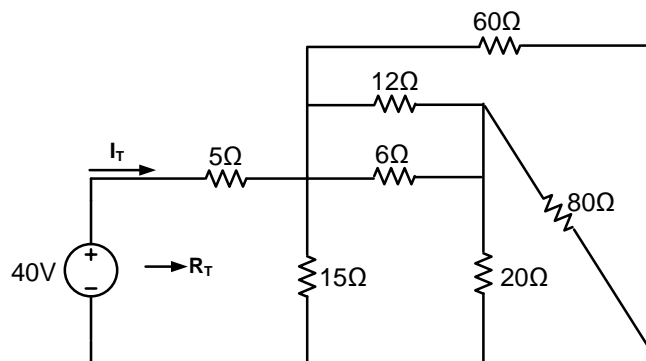
State the definition of:

- (a) Kirchoff's Voltage Law (KVL) (2 marks)
- (b) Kirchoff's Current Law (KCL) (2 marks)

**Question 3**

Analyze the series-parallel circuit in **Figure 1**, with supply 40V, hence determine:

- (a) The total resistance  $R_T$  (6 marks)
- (b) The total current  $I_T$  drawn from the supply (3 marks)
- (c) The current through 80  $\Omega$  and 15  $\Omega$  resistor (4 marks)
- (d) The power delivered to the circuit (2 marks)



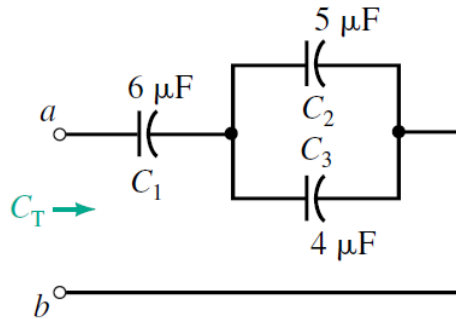
**Figure 1**

**Question 4**

(a) **Figure 2** shows the capacitor circuit.

(i) Determine the total capacitance,  $C_T$  (4 marks)

(ii) Find the voltage across  $C_1$  and  $C_3$  if  $V_{DC} = 100\text{ V}$  is applied to terminals  $a$ - $b$ . (4 marks)



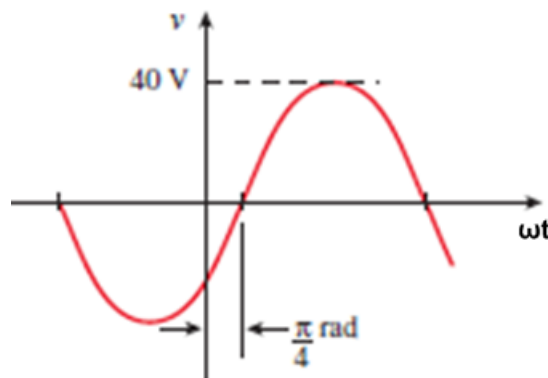
**Figure 2**

(b) Write the equation for the waveform of **Figure 3** if the frequency is given 50Hz. Express the phase angle,  $\theta$  in degree. (2 marks)

(c) Based on the equation in part (b), determine:

(i) The rms value,  $V_{RMS}$  of the voltage (2 marks)

(ii) The value of voltage at  $t = 83.5\text{ ms}$  (3 marks)



**Figure 3**

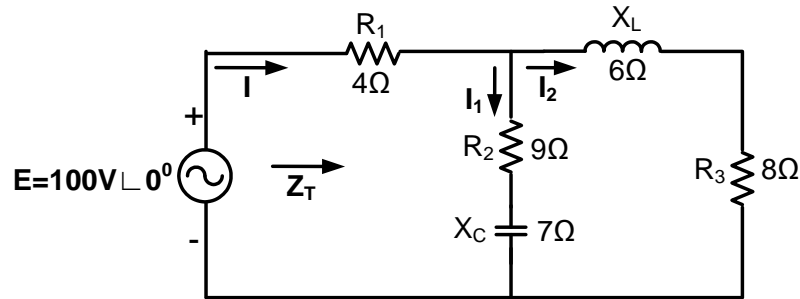
**SECTION B (Total: 60 marks)**

**INSTRUCTION: Answer THREE (3) questions only**

**Please use the answer booklet provided.**

**Question 5**

**Figure 4** shows Series-parallel AC circuit, calculate:

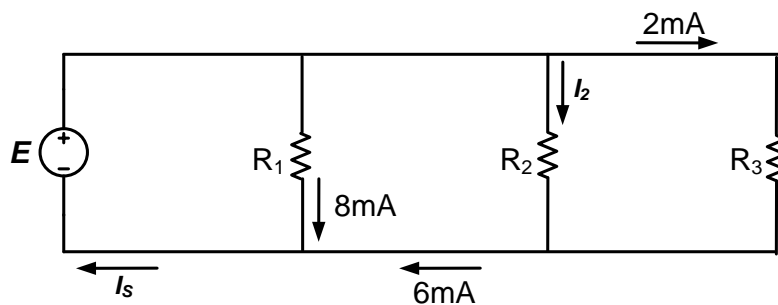


**Figure 4**

- (a) The total impedance  $Z_T$  (6 marks)
- (b) The total admittance  $Y_T$  (2 marks)
- (c) The supply current  $I$ ,  $I_1$  and  $I_2$  (7 marks)
- (d) The circuit power factor  $F_P$  (2 marks)
- (e) Total reactive power,  $Q_T$  (3 marks)

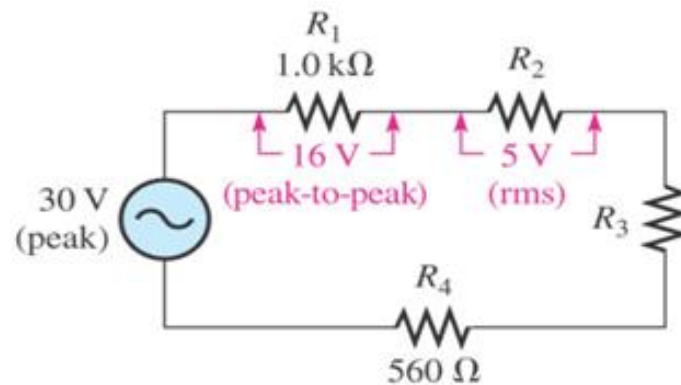
**Question 6**

- (a) Using Kirchoff's current law (KCL), determine the current  $I_2$  and  $I_s$  for the parallel circuit in **Figure 5**. (5 marks)



**Figure 5**

(b) For the circuit in **Figure 6** below, determine the:

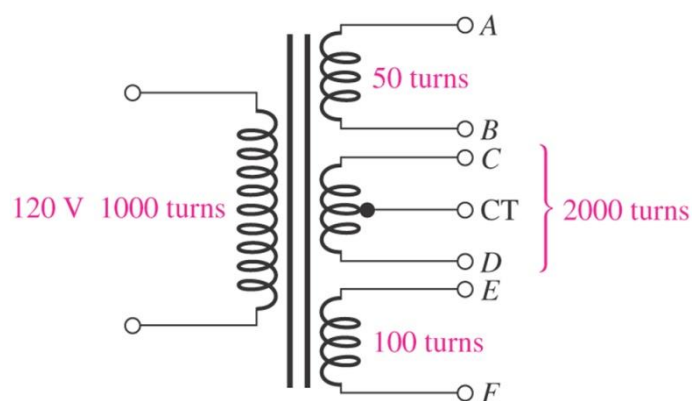


**Figure 6**

- (a) Total rms current,  $I_{rms}$  (3 marks)
- (b) Value of  $R_2$  (3 marks)
- (c) Value of  $R_3$  (3 marks)
- (c) Rms voltage across  $R_4$ ,  $V_4(\text{rms})$  (3 marks)
- (d) Rms voltage across  $R_3$ ,  $V_3(\text{rms})$  (3 marks)

**Question 7**

(a) The transformer shown in **Figure 7** below, determine each secondary voltage and the voltages with respect to the center tap (CT) on the middle secondary (11 marks)

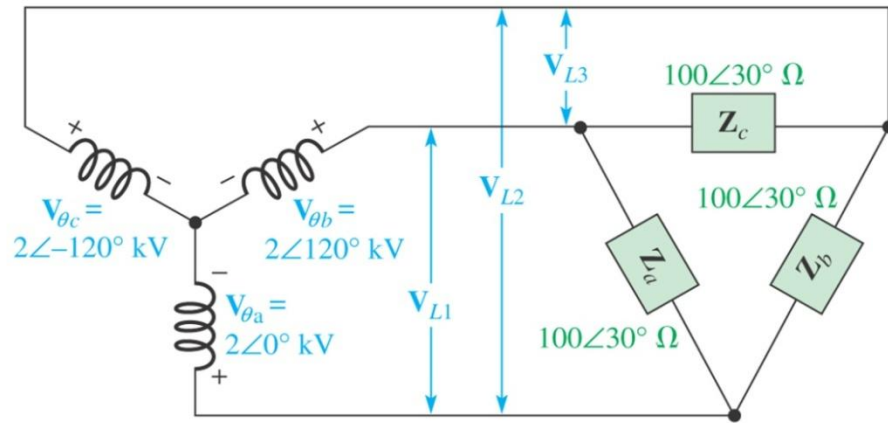


**Figure 7**

- (b) Draw the schematic diagram of the following types of autotransformers:
- (i) Step-up (3 marks)
  - (ii) Step-down (3 marks)
  - (iii) Variable (3 marks)

**Question 8**

Determine the load voltages and load currents in **Figure 8** below and show their relationship in a phasor diagram. (20 marks)



**Figure 8**

**END OF QUESTION PAPER**