Universiti Malaysia PAHANG

Engineering • Technology • Creativity

FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

FINAL EXAMINATION

COURSE	:	**CIRCUIT ANALYSIS I/ ELECTRIC CIRCUITS I**
COURSE CODE	:	**BEE1133/BEE1113**
LECTURERS	:	**ROSYATI BINTI HAMID**
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DATE	:	**9 JANUARY 2013**
DURATION	:	**3 HOURS**
SESSION/SEMESTER	:	**SESSION 2012/2013 SEMESTER I**
PROGRAMME CODE	:	**BEE/BEC/BEP**

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.
4. Candidates are not allowed to bring any material other than those allowed by the invigilator into the examination room.

EXAMINATION REQUIREMENTS

1. **Appendix 1** : Table of Formula

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

This examination paper consists of **SEVEN (7)** printed pages including front page

QUESTION 1

a. Figure 1 shows an example of an electric circuit. By using circuit simplification method, find the value of v_x in the circuit.

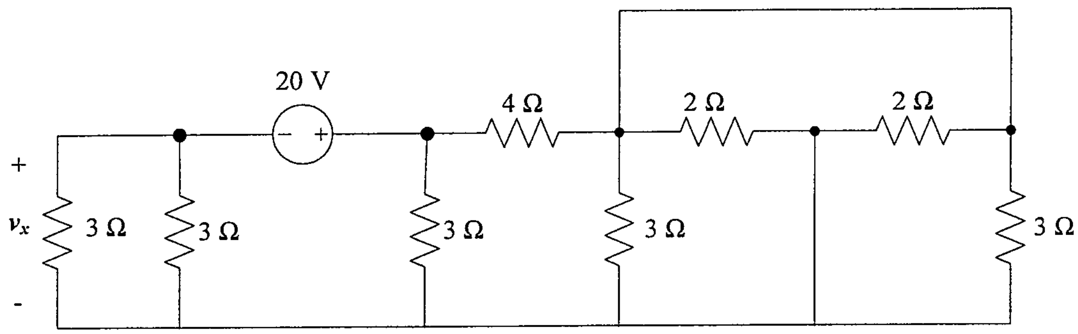

Figure 1

[10 Marks]
[CO1, PO1, C4]

b. For the circuit shown in Figure 2, use the circuit simplification techniques to determine;

(i) the voltages, v_1 and v_2, and

(ii) the power provided by independent source.

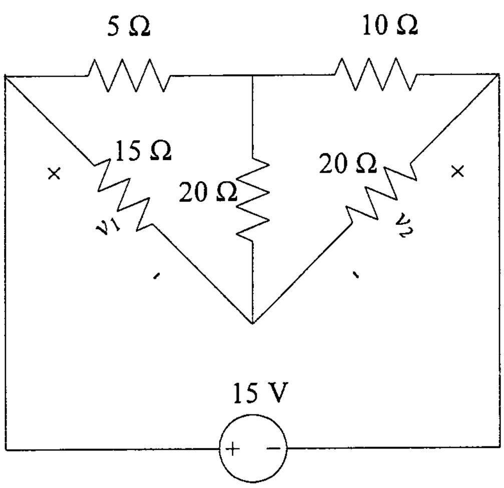

Figure 2

[10 Marks]
[CO1, PO1, C4]

QUESTION 2

For the circuit shown in Figure 3, use Nodal Analysis to determine:

a. the voltages V_1, V_2 and V_3,

b. the current, i_x

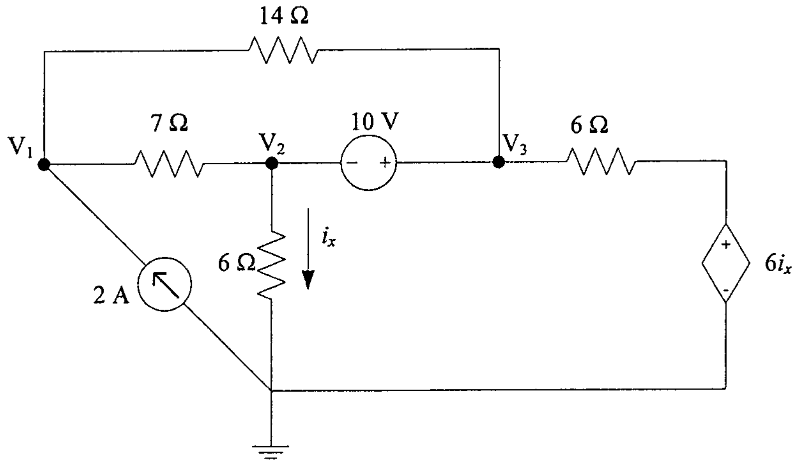

Figure 3

[15 Marks]
[CO2, PO1, C4]

QUESTION 3

Determine the voltage V_o in Figure 4 by using Norton's theorem. Find the maximum power that can be delivered to 5 Ω resistor.

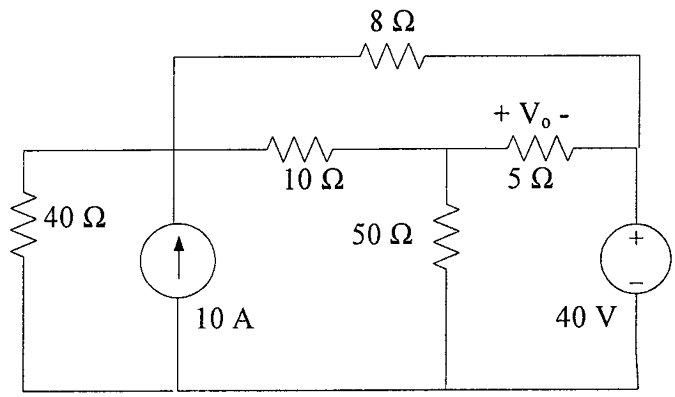

Figure 4

[20 Marks]
[CO2, PO1, C4]

QUESTION 4

The switch in Figure 5 has been in position x for a long time. At $t = 0$, the switch moves instantaneously to position y.

a. Find α so that the time constant for $t > 0$ is 40 ms.

b. For the α found in (a), find V_Δ.

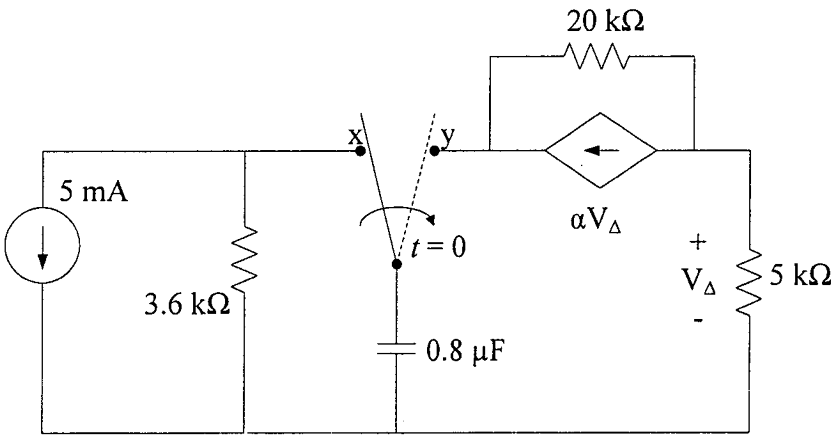

Figure 5

[15 Marks]
[CO2, PO1, C4]

QUESTION 5

a. Given

$$60\cos\left(5t+45^{o}\right)-6\frac{di}{dt}+3\int idt+6i=0 \qquad (1)$$

i. Using phasor approach, determine the current *i(t)* in circuit described by the equation (1).

ii. If current obtained in (i) is applied to a 0.5 H inductor, calculate the voltage across that inductor.

[5 Marks]
[CO3, PO2, C4]

b. The circuit in Figure 6 shows a combination of resistor and inductor elements. Calculate the voltages across resistors 5Ω and 60Ω using nodal analysis if $V_1 = 30\cos(2t+25^{o})V$ and $V_2 = 20\cos(2t+130^{o})V$.

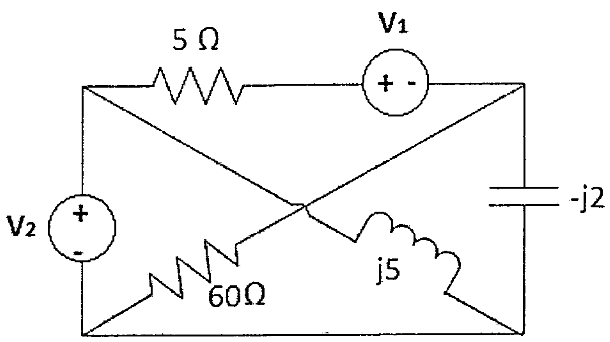

Figure 6

[12 Marks]
[CO3, PO2, C4]

c. Determine the voltages of V_A and V_B in Figure 7.

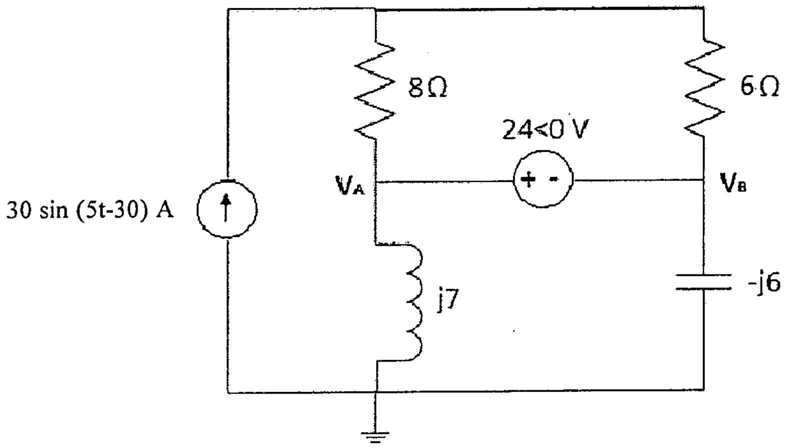

Figure 7

[13 Marks]
[CO3, PO2, C5]

END OF QUESTION PAPER

APPENDIX I - Table of Formula

(1) Y-Δ Transformation	(2) Δ-Y Transformation
$R_a = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_1}$ $R_b = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_2}$ $R_c = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_3}$	$R_1 = \frac{R_bR_c}{R_a + R_b + R_c}$ $R_2 = \frac{R_cR_a}{R_a + R_b + R_c}$ $R_3 = \frac{R_aR_b}{R_a + R_b + R_c}$
(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) $i(t) = i(\infty) + [i(0) - i(\infty)]e^{-t/\tau}$