

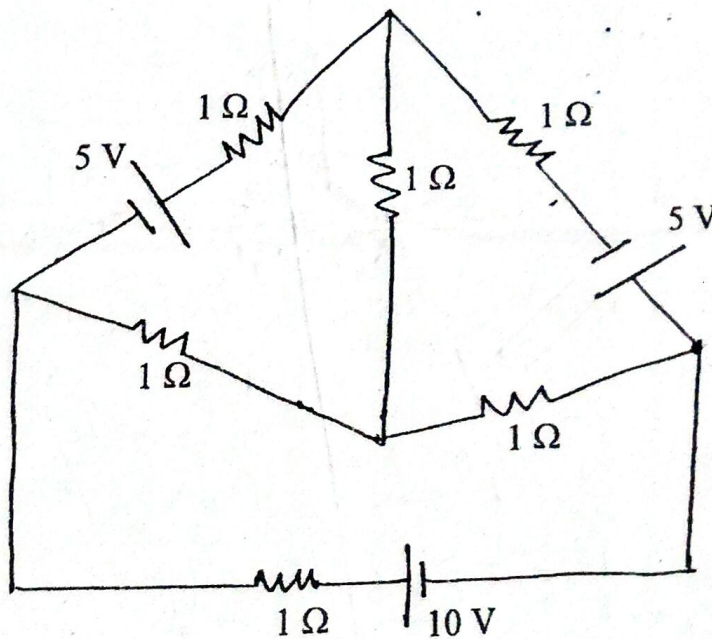
2070 Magh

| Exam.       | New Back (2066 & Later Batch) |            |        |
|-------------|-------------------------------|------------|--------|
| Level       | BE                            | Full Marks | 80     |
| Programme   | BCE, BGE, BME                 | Pass Marks | 32     |
| Year / Part | I / II                        | Time       | 3 hrs. |

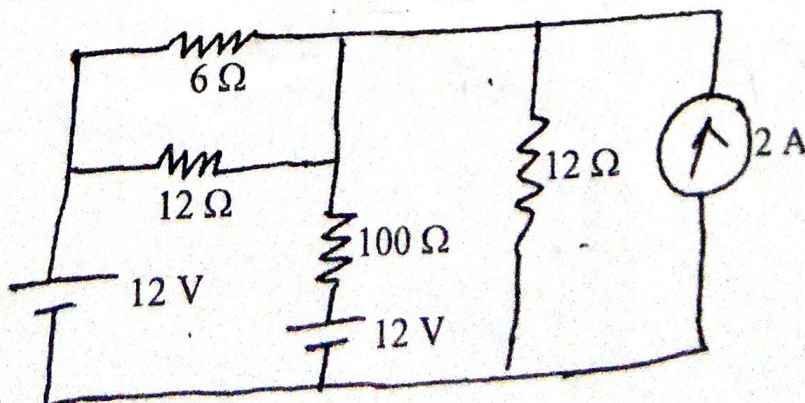
**Subject:** - Basic Electrical Engineering (EE451)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) What are ideal current and voltage sources and explain how do they differ from the practical ones? [4]
- b) A piece of resistance wire, 15.6 m long of cross-sectional area  $12 \text{ mm}^2$  at a temperature of  $0^\circ\text{C}$ , passes a current of 7.9 A when connected to DC supply at 240 V. Calculate (i) resistivity of the wire (ii) the current when the temperature rises to  $55^\circ\text{C}$ . The temperature coefficient of the wire is  $0.00029 \Omega/\text{C}^\circ$  [6]
- c) Find the current flowing from the 10 V source using KVL. [6]

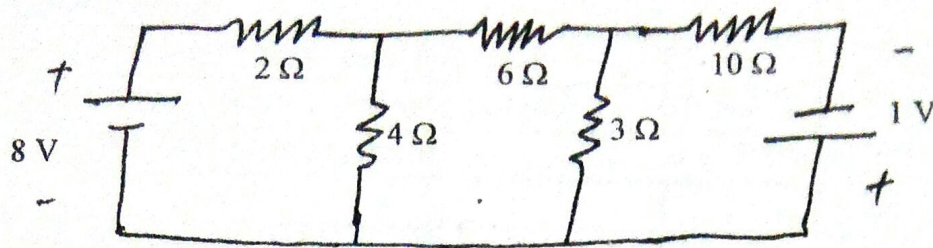


2. a) State and explain superposition theorem with an example. [4]
- b) How can a delta connected network of resistors be converted to star connection? Explain with necessary circuits and equations. [6]
- c) Use Norton's theorem to find the current through  $100 \Omega$  resistor of the circuit below. [6]



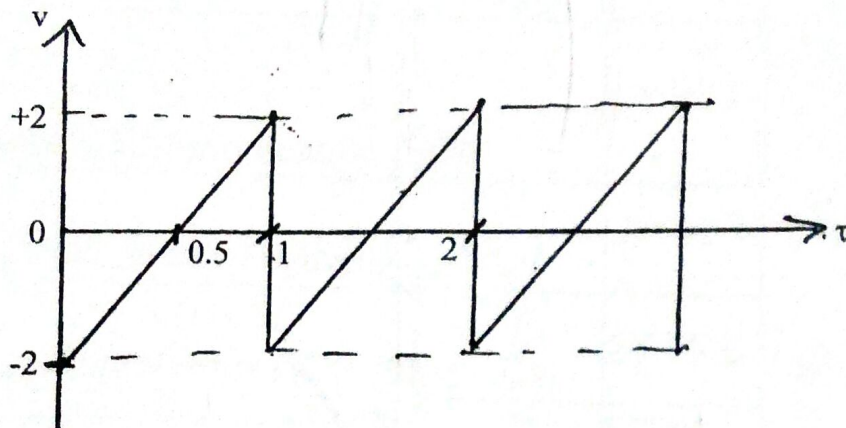


3. a) Find the voltage across the  $3\ \Omega$  resistor in the following network by nodal analysis. [8]



- b) Obtain the equivalent inductance when two inductors are connected in parallel both in (a) Opposition (b) Aiding nodes. [8]

4. a) Find the rms and average values of the waveform given in figure below. [4]



- b) Define capacitance and capacitor. Explain the process of charging and discharging of capacitor with neat sketch. [4]

- c) Determine the current, overall power factor, active, reactive and apparent power in each branch of the given circuit diagram. Also draw the phasor diagram. [8]

5. a) A voltage  $e(t) = 100 \sin 314 t$  is applied across series circuit consisting of  $10\ \Omega$  resistance,  $0.0318\text{ H}$  inductance and a capacitor of  $63.6\ \mu\text{F}$ . Calculate expression for  $i(t)$ , phase difference between voltage and current, power factor, apparent power and active power. [8]

- b) For the delta connected load, find the phase currents, line currents, power (active, reactive and apparent) in each phases. Also determine the total active power consumed. [8]

