FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

FINAL EXAMINATION

COURSE	**:**	**CIRCUIT ANALYSIS I/**
		ELECTRIC CIRCUITS I
COURSE CODE	**:**	**BEE1133/ BEE1113**
LECTURER	**:**	**DR. NOR RUL HASMA BINTI ABDULLAH**
DATE	**:**	
DURATION	**:**	**3 HOURS**
SESSION/SEMESTER	**:**	**SESSION 2012/2013 SEMESTER 2**
PROGRAMME CODE	**:**	**BEE/BEP/BEC**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of **FIVE (5)** questions. Answer **ALL** the questions.
2. All answers to a new question should start on new page.
3. All the calculations and assumptions must be clearly stated.

EXAMINATION REQUIREMENTS

Appendix 1: Table of Formula

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of **NINE (9)** printed pages including front page

QUESTION 1

a) Figure 1 shows an example of an electric circuit. Determine;

(i) Kirchoff's Voltage Law (KVL) equation for each loop.

(ii) The voltage, V_2.

(iii)The voltage, V_3 if voltage, V_4 is given as 3.3 V.

[8 Marks]
[CO1, PO1, C3]

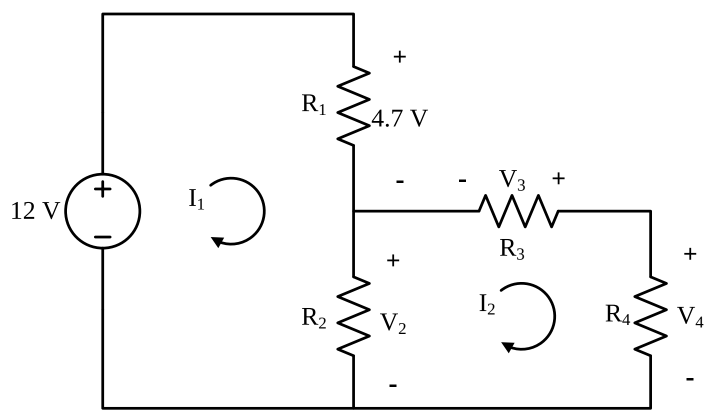

Figure 1

b) By applying Δ↔Y transformation technique to the circuit in Figure 2, determine;

(i) The equivalent resistance, $R_{eq.}$

(ii) The value of current, I_o.

(iii) The value of voltage, V_o.

(iv) The power dissipated by 4-Ω resistor at V_o.

(v) The power delivered by independent voltage source.

[12 Marks]
[CO1, PO1, C4]

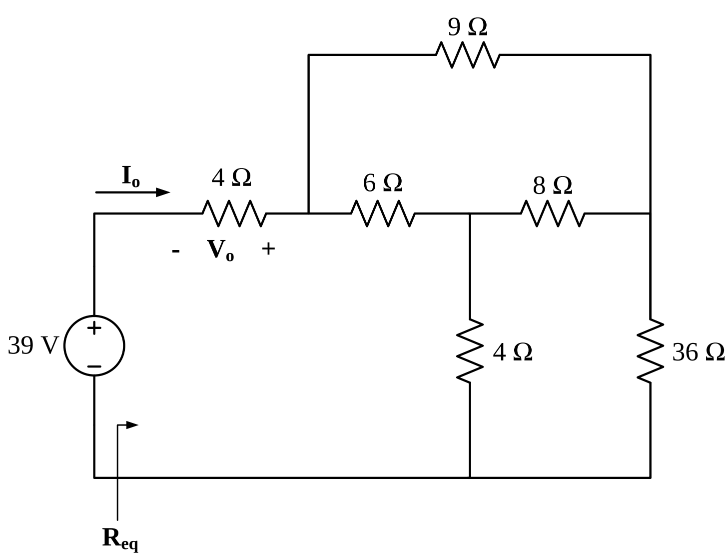

Figure 2

QUESTION 2

Perform Mesh analysis to the circuit in Figure 3, then

a) Determine all the value of unknown mesh currents, I_1, I_2 and I_3.

b) Calculate the power delivered by dependent current source.

[15 Marks]
[CO2, PO1, C4]

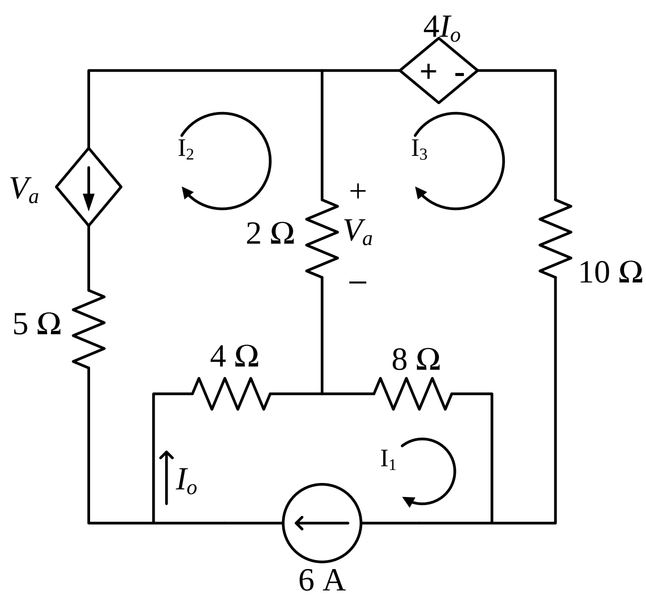

Figure 3

QUESTION 3

A modified bridge circuit is shown in Figure 4. By using Thevenin theorem;

a) Find the Thevenin equivalent resistance, R_{th} at terminal a-b.

b) Find the Thevenin voltage, V_{th} across terminal a-b

c) Draw the Thevenin equivalent circuit

d) From 3(c), draw the Norton equivalent circuit and find the current through R_L=1Ω.

e) Calculate the maximum power, P_{max} transferred to the load.

[20 Marks]
[CO2, PO1, C4]

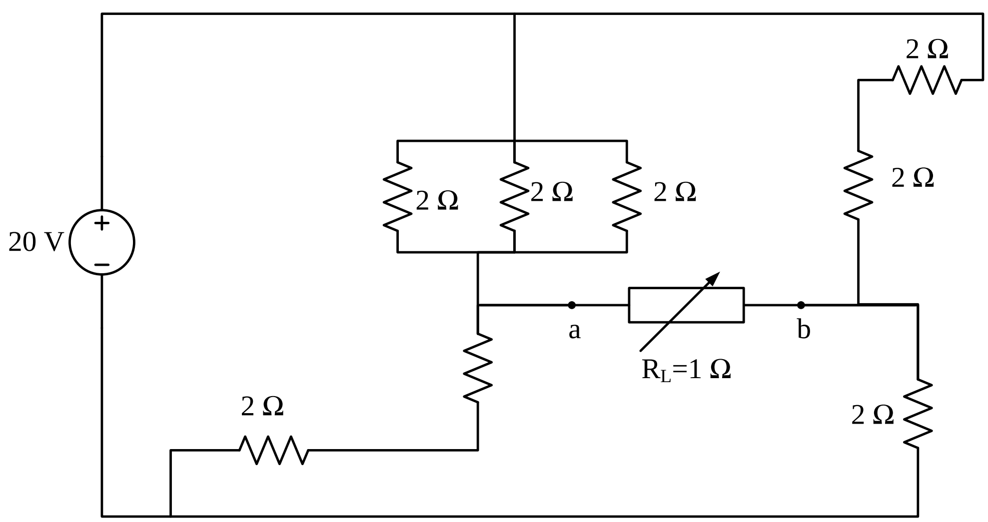

Figure 4

QUESTION 4

The switch, s in Figure 5 was at position ‘a’ for a long time. At $t = 0$, the switch is move to position ‘b’. Find the expression for v(t) for $t \geq 0$.

[15 Marks]
[CO2, PO1, C4]

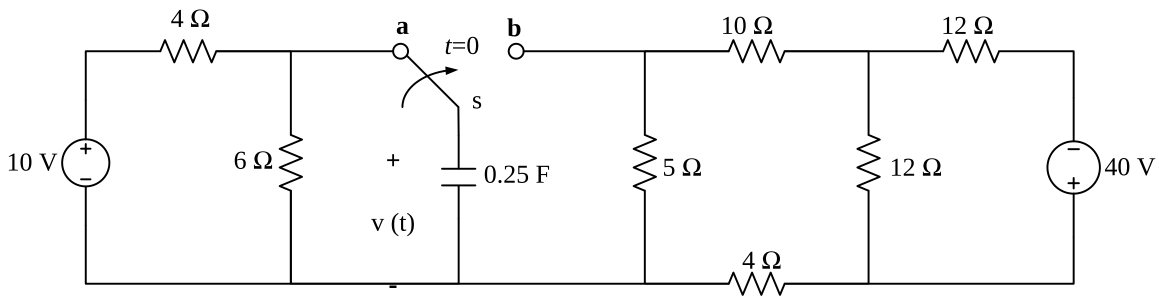

Figure 5

QUESTION 5

a) For the circuit shown in Figure 6;

(i) Obtain the equivalent circuit in frequency domain.

(ii) Determine the impedance, Z_x as seen looking into terminals a-b.

(iii) Find the voltage, $\mathbf{v_x}$.

(iv) Calculate the voltage, $\mathbf{v_o}$.

[10 Marks]
[CO3, PO1, C4]

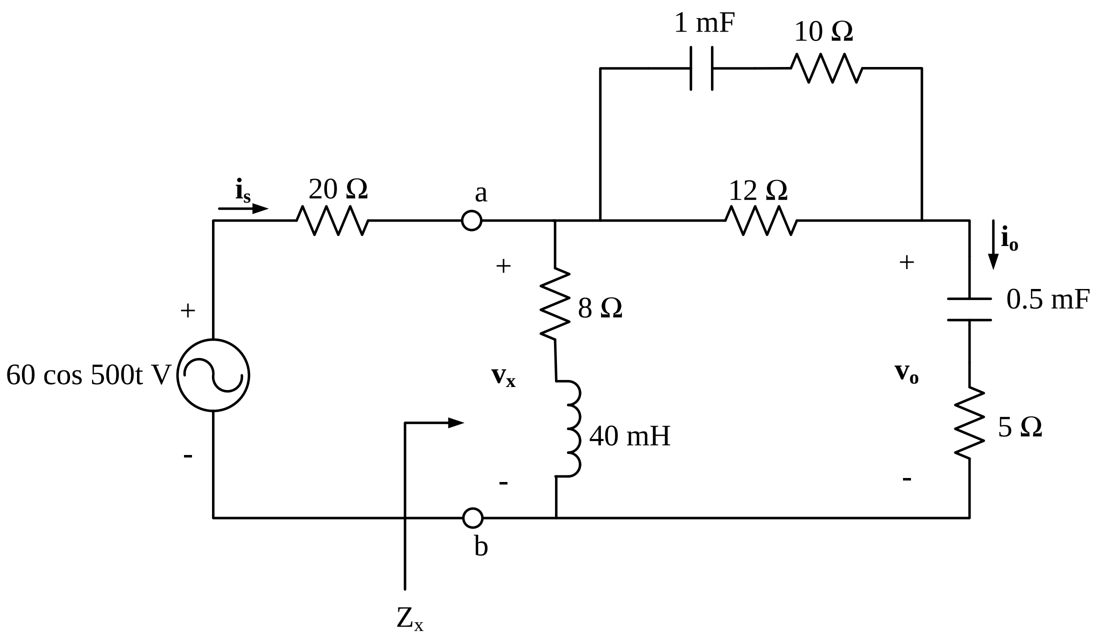

Figure 6

b) Use Nodal analysis to determine the voltage, V_x and V_z for the circuit shown in Figure 7.

[20 Marks]
[CO3, PO1, C5]

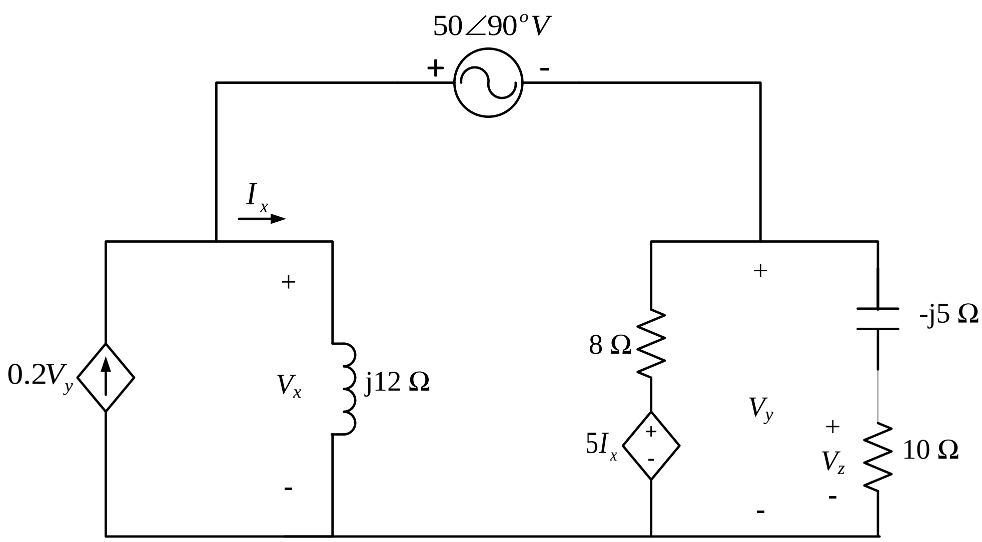

Figure 7

END OF QUESTION PAPER

APPENDIX I –Table of Formula

(1) Y-Δ Transformation $R_a = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_1}$ $R_b = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_2}$ $R_c = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_3}$	(2) Δ-Y Transformation $R_1 = \frac{R_bR_c}{R_a + R_b + R_c}$ $R_2 = \frac{R_cR_a}{R_a + R_b + R_c}$ $R_3 = \frac{R_aR_b}{R_a + R_b + R_c}$
(3) $V_c = \frac{1}{C}\int_{t_0}^{t} idt + v(t_o)$ $i_L = \frac{1}{L}\int_{t_0}^{t} vdt + i(t_o)$	(4) $i_c = C\frac{dv}{dt};$ $V_L = L\frac{di}{dt}$
(5) $v(t) = v(\infty) + [v(0) - v(\infty)]e^{-t/\tau}$	(6) $i(t) = i(\infty) + [i(0) - i(\infty)]e^{-t/\tau}$