FIJI NATIONAL UNIVERSITY
College of Engineering, Science & Technology

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

DIPLOMA IN ELECTRICAL ENGINEERING (TELECOMM & NETWORKING)

EEE408 – CIRCUIT ANALYSIS

RE-SIT EXAMINATION – TRIMESTER 3, 2016

DAY/DATE: 01/12/2016 TIME : 2.00-5.00pm DURATION: 3HRS.10min

ROOM: SAMABULA CAMPUS

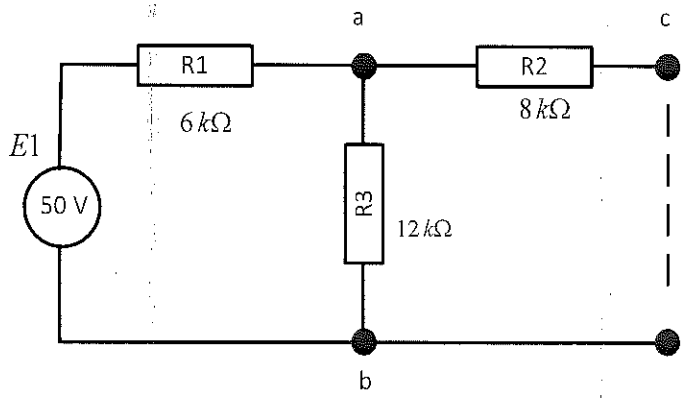
INSTRUCTION TO STUDENT

1. You are allowed 10 minutes extra reading time during which you are **NOT** to write.
2. **Begin each answer(each Question)** on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each answer & attached sheet.
4. Insert all written foolscaps, graph paper etc. in their correct sequence and secure with a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and you must attach all of them to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Tables & formula on the Appendix.
8. **SECTION A. – Answer ALL question.**
   SECTION B. – Select any three(3) question.

Section – A: [40 marks]

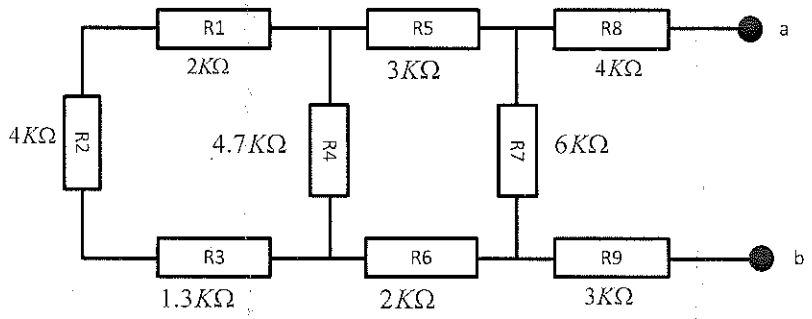
Question 1

1. For the resistive circuit below, find out:

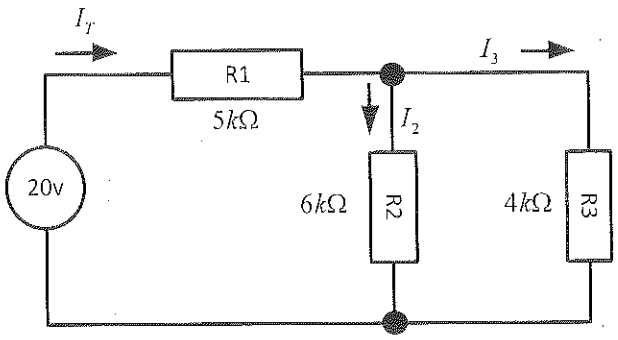


a) The voltage across each resistor using voltage divider method. (4marks)
b) The current through the circuit. (1mark)
c) If there is a short between points **c-b**, work out the current through 8KΩ resistor using current divider method. . (3marks)
d) The current through the circuit if points **a-b** is shorted. (2marks)

2. A circuit is given as shown below. Workout the *Req* between terminal *a* and *b*. (4 marks)



3. Find the current through 4kΩ resistor for the circuit in figure below....**(6 marks)**

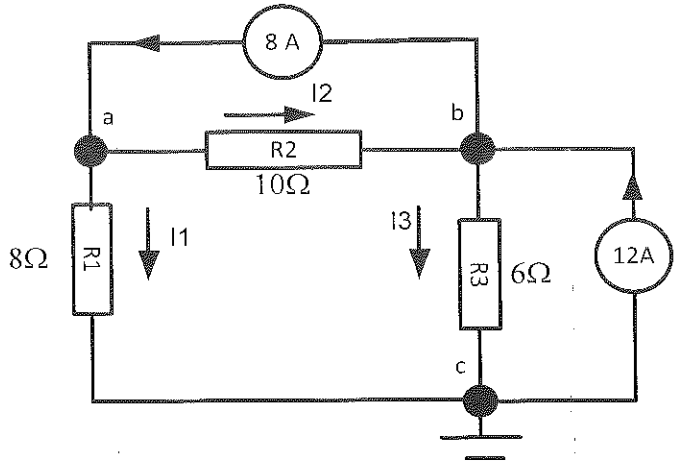


[Total: 20marks]

Question 2

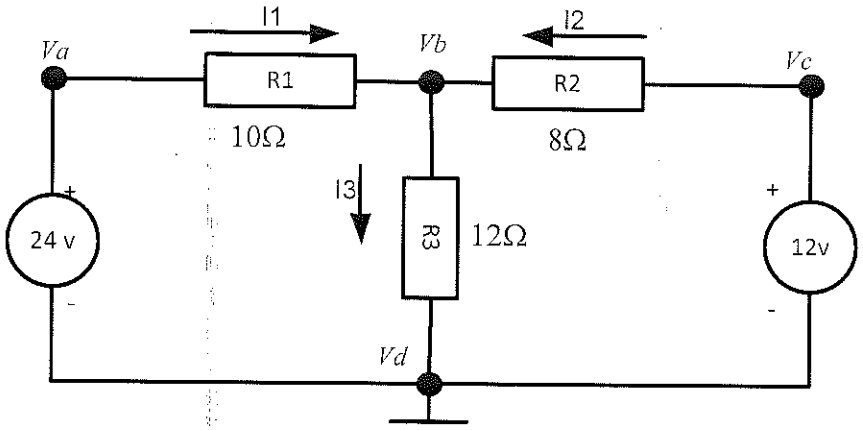
1. Using Nodal Analysis method:

   a) find the voltage at node "a" & node "b" in a circuit given below.
   (10 marks)



b) find the current in a 12Ω in a circuit below.

(10 marks)



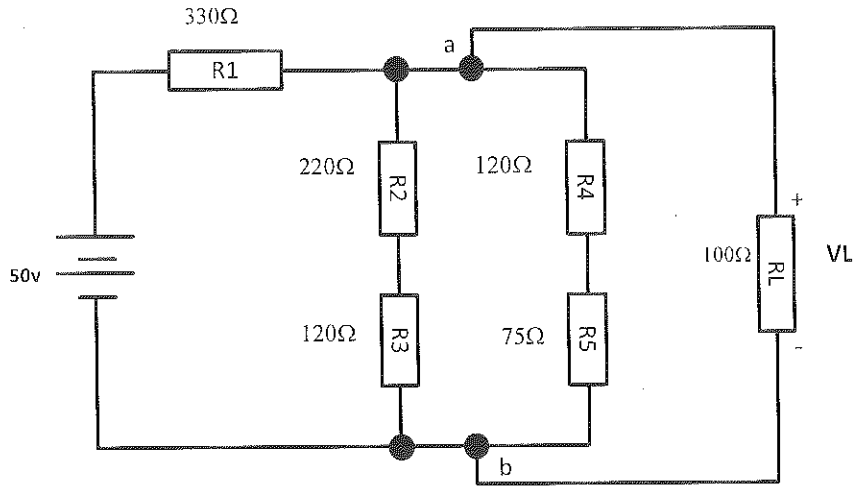
[Total: 20marks]

Section – B: - Answer ONLY Three[3] question in this section [60 marks]

Question 1

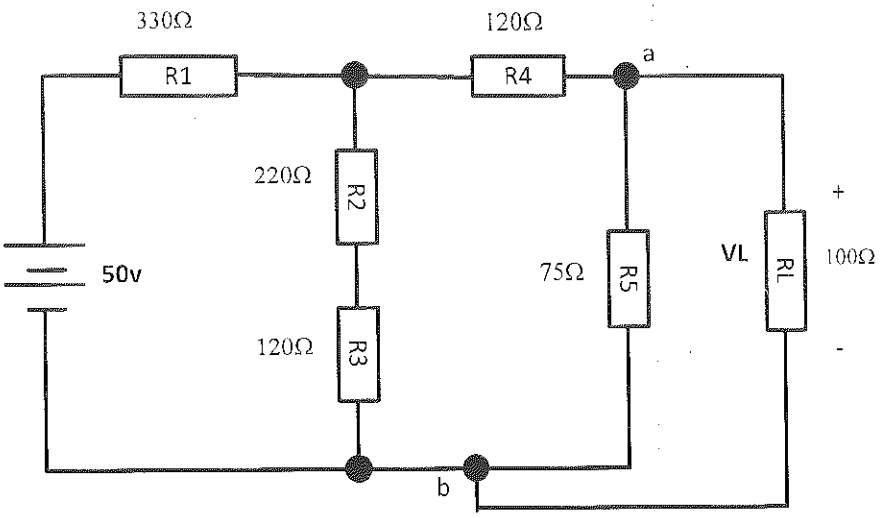
1. From the circuit given below, determine the Thévenin's equivalent circuit.

(10 marks)



2. For the circuit shown below, determine the Norton equivalent circuit.

(10 marks)



[Total: 20marks]

Question 2

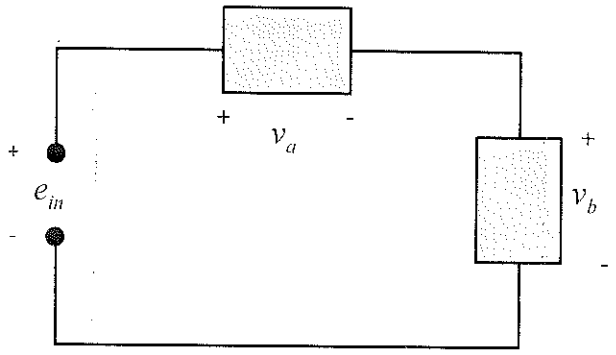
1. Using the Phasor analysis method, find:-

(i) the sinusoidal expression of input voltage of the network in the figure below, with frequency f = 60 Hz if :-

$v_a = 50 \sin(377t + 30^0)$ and

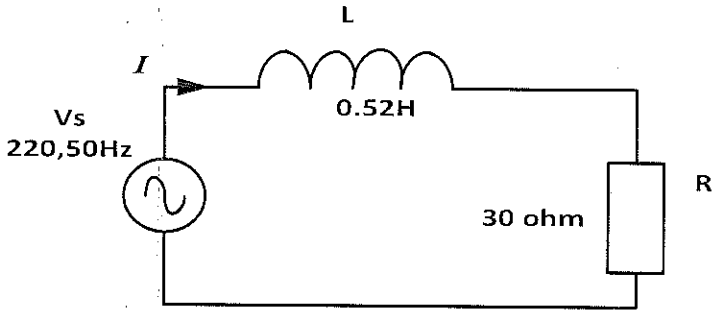
$v_b = 30 \sin(377t + 60^0)$ (8 marks)

(ii) plot the graph of the all voltages on the same axes. (2 marks)



2. The circuit shown below is connected to 220V, 50Hz supply. Determine the impedance of the circuit, and its phase angle?

(6 marks)



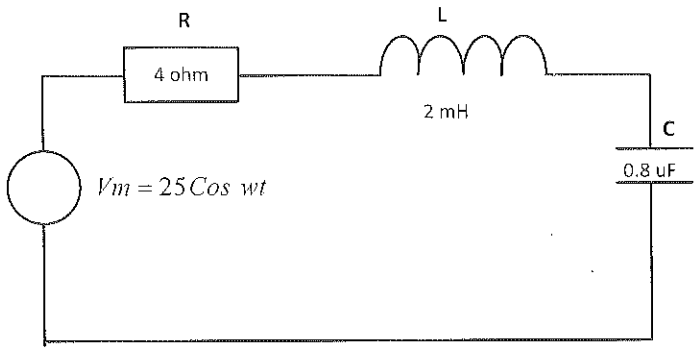
3. The voltage across a 1-uF Capacitor is given as $v = 30 \sin 400t$. What is the sinusoidal expression for the current? and Sketch the v and i curves.

(4 marks)

[Total: 20marks]

Question 3

For the RLC circuit below, **[20 marks]**



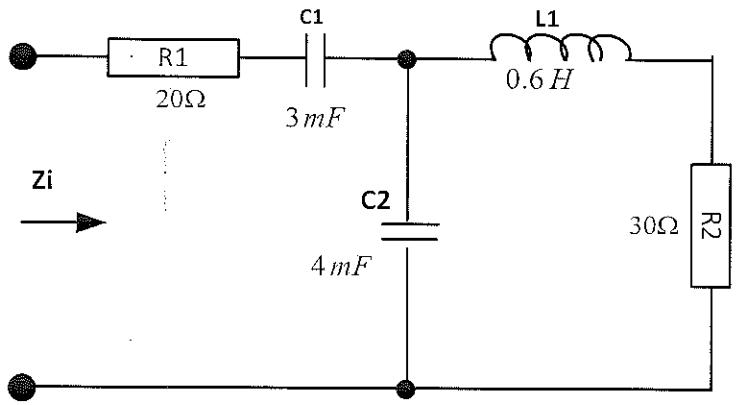
Calculate the following:-

a) The resonant frequency (2 marks)
b) Half power frequency (6 marks)
c) Quality factor (4 marks)
d) Bandwidth (3 marks)
e) Current Amplitude of w0, w1, w2 (5 marks)

Question 4

[20 marks]

Use complex algebra to determine the input impedance of the circuit shown below.
Assume $w = 10\ rad/s$.



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Appendix 1

Formulas

1. $w_x = R/2L + \sqrt{(R/2L)^2 + 1/LC}$

2. $w_y = -R/2L + \sqrt{(R/2L)^2 + 1/LC}$

3. $f_0 = 1/2\pi\sqrt{LC}$

4. $Q = \dfrac{1}{w_0 CR}$

5. $B = w_0{}^2 CR$

6. $X_L = 2\pi fL$

7. $X_C = \dfrac{1}{2\pi fC}$

9. $I_D = I_{DSS}\left(1 - \dfrac{V_{GS}}{V_P}\right)^2, \qquad \beta_1\left[(V_{DD} - 2V_T)V_{ON} - 0.5^2{}_{ON}\right]$

10. $f_H = \pm\dfrac{8fo}{Vc}, \qquad V_{DS} = V_{DD} - I_D R_D$