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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2014 SESSION

SUBJECT CODE	:	**FEB 10202**
SUBJECT TITLE	:	**ELECTRICAL PRINCIPLES**
LEVEL	:	**BACHELOR**
TIME / DURATION	:	**2.5 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. **Answers should be written in blue or black ink except for sketching, graphic and illustration.**
5. **This question paper consists of SIX (6) questions. Answer FIVE (5) questions only.**
6. **Answer all questions in English.**
7. **Do not open the question paper until instructed to do so**

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FIVE(5) questions only.
Please use the answer booklet provided.

Question 1

(a) What is a capacitor and state two (2) different types of capacitor. (3 marks)

(b) Briefly describe four (4) factors affecting the amount of inductance for an inductor (coil).

(2 marks)

(c) Express 0.000028 Amps in

(i) Scientific notation (1 marks)
(ii) Engineering notation (1 marks)
(iii) microamps (1 marks)

(d) Determine the resistance and tolerance of each of the following 4-band resistors:

(i) Green, gray, red, gold (2 marks)
(ii) Violet, white, brown, silver (2 marks)
(iii) Brown, red, orange, gold (2 marks)

(e) Determine the color bands for each of the following 4-band resistors. Assume each has a 5% tolerance.

(i) 0.47 Ω (2 marks)
(ii) 5.1 MΩ (2 marks)

(f) Determine the voltage across the resistor when a current of 8 A through it converts 2000 J of electrical energy into heat energy in 1 minute. (2 marks)

Question 2

(a) Define:

(i) Kirchoff's Voltage Law (2 marks)

(ii) Kirchoff's Current Law (2 marks)

(b) Find the current in the 5 ohms resistor in the interconnection of resistors shown in Figure 1. (3 marks)

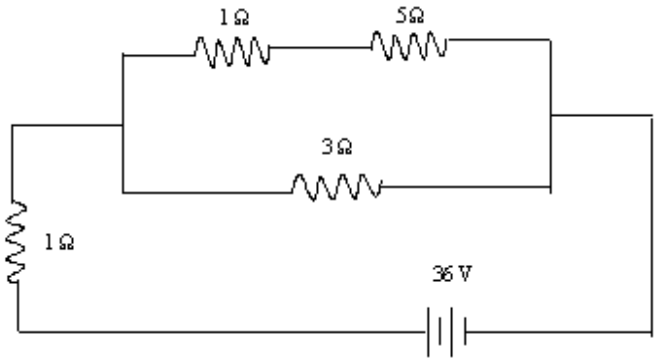

Figure 1

(c) For the circuit in Figure 2 below, determine:

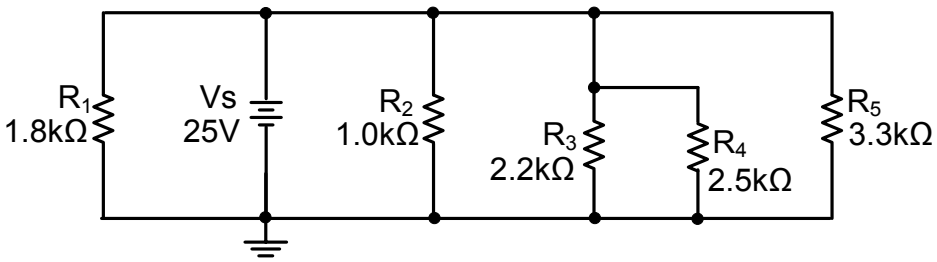

Figure 2

(i) Total resistance, (**R_T**) (3 marks)

(ii) Total current, (**Is**) (2 marks)

(iii) Voltage drop across R_3 resistor (2 marks)

(iv) Current flow through R_4 (**I_4**) (2 marks)

(v) Power delivered by the source, (**Ps**) (2 marks)

(vi) Power dissipated in R_3, (**P_3**) (2 marks)

Question 3

(a) Find the total inductance of the following circuit in Figure 3. The coils are spaced far apart so that mutual inductance is negligible. (4 marks)

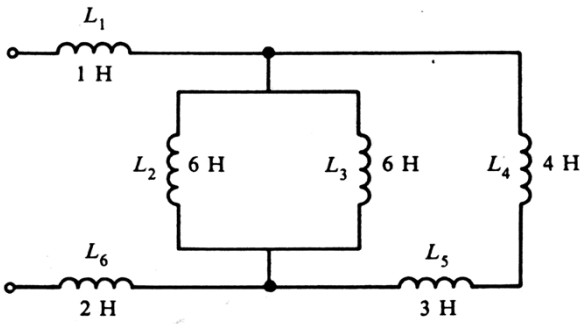

Figure 3

(b) For the network shown in Figure 4 below, determine the:

(i) Total capacitance (**C_T**) (4 marks)

(ii) Total charge (**Q_T**) (2 marks)

(iii) Voltage across capacitor C_2 (**V_2**) (2 marks)

(iv) Charge at capacitor C_3 (**Q_3**) (2 marks)

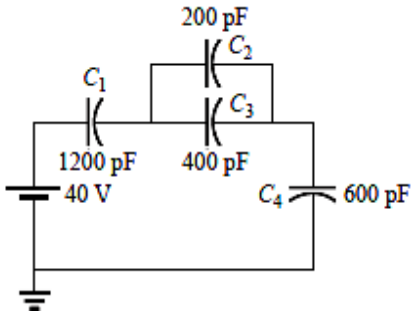

Figure 4

(c) For the circuit in Figure 5 below, the capacitor is initially uncharged. After switch S_1 is closed, calculate the:

(i) Time constant (τ) (2 marks)

(ii) Time taken for the capacitor to charge to 8V. (2 marks)

(iii) Capacitor voltage 50 μs after switch S_1 is closed. (2 marks)

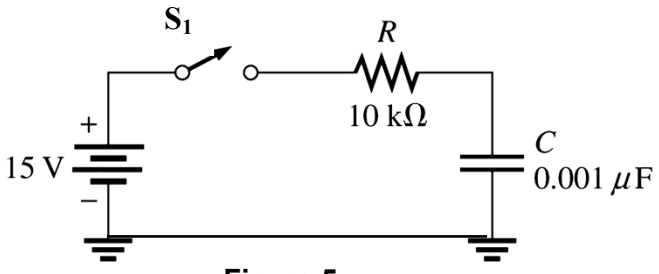

Figure 5

Question 4

(a) Referring to the Sinusoidal voltage waveform shown in the Figure 6 below, determine:-

(i)	Peak voltage, $\mathbf{V_P}$	(2 marks)
(ii)	Peak to peak voltage, $\mathbf{V_{pp}}$	(2 marks)
(iii)	RMS Voltage (effective value), $\mathbf{V_{rms}}$	(2 marks)
(iv)	Average voltage, $\mathbf{V_{AV}}$	(2 marks)
(v)	Frequency of the sine wave	(2 marks)
(vi)	Period/time interval of the sine wave	(2 marks)
(vii)	Instantaneous voltage at **1ms**	(2 marks)

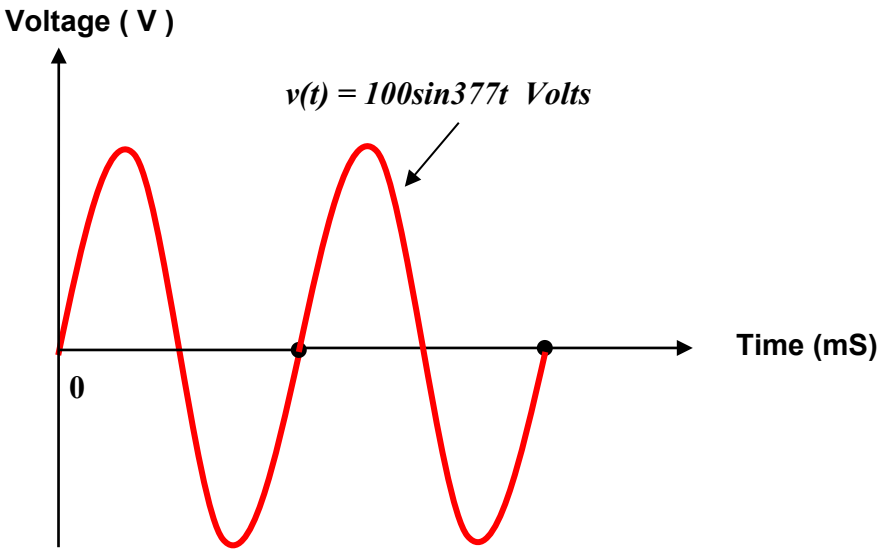

Figure 6

(b) What are the phase relationships between the following sinusoidal waveforms and sketch the voltage and current sinusoidal waveforms showing peak value and phase shift. (2 marks)

(i) $v(t) = 100\sin(\omega t + 30)$ $i(t) = 10\sin(\omega t + 60)$ (2 marks)

(ii) $v(t) = 100\sin(\omega t - 60)$ $i(t) = 10\sin(\omega t - 90)$ (2 marks)

Question 5

(a) Determine the current of the circuit in figure 7, and draw a phasor diagram showing the relation between source voltage and current. (8 marks)

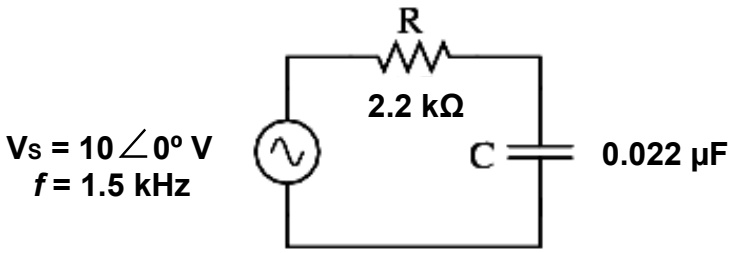

Figure 7

(b) Determine the voltage across each element in the following figure 8. Draw a voltage phasor diagram and a current phasor diagram.

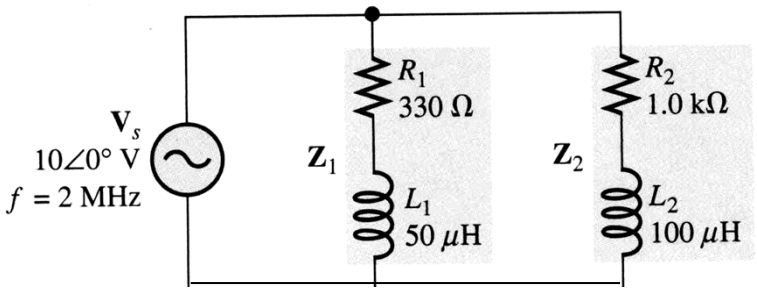

Figure 8

(i) Total impedance (Z_T) (6 marks)

(ii) Total current (I_T) (2 marks)

(iii) Voltage across R_2 (2 marks)

(iv) Power factor of the circuit (2 marks)

Question 6

(a) For the network in Figure 9 below, find the:

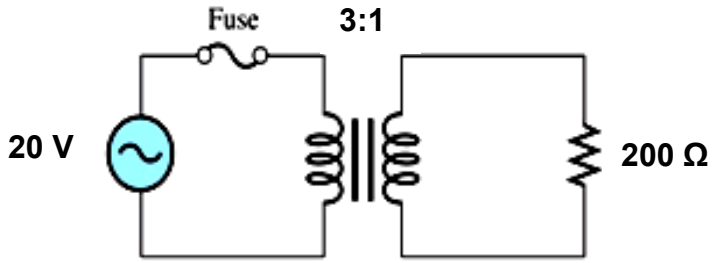

Figure 9

(i) Reflected resistance at primary winding (**R_p**) (2 marks)

(ii) Primary current (**I_p**) (2 marks)

(iii) Secondary current (**I_s**) (2 marks)

(iv) Secondary voltage (**V_s**) (2 marks)

(v) Power in the load (**P_L**) (2 marks)

(b) In the Y **–** Δ system shown in figure 10, $\mathbf{Z_A = Z_B = Z_C = 60 \angle 50^o\ \Omega}$. The phase sequence is ABC and E_{AN} = 340 ∠0° Volts.

(i) Calculate the line voltages (E_{AB}, E_{BC} and E_{CA}) (3 marks)

(ii) Find the current in each load (I_{ab}, I_{bc} and I_{ca}) (3 marks)

(iii) The line currents (I_{Aa}, I_{Bb} and I_{Cc}) (3 marks)

(iv) The sum of line currents (1 marks)

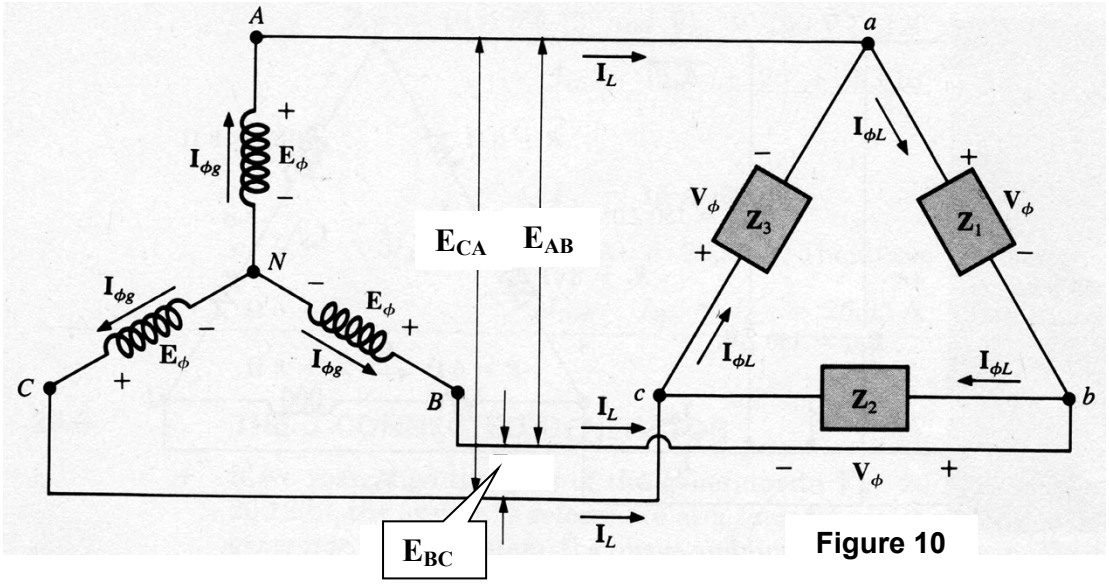

Figure 10

END OF QUESTION PAPER