

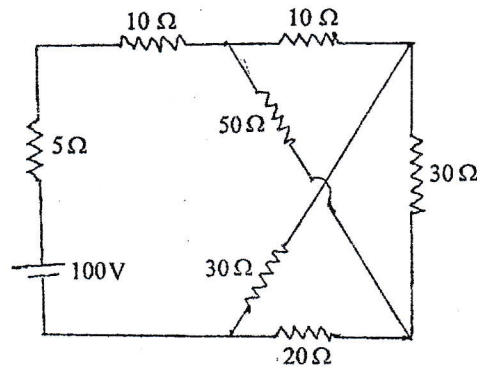
TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2076 Ashwin

Exam.	Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BEI, BCT, BAM, BIE, BAG, BAS	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

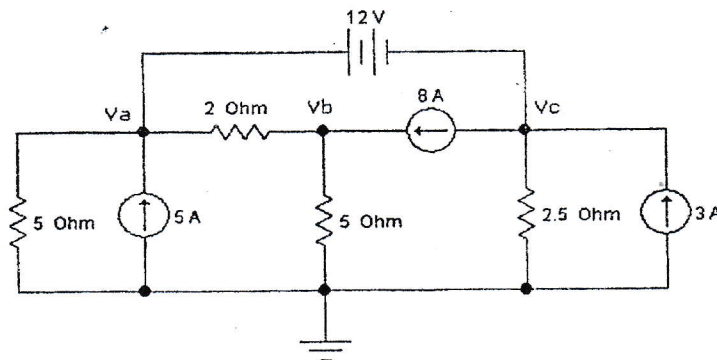
**Subject: - Basic Electrical Engineering (EE 401)**

- ✓ 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.

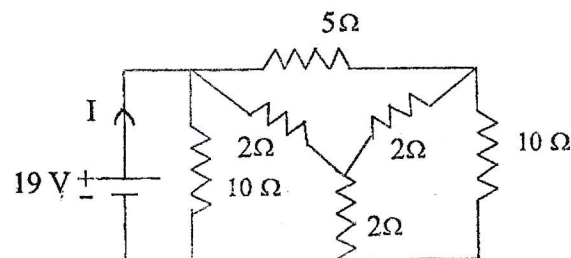
1. a) What are ideal and practical voltage and current source? Explain. [4]
- b) A coil has a resistance of  $18\ \Omega$  when its mean temperature is  $20^\circ\text{C}$  and of  $20\ \Omega$  when its mean temperature is  $50^\circ\text{C}$ . Find its mean temperature rise when its resistance is  $21\ \Omega$  and the surrounding temperature is  $15^\circ\text{C}$ . [6]
- c) State and explain Kirchoff's voltage laws. Determine the current supplied by the battery in the circuit shown in figure below. [6]



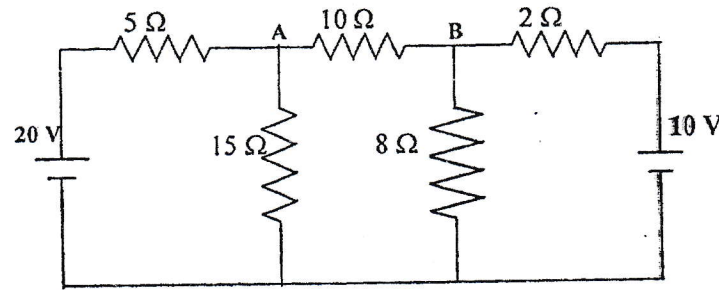
2. a) Use Nodal Analysis Method to determine the  $V_a$ ,  $V_b$  and  $V_c$  and Calculate current through  $2\ \Omega$ . [8]



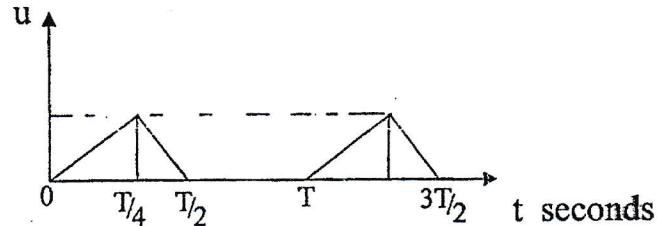
- b) Find the current  $I$  as shown in figure using star – delta transformation. [8]



3. a) Calculate the current in the  $10\Omega$  resistor in the networks shown in the circuit using Thevenin's Theorem. [8]



- b) Explain what is mean by self inductance and mutual inductance of a coil. [4]  
 c) Calculate the average and rms value of the waveform shown below, over one cycle. [4]



4. a) State and explain reciprocity theorem with a suitable example. [4]  
 b) A resistance of  $20\Omega$ , an inductance of  $0.2\text{ H}$  and a capacitance of  $100\text{ }\mu\text{F}$  are connected in series across a  $220\text{ V}$ ,  $50\text{ Hz}$  supply. Determine the following (i) impedance (ii) current (iii) voltage across  $R$ ,  $L$  and  $C$ . [4]  
 c) Two impedances  $z_1$  and  $z_2$  are connected in parallel. The first branch takes a leading current of  $16\text{ A}$  and has a resistance of  $5\Omega$ , while the second branch takes a lagging current at power factor  $0.8$ . The total power supplied is  $5\text{ kW}$ , the applied voltage being  $(100+j200)\text{ V}$ . Determine the branch and total currents. [8]  
 5. a) What are the disadvantages of supplying a low power factor? A  $100\text{ KW}$  load at  $0.85$  lagging power factor is being supplied by a  $230\text{ V}$ ,  $50\text{ Hz}$  source. Calculate the reactive power drawn from the source. If a capacitor connected parallel to the load improves its power factor to  $0.9$ , find the capacitance of the capacitor. Also, calculate the current drawn from the source before and after connecting the capacitor. [2+6]  
 b) A three phase delta connected system with  $400\text{ V}$  line voltage is connected to three unbalanced loads:  $(12-j16)\Omega$ ,  $(3+j4)$ , and  $20\Omega$ , are also connected in delta. Find (i) phase currents (ii) line currents (iii) total active power consumed. [8]

\*\*\*