FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY
SCHOOL OF ELECTRICAL & ELECTRONIC

ENGINEERING

TRADE DIPLOMA IN ELECTRICAL ENGINEERING
STAGE 5

EEE571–ELECTRICAL POWER NETWORKS & THEOREMS

TRIMESTER 3 - 2015.

Total marks-100%---------Duration: 2Hrs 10 Minutes

DAY/DATE: **TIME:** **ROOM: As per timetable.**

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes Extra reading time during which you are NOT to write.

2. Begin each answer on a fresh page and use both sides of the sheet.

3. Write your candidate-number at the top of each attached sheet.

4. Insert all written sheets in their correct sequence and secure with string.

5. For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to your answer scripts.

6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.

7. Answer all Questions

8. Show all workings where necessary.

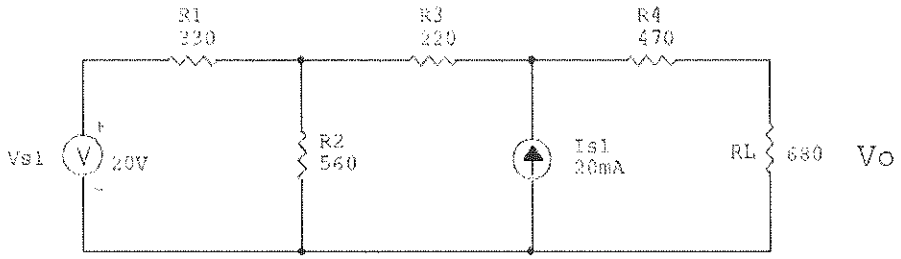
9. Do not use programmable calculators, especially the ones that does the conversions of number systems.

*10. **CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

Attempt all the questions

Question 1

a) Reduce the circuit shown to its Thevenin and Norton equivalent circuits.



(15 marks)

b) For the circuit shown in Fig. 2 find the current in the load resistance RL = 18Ω and the voltage across it by Norton's theorem and verify the result by applying Thevenin's theorem.

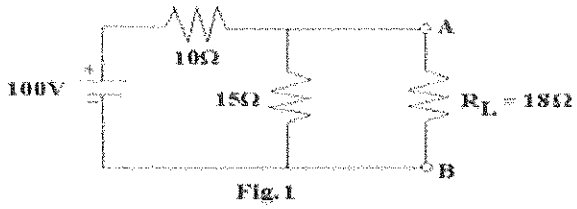


Fig. 1

(5marks)

Question 2

For the circuit shown in Fig. 1, find the value of RL for maximum power transfer. What will be the value of maximum power?

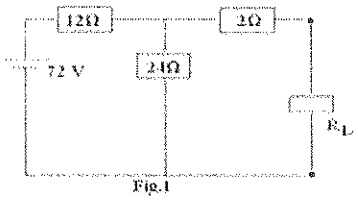


Fig.1

(5 marks)

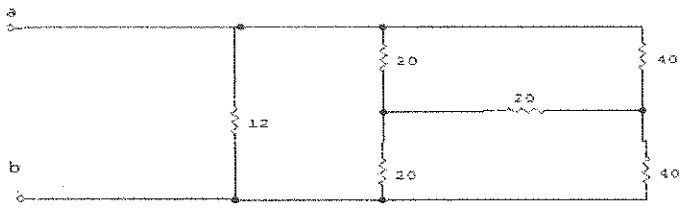
Question 3

Calculate the voltage applied across the circuit given below if, at a frequency of 2000Hz, 2V are dropped across the 1000 ohms resistance.

(5 marks)

Question 4

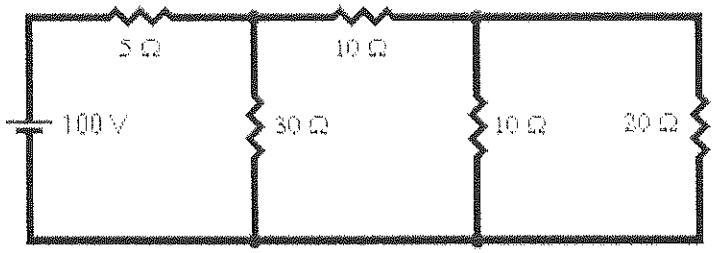
Execute $Y \rightarrow \Delta$ (R_{ab})



(10 marks)

Question 5

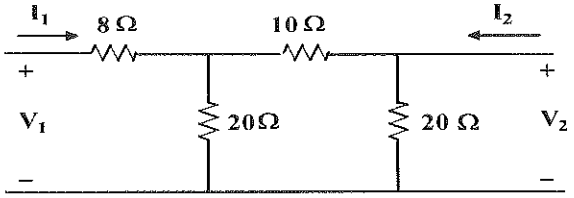
Use nodal analysis to find the voltage at each node of this circuit.



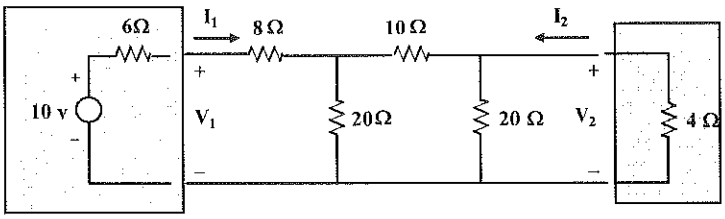
(10 marks)

Question 6

a) Given the following circuit. Determine the Z parameters (8 marks)



b) We modify the network as shown be adding elements outside the two ports (12 marks)



Find the values for V_1, V_2, I_1 and I_2

Question 7

Determine the phase sequence of the set of voltages.

$$V_{an} = 200\cos(\omega t + 10°)$$
$$V_{bn} = 200\cos(\omega t - 230°)$$
$$V_{cn} = 200\cos(\omega t - 110°)$$

(10marks)

Question 8

Determine the Laplace Transform of each of the following functions.

a) $t^2 - 2t$ (3marks)

b) $(t^2 - 3)^2$ (3 marks)

c) $\cos 2\pi t$ (4 marks)

Question 9

A balanced Y-connected load with a phase resistance of 40 ohms and a reactance of 25 ohms is supplied by a balanced, positive sequence Δ- connected source with a line voltage of 210 V. Calculate the phase currents. Use Vab as reference.

(10marks)

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