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SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JULY 2010 SESSION

SUBJECT CODE	:	FEB 10102
SUBJECT TITLE	:	ELECTRICAL FUNDAMENTAL
LEVEL	:	BACHELOR
TIME / DURATION	:	8.00pm – 10.00pm (2 HOURS
DATE	:	09 NOVEMBER 2010

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 two (2) question 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.

SECTION A (Total: 40 marks)

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

Question 1

(a) An ac current is represented by the mathematical equation, $i(t) = 5\sin(2\pi \times 100t)$ mA. Determine;

i. The angular velocity, ω. (2 marks)

ii. The frequency, f. (2 marks)

iii. The instantaneous current at t = 2 ms. (3 marks)

(b) The circuit in Figure 1 is used to test the 15 V source drawing by three different values of current from it as the switch is put in the three positions shown. The test currents corresponding to the three switch positions are to be as follows:

- Position 1: I = 10 mA
- Position 2: I = 30 mA
- Position 3: I = 150 mA

Determine the resistance value R_1, R_2 and R_3. (9 marks)

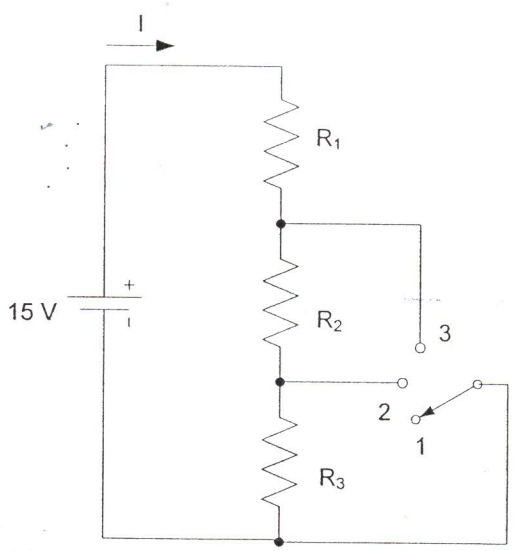

Figure 1

Question 2

(a) Referring to Figure 2 switch S is placed in position 2, after being placed in position 1 long enough for the capacitor to be fully charged. Calculate:

i. The time required for capacitor to be fully discharged.

(2 marks)

ii. The capacitor voltage at t = 2τ

(2 marks)

iii. Draw the discharging curve of capacitor, $v_C(t)$ versus t.

(2 marks)

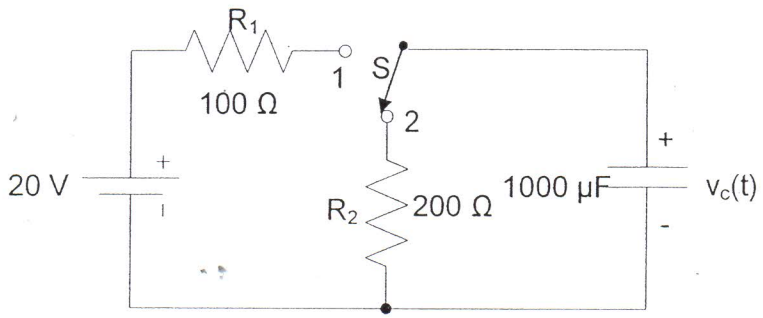

Figure 2

(b) For the circuit shown in Figure 3, determine the value of the current I_X and the voltage across 4 Ω resistance.

(3 marks)

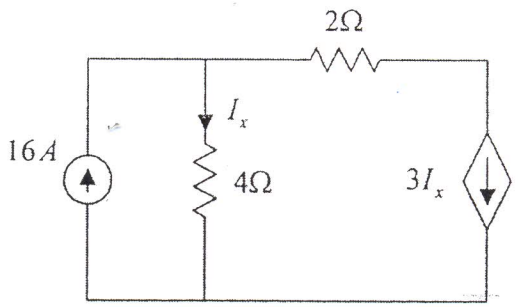

Figure 3

Question 3

A series-parallel circuit shown in Figure 4 is connected to an unknown voltage source, V_S. The voltage drop across 75 Ω resistor is 2.45 V. Determine:

(a) The branch current, I_1 and I_2. (7 marks)

(b) The total current, I_T. (2 marks)

(c) The voltage, V_S and V_0 (4 marks)

(d) The total power delivered to the circuit (2 marks)

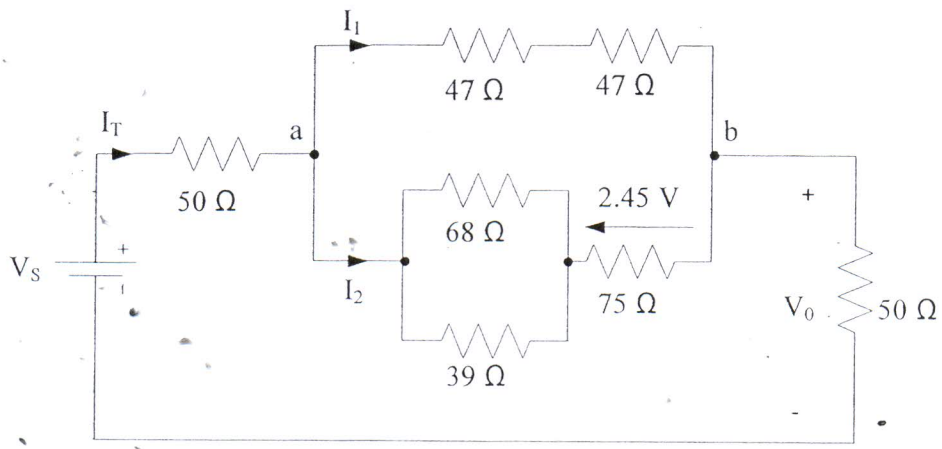

Figure 4

SECTION B (Total: 60 marks)

INSTRUCTION: Answer only TW0 questions.
Please use the answer booklet provided.

Question 4

(a) Explain briefly the steps in performing circuit analysis using Mesh current method.

(5 marks)

(b) For the circuit shown in Figure 5, use Mesh Current analysis to determine;

i. The current through 3 Ω resistor , I_0

ii. The voltage across 3 Ω resistor, V_0

iii. The power dissipated through 3 Ω resistor

(25 marks)

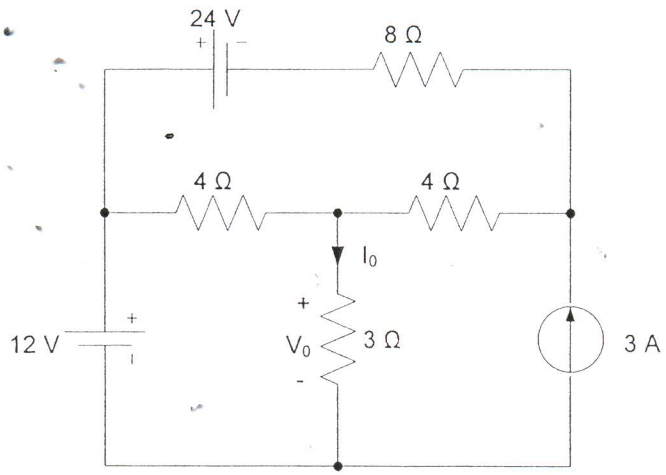

Figure 5

Question 5

(a) Define the Norton's Theorem. State clearly the Norton equivalent resistance, R_N and Norton equivalent current, I_N

(6 marks)

(b) Figure 6 shown a multi source circuit with a voltage and current source

i. Find the Norton equivalent across the R_L.

ii. If the load R_L = 6 Ω, determine the current through the load.

iii. Calculate the power dissipated through R_L

(20 marks)

(c) Convert the Norton equivalent circuit in part b(i) to Thevenin equivalent circuit.

(4 marks)

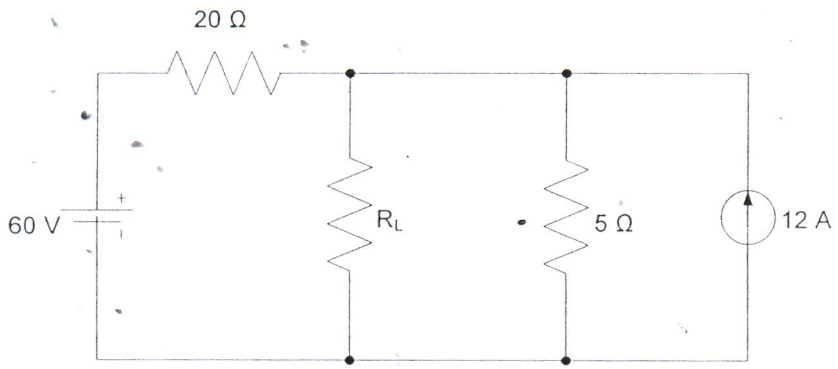

Figure 6

Question 6

(a) Figure 7 shows two resistor are connected in parallel. Given $I_1 = \frac{V_s}{R_1}$ and $I_2 = \frac{V_s}{R_2}$

Prove that:

$$I_1 = I_T \frac{R_2}{(R_1 + R_2)}; \text{ and } I_2 = I_T \frac{R_1}{(R_1 + R_2)}$$

(6 marks)

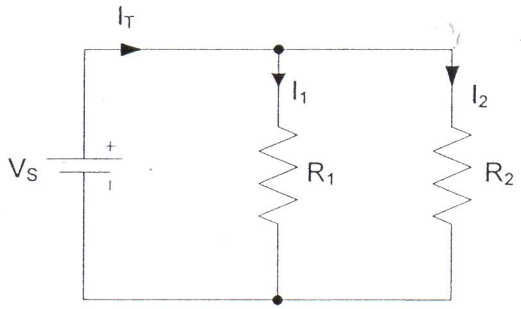

Figure 7

(b) A bridge network shown in Figure 8 is connected to a 120 V source. Calculate:

i. The equivalent resistance

ii. The current, I_T, I_X and I_Y.

iii. The voltage across 30 Ω resistor, V_0

iv. The power dissipated through 30 Ω resistance.

(24 marks)

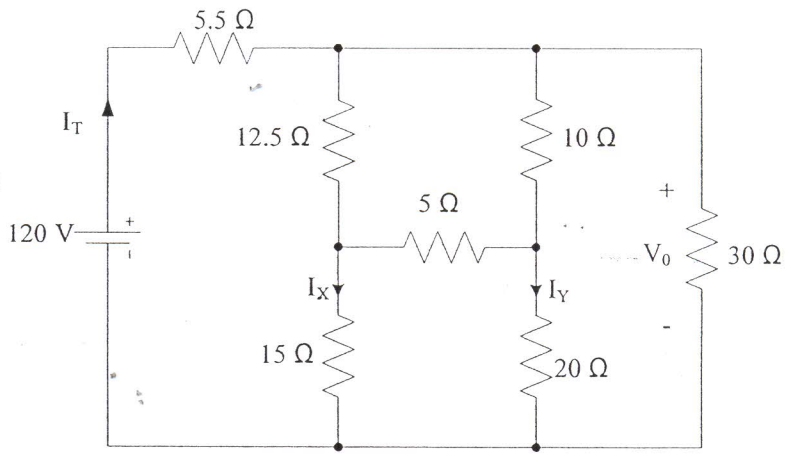

Figure 8

END OF QUESTION PAPER