UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2014 SESSION

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

INSTRUCTIONS TO CANDIDATES

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.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.
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 ± 10% Ω (2 marks)
   (ii) 2.7 M± 5% Ω (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 Ω and 15 Ω resistor (4 marks)
(d) The power delivered to the circuit (2 marks)
Question 4

(a) Figure 2 shows the capacitor circuit.

(i) Determine the total capacitance, $C_T$  

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

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

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

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

(ii) The value of voltage at $t = 83.5$ ms
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](image)

(a) The total impedance $Z_T$  
(b) The total admittance $Y_T$ 
(c) The supply current $I$, $I_1$ and $I_2$  
(d) The circuit power factor $F_p$  
(e) Total reactive power, $Q_T$

Question 6

(a) Using Kirchoff’s current law (KCL), determine the current $I_2$ and $I_S$ for the parallel circuit in Figure 5.

![Figure 5](image)
(b) For the circuit in Figure 6 below, determine the:

![Figure 6](image)

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

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  

![Figure 7](image)

(b) Draw the schematic diagram of the following types of autotransformers:

(i) Step-up  
(ii) Step-down  
(iii) Variable
Question 8

Determine the load voltages and load currents in Figure 8 below and show their relationship in a phasor diagram.

(20 marks)

END OF QUESTION PAPER