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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2013 SESSION

SUBJECT CODE	:	**FED 10202**
SUBJECT TITLE	:	**ELECTRICAL PRINCIPLES**
LEVEL	:	**DIPLOMA**
TIME / DURATION	:	**2 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 TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) question only.**
6. **Answer all questions in English.**

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A(Total:60marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) Perform the indicated conversion:
   (i) 25000 kΩ to MΩ (3 marks)
   (ii) 0.0368μA to nF (3 marks)

(b) Express the following number in scientific notation and engineering notationusing metricprefixes:
   (i) 0.0000563 A (3 marks)
   (ii) 58900000 Ω (3 marks)

Question 2

(a) Define:
   (i) Voltage (1 mark)
   (ii) Resistance (1 mark)

(b) If 500J energy is used to move 20 C of charge through a resistor, calculate the voltage across the resistor (2 marks)

(c) Determine the resistance and tolerance for each of the following 4-band resistors:
   (i) Green, Gray, Red, Gold (2 marks)
   (ii) Orange, Black, Gold, Silver (2 marks)

(d) Determine the colour bands for each of the following 4-band resistors. Assume each has a 5% tolerance.
   (i) 9.7 Ω (2 marks)
   (ii) 68 kΩ (2 marks)

Question 3

Referring to **Figure 1** below, calculate the:

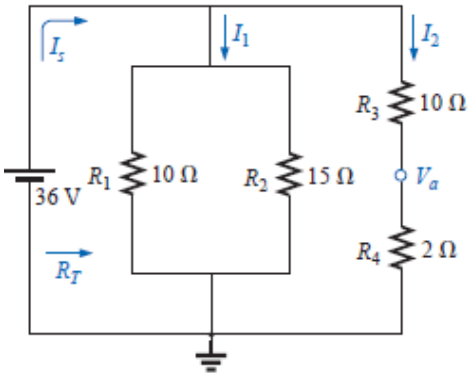

Figure 1

(a) Total resistance, (**R_T**) (5 marks)

(b) Total current, (**I_s**) (3 marks)

(c) Currents (**I_1**) and (**I_2**) (6 marks)

(d) Voltage (**V_a**) with respect to ground (3marks)

(e) Power delivered by the source (**P_s**) (3 marks)

Question 4

(a)State THREE (3) various sources of AC power (3 marks)

(b) An alternating voltage is represented by $v = 80 \sin 200t$. Determine the:

(i) Frequency, (**f**) (2 marks)

(ii) **V_{pp}** and**V_{rms}** (4 marks)

(iii) The instantaneous voltage (**v**) at t = 2 ms (3 marks)

(iv) The angle (**θ**)when the voltage first reaches the instantaneous value of 25 V (4 marks)

SECTION B(Total:40marks)

INSTRUCTION: Answer TWO (2) questions only.

Please use the answer booklet provided.

Question 5

The instantaneous value of voltage in an AC circuit at any time ***t***seconds is given by $V = 100 \cdot \sin(50\pi t - 0.523)\ V$. Find:

(a) ***Vpp***, the peak-to-peak voltage

(2 marks)

(b) ***Vrms***, the rmsvoltage

(2 marks)

(c) ***T***, the periodic timeand f, the frequency

(2 marks)

(d) φ, the phase angle in degrees.

(2 marks)

(e) the voltage when ***t***=8 ms

(3 marks)

(f) time of first occurrence in the first cycle when the voltage is 60 V

(3 marks)

(g) time of first occurrencewhen the voltage is a maximum.

(3 marks)

(h) Sketch the signal from ***t***=0s until end of first cycle, showing and labelling important points: peaks and zero crossings points.

(3 marks)

Question 5

(a) State three(3) applications of capacitor in electrical and electronic area.

(3 marks)

(b) Determine the capacitance of a parallel plate capacitor having a plate area of 0.01 m^2 and a plate separation of 0.5 mil (1.27 x 10^{-5} m). The dielectric is mica, which has adielectric constant of 5.0.Given ε_0 = 8.85x10^{-12} F/m.

(3 marks)

(c) An electronic circuit is shown in **Figure 2**. Determine :

(i) Reactances of **C1** and **C2** and total reactance.

(6 marks)

(ii) The voltage across **C2.**

(2 marks)

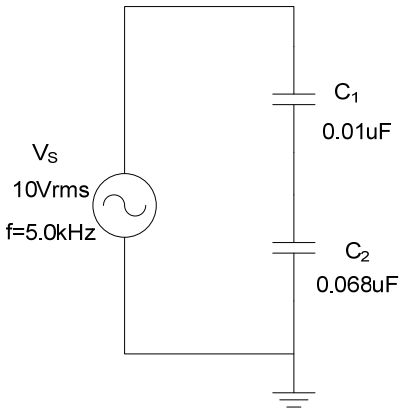

FIGURE 2

(d) Briefly describe the phenomena of inductance.

(3 marks)

(e) An electronic circuit containing inductances is shown in **Figure 3**. Calculate the total rms current flowing through the circuit.

(3 marks)

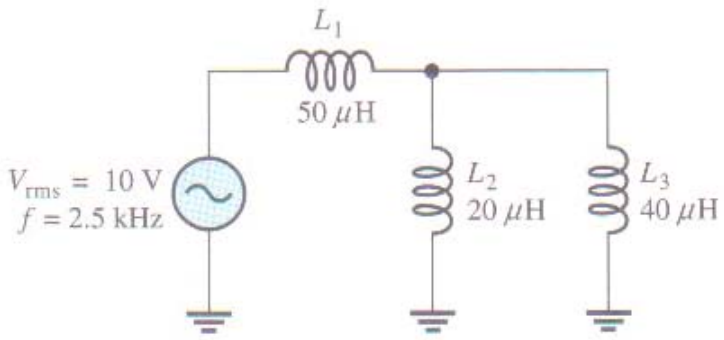

Figure 3

Question 6

(a) Briefly explain the following:

(i) Step-up transformer (2 marks)

(ii) Step-down transformer (2 marks)

(b) Referring to **Figure 4** below, determine the:

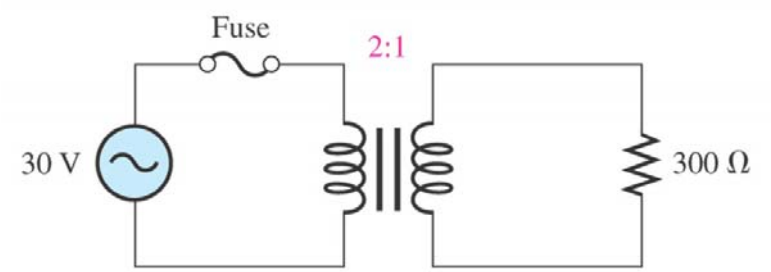

Figure 4

(i) Turns ratio (2 marks)

(ii) Secondary voltage (3 marks)

(iii) Secondary current (3 marks)

(iv) Primary current (3 marks)

(v) Reflected resistance seen by the source (3 marks)

(vi) Power in the load (2 marks)

END OF QUESTION PAPER

FORMULA

CAPACITANCE

Capacitance , $C = \frac{Q}{V}$

Capacitance, $C = \frac{A \cdot \varepsilon_r \cdot (8.85 \times 10^{-12}\ \text{F/m})}{d}$

Capacitive reactance, $X_C = \frac{1}{2\pi \cdot f \cdot C}$

Time constant, $\tau = R \cdot C$

INDUCTANCE

Voltage induced $V_L = L \cdot \frac{\Delta i}{\Delta t}$

Circle area = $\pi \times r^2$

Inductance, L = $\frac{N^2 \times \mu \times A}{l}$

Inductive reactance, $X_L = 2\pi \cdot f \cdot L$

Time constant, $\tau = \frac{L}{R}$

CHARGE/DISCHARGE

Voltage $V = V_F + (V_F - V_I) \cdot e^{-\frac{t}{\tau}}$

Current $I = I_F + (I_F - I_I) \cdot e^{-\frac{t}{\tau}}$