



FIJI NATIONAL UNIVERSITY

College of Engineering, Science & Technology

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

TRADE DIPLOMA IN ENGINEERING (ELECTRICAL & ELECTRONICS MAJOR)

EEE466 – CIRCUIT ANALYSIS

FINAL EXAMINATION – TRIMESTER 3, 2015

DAY/DATE: TIME : DURATION: 2HRS+10min

ROOM: J/NARAIN COLLEGE HALL/ BA CAMPUS

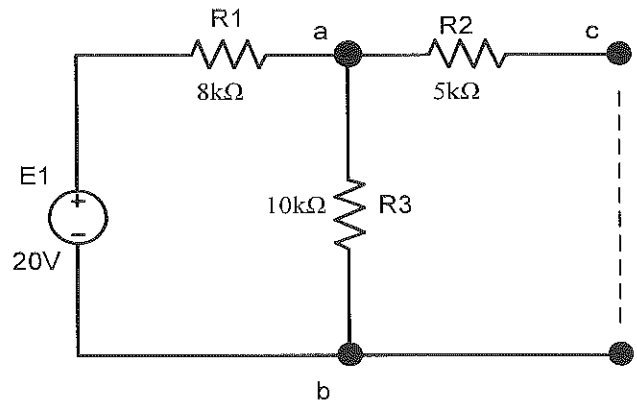
INSTRUCTION TO STUDENT

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. – Attempt ALL ;
SECTION B – Choose any two(2) question.**

Section – A: - Compulsory Section - Answer all question in this section

Question 1

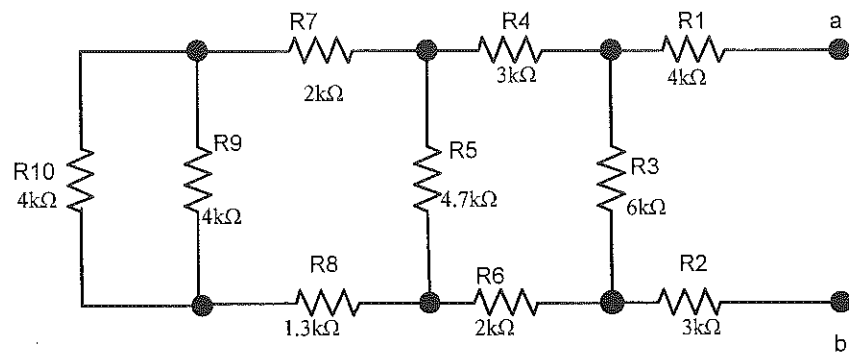
(A). For the series/parallel Resistive circuit below, find out:-



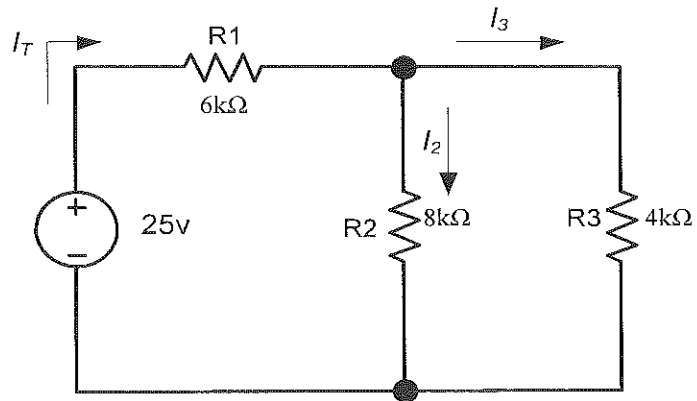
- i) The voltage across each resistor. (4marks)
- ii) The current through the circuit. (1 mark)
- iii) If there is a short between points **c-b**, work out the current through the parallel branch (3marks)
- iv) The current through the circuit if points **a-b** is shorted. (2marks)

(B). A resistive circuit is given below. Workout the:

- i) the R_{eq} between terminal a and b . (4 marks)



- (C). Find the current flowing through each branch of the circuit in figure below....
(6 marks)



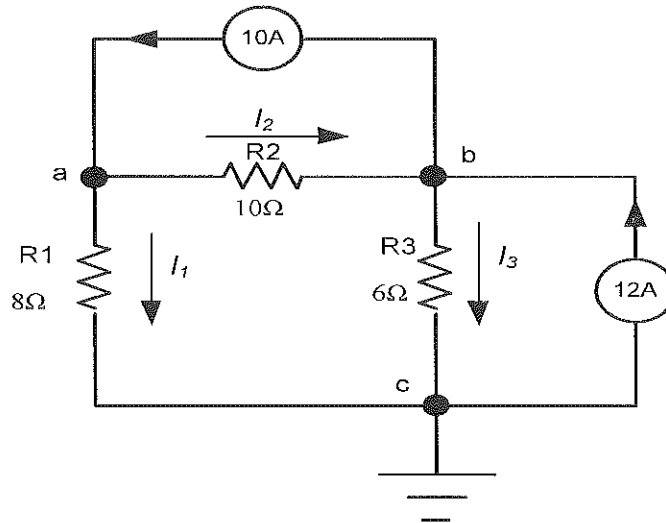
[Total 20 marks]

Question 2

Using Nodal Analysis method:

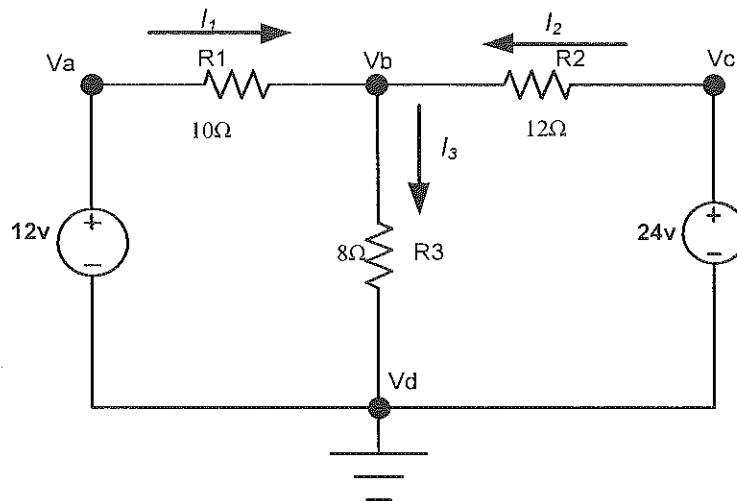
(A). Find the voltage at node "a" & node "b" in a circuit given below.

(10 marks)



(B). Find the current in a 12Ω resistor in a circuit below.

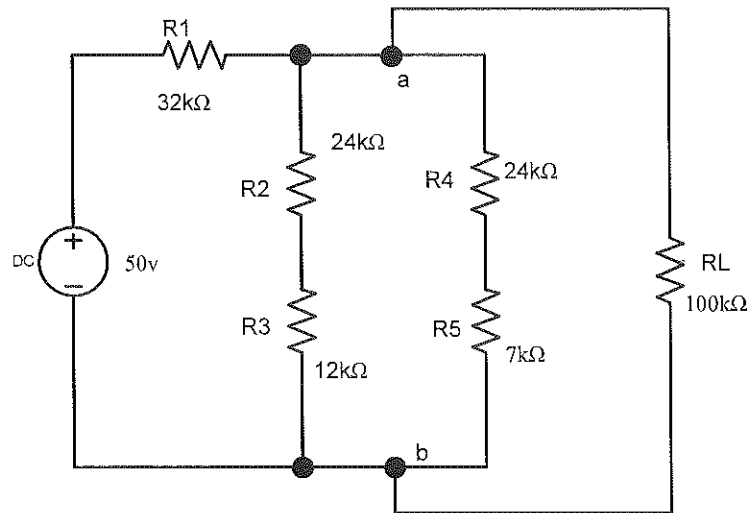
(10 marks)



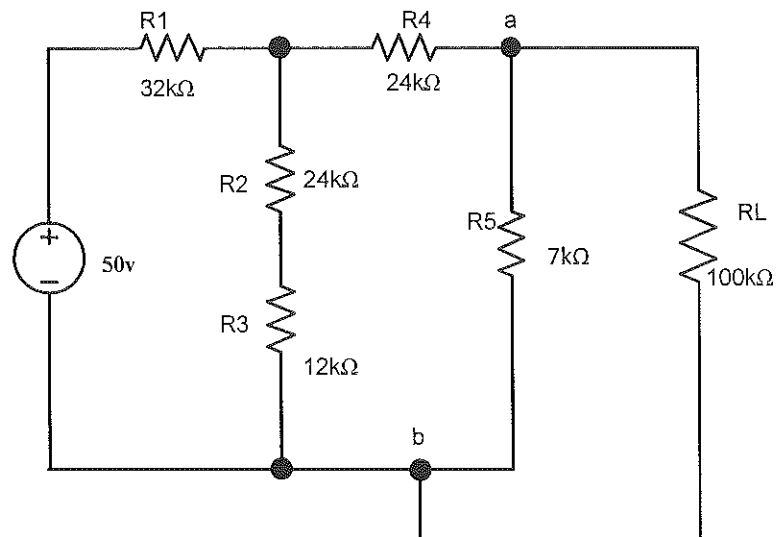
[Total: 20marks]

Question 3

(A). From the circuit given below, determine Thévenin's equivalent circuit and calculate the current through the load resistor. (10 marks)



(B). For the circuit shown below, calculate and determine the Norton equivalent circuit. (10 marks)



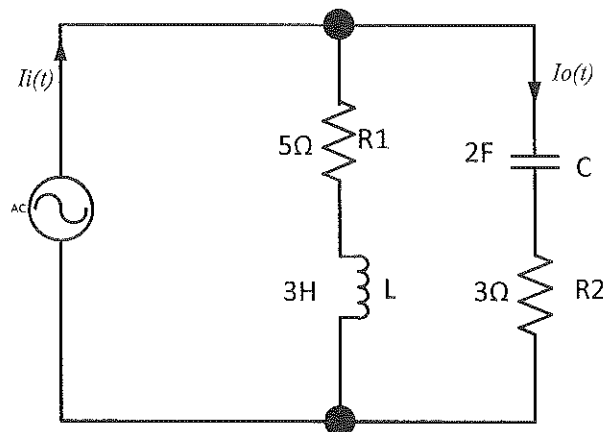
[Total: 20 marks]

Section – B: Select only TWO (2) questions from the FOUR (4) below.

Question 1

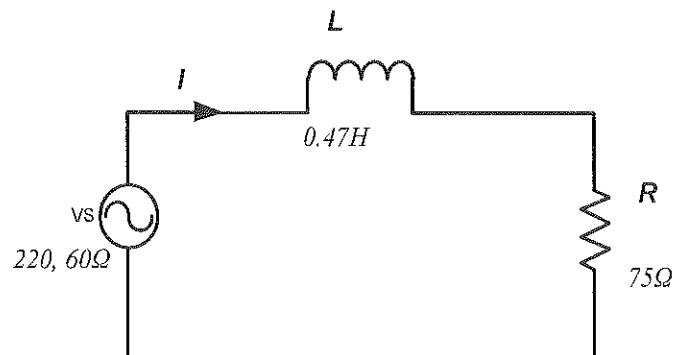
[20 marks]

(A). For the circuit below, show the full calculation of the **Gain = $I_O(\omega) / I_I(\omega)$** and determine the **poles and zeroes** of the circuit below using the RL and RC responses.
(10 marks)



(B). The circuit shown below, determine the impedance of the circuit, and its phase angle?

(6 marks)



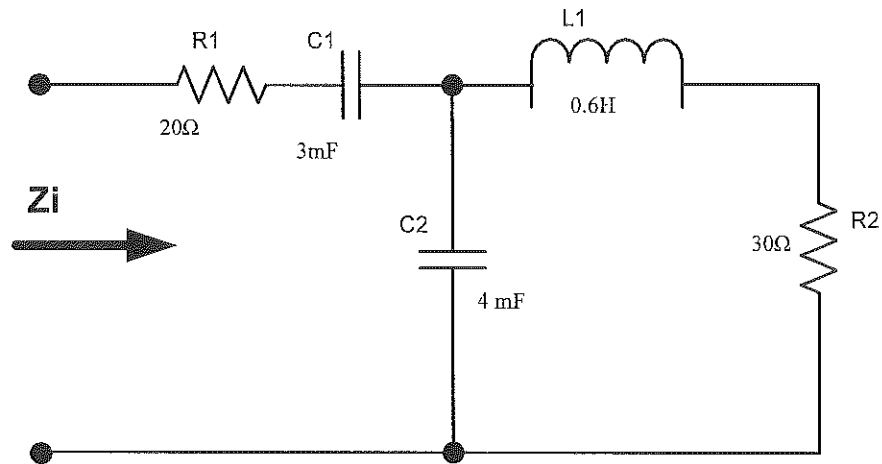
(C). The voltage across a 3μF Capacitor is given as $v = 30 \sin 377t$. What is the sinusoidal expression for the current and Sketch the voltage and current curves.
(4 marks)

[Total: 20marks]

Question 2

Use complex algebra [j-notation] application to:-

- Determine the input impedance of the circuit shown below. [15 marks]
- Plot its phasor diagram [5 marks]

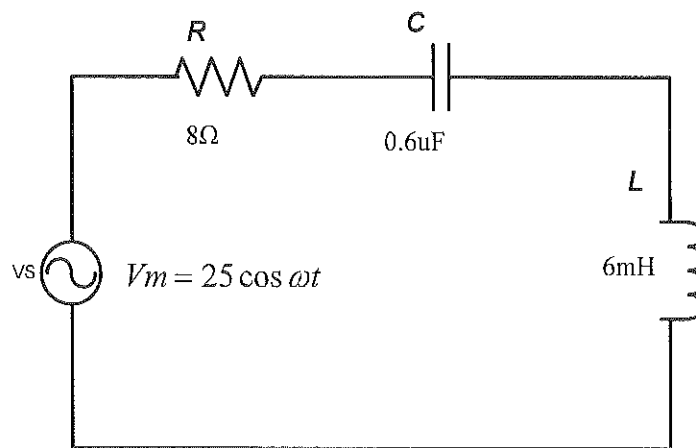


(use $\omega = 10$ rad/s)

[20 marks]

Question 3

For the RLC circuit below, resistor = 8Ω , capacitor = $0.6\mu\text{F}$ and inductor = 6mH , show all the necessary calculation to determine the following:- ,



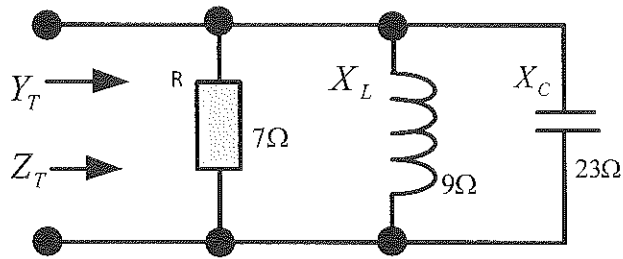
(use $\pi = 3.14$)

- | | |
|--|-----------|
| a) The resonant frequency | (3 marks) |
| b) Half power frequencies | (6 marks) |
| c) Quality Factor | (4 marks) |
| d) Bandwidth | (2 marks) |
| e) Current Amplitude of $\omega_0, \omega_1, \omega_2$ | (5 marks) |

[Total:20 marks]

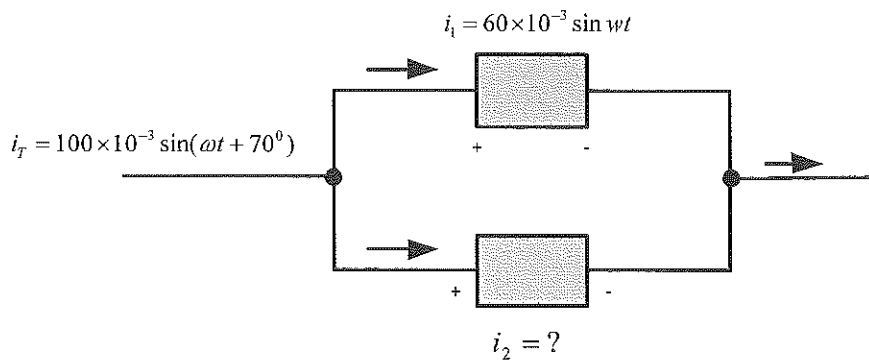
Question 4

A. For the parallel RCL network below. (10 marks)



- i. Find the admittance of each parallel circuit. (3 marks)
- ii. Determine the input admittance. (2 marks)
- iii. Calculate the input impedance (2 marks)
- iv. Draw the input impedance diagram. (1½ marks)
- v. Draw the admittance diagram. (1½ marks)

B. Determine the current i_2 for the network of the circuit below, (10 marks)



[Total: 20 marks]

----- END OF PAPER -----

Appendix 1

Formulas

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

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

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

$$4. \quad Q = \frac{1}{w_0 CR}$$

$$5. \quad B = w_0^2 CR$$

$$6. \quad X_L = 2\pi fL$$

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

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

$$10. \quad f_H = \pm \frac{8f_0}{V_C}, \quad V_{DS} = V_{DD} - I_D R_D$$

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