FNU FIJI NATIONAL UNIVERSITY

**COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLOGY**

**SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**ADVANCED DIPLOMA IN ENGINEERING**

**(ELECTRICAL & ELECTRONICS)**

**EEE 606 CIRCUIT AND SIGALS**

## FINAL EXAMINATION (SEMESTER 1, 2019)

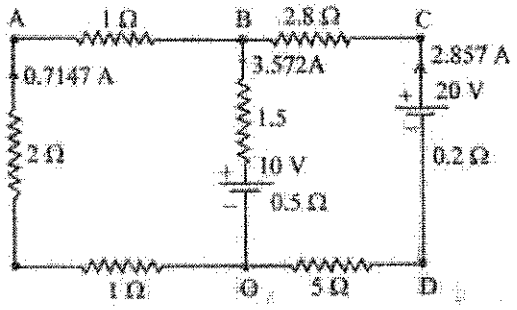
DATE/TIME/ROOM – Refer to Timetable

INSTRUCTIONS TO CANDIDATES

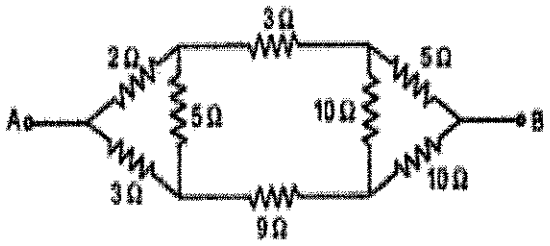
1. You are allowed 10 minutes extra reading time during which you are NOT to write.
2. Begin each answer on a fresh new page and use both sides of the sheets.
3. Write your candidate number on the top of each attached sheet.
4. Attempt all questions.
5. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
6. Good handwriting and way of representation of answers has weight with respect to marks.
7. **Draw diagrams if any with pencil only and label it and show all working where necessary.**
8. Always check your work before you leave the exam room.
9. **The paper is of 100 marks.**
10. **The exam duration is 3 hours.**

## Section A

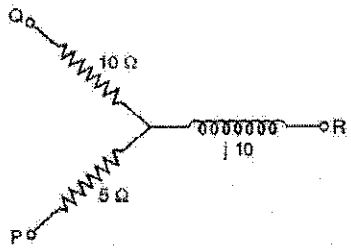
1. Find the currents in all the resistors by Superposition Theorem in the circuit shown below. Calculate the power consumed. [5 marks]



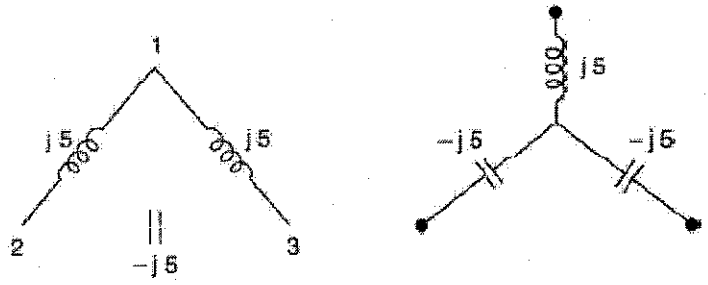

2. Find the voltage to be applied across AB in order to drive a current of 5 A into the circuit using star delta transformations. [5 marks]



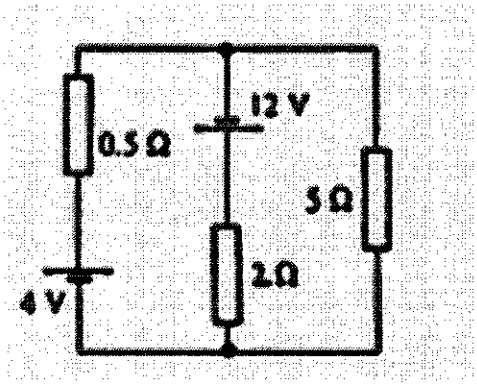

3. a) Determine delta equivalent of the star circuit shown in the figure below. [5 marks]




b) Determine the star equivalent of the delta circuit shown below. [5 marks]

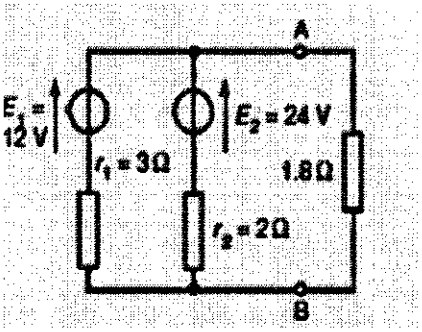


4. Determine the current in the 5Ω resistance of the network shown below using Norton's theorem. Hence find the current flowing in the other two branches. [5 marks]

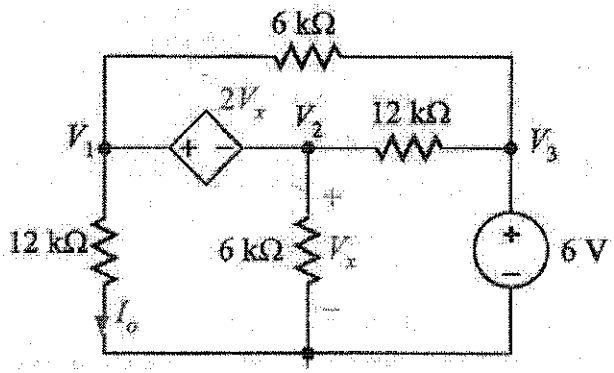



5. a) Convert the circuit to the left of the terminals AB for the figure shown below to an equivalent Thevenin circuit by initially converting to a Norton equivalent circuit. [6 marks]

   b) Determine the current flowing in the 1.8 Ω resistor. [2 marks]



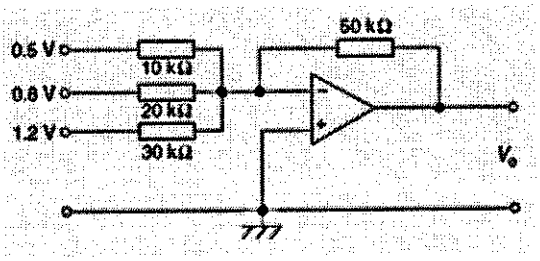

6. Use node analysis method to find the current $I_0$ shown in the figure below. [7 marks]



## Section B

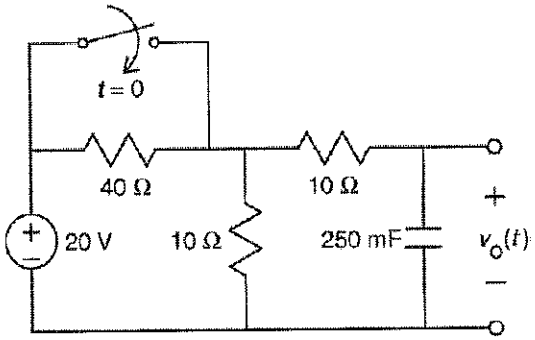
1. A filter section is required to pass all frequencies above 25 KHz and to have a nominal impedance of 600 Ω. Design the below filters to meet the above requirements. [ 10 marks]
   (a) A high-pass T- section filter
   (b) A high-pass π- section filter

2. a) For the summing op amp shown in the figure below, determine the output voltage $V_o$. [ 5 marks]

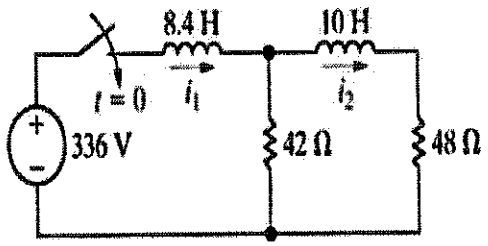



   b) Devise a light-operated alarm circuit using an op amp, a LDR, a LED, and a ± 15 V supply. [5 marks]

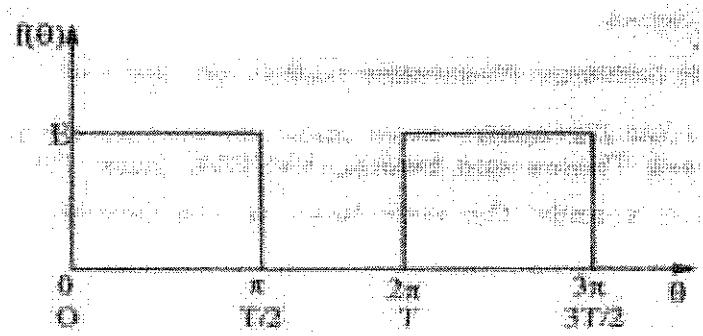
3. Consider the circuit shown in the figure. The input to the circuit is the voltage of the voltage source, 20V. The output of this circuit is the voltage across the capacitor, $v_o(t)$. Determine the value of the capacitor voltage 2 seconds after the switch closes. [ 10 marks]




4. For the RL circuit shown below, there is no initial energy stored. By using Laplace technique, find $i_1$ (t) and $i_2$ (t) for t > 0. [ 10 marks]

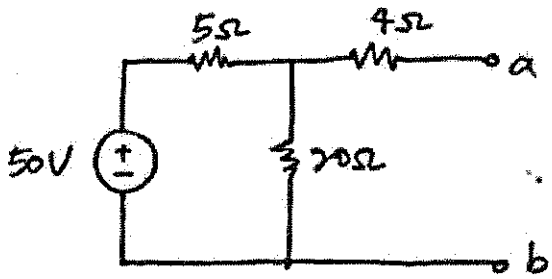


5. Determine the Fourier series for the square voltage pulse shown in the figure below and plot its line spectrum. [ 10 marks]




6. a) Explain Thevenin's Theorem. [ 5 marks]

b) In the circuit given below calculate $R_{th}$ & $V_{th}$ [5 marks]

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