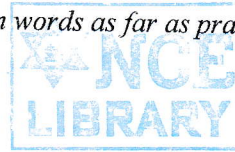


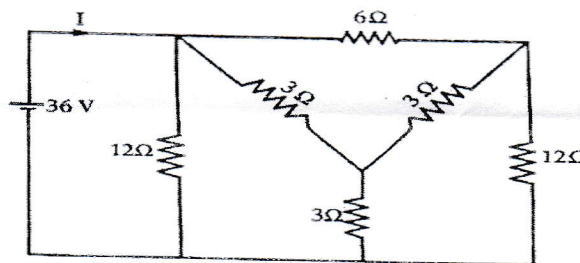
Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BEL	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

Subject: - Electric Circuit I (ENEE 101)

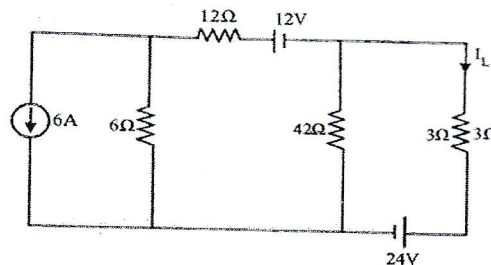
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.



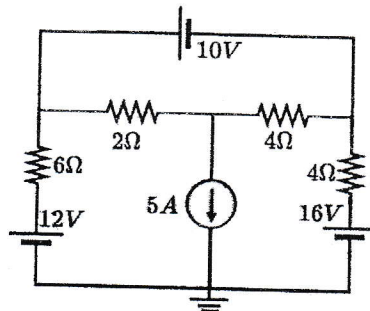
1. a) Two coils connected in series have resistances of $600\ \Omega$ and $300\ \Omega$ and temperature coefficient of 0.001 and 0.004 respectively at 20°C . Find the resistance of combination at 50°C . What is the effective temperature coefficient of the combination at 20°C ? [4]
- b) When a current of $5\ \text{A}$ is passed through the parallel combination of an aluminum wire 7.5m long and copper wire 6m long, it is found that the current in the aluminum wire is 3A . The diameter of aluminum wire is $1\ \text{mm}$. Determine the diameter of copper wire. The resistivity of copper is $0.017\ \mu\Omega\text{-m}$ and that of aluminum is $0.028\ \mu\Omega\text{-m}$. [4]
- c) Find the value of 'I' using star-delta analysis. [4]



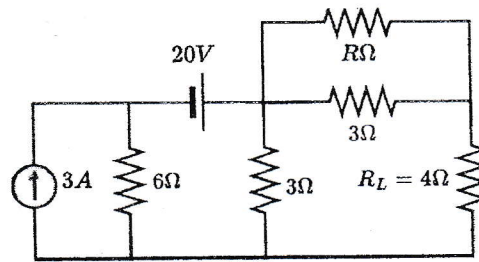
2. a) Apply superposition theorem to find the current I_L in the circuit below. [6]



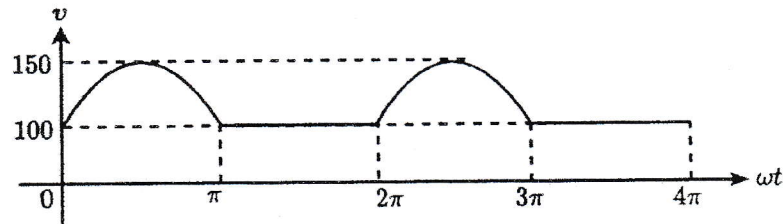
- b) In the circuit shown in the figure below, determine the current through $2\ \Omega$ and $6\ \Omega$ resistors using nodal analysis. [6]



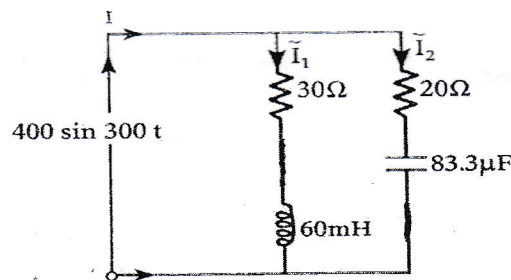
3. a) Find the value of R such that the load resistance R_L equal to 4Ω will deliver maximum power. Also, find the value of this maximum power for the circuit shown in the figure below. [6]



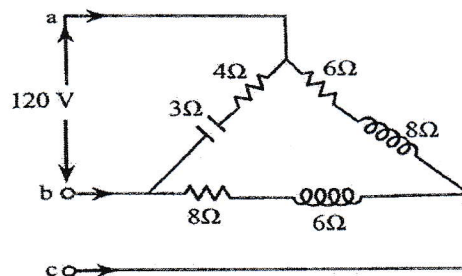
- b) Determine the RMS value, average value and form factor for the following waveform. [6]



4. a) For the circuit below; find the current in each branch, active and reactive power. Also draw the phasor diagram showing branch currents and supply voltage. [6]



- b) For the given unbalanced delta connected load, find the phase currents, line currents and total power consumed by the load when phase sequence is abc. [6]



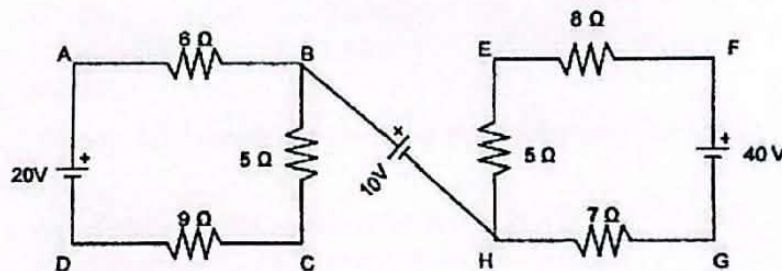
5. a) Derive the resonant frequency for a parallel circuit consisting of coil having R and L in one branch and a pure capacitance C in the other branch. [6]
 b) Derive the resonant frequency for a parallel circuit consisting of coil having R and L in one branch and a pure capacitance C in the other branch. [3]
 c) Show by equation and the phasor diagram that the sum of three phase EMFs is always zero. [3]

Exam.	Back (New Course)		
Level	BE	Full Marks	60
Programme	BEL	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

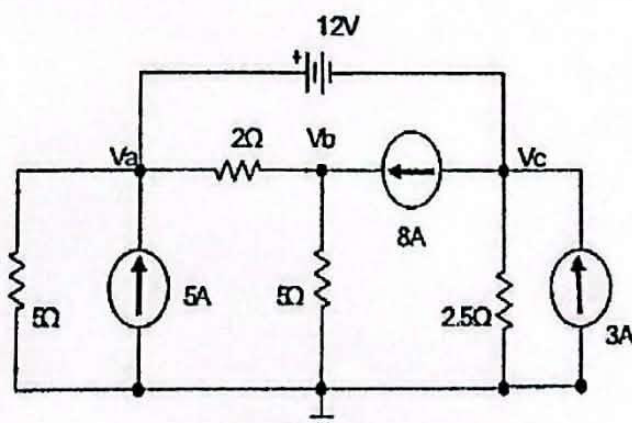
Subject: - Electric Circuits I (ENEE 101)

- ✓ 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.

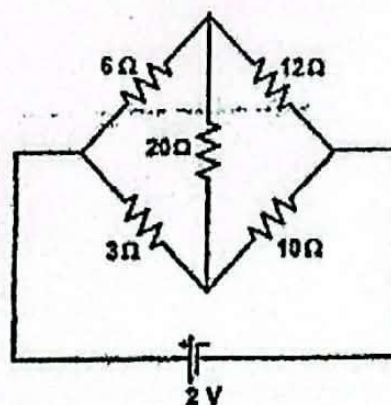
1. a) A coil is connected across a constant dc source of 120 V. It draws a current of 12 A at room temperature of 25°C. After 5 hours of operation, its temperature rises to 65°C and current reduces to 8 A. Calculate: [6]
 - i) Current when its temperature has increased to 80°C
 - ii) Temperature coefficient of resistance at 30°C
- b) What is independent source? Classify them briefly. [2+4]
- c) For the given circuit shown below, find V_{CE} and V_{AG} . [4]



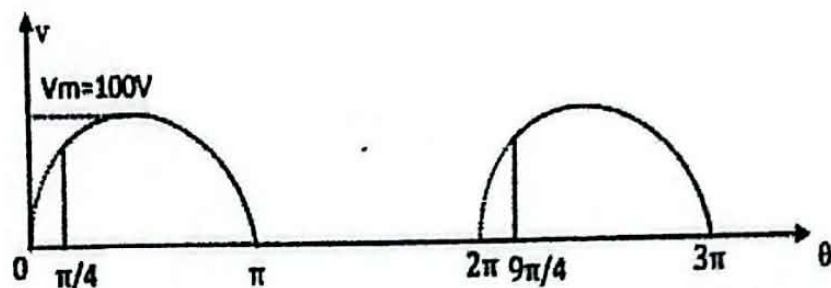
2. a) Use nodal analysis to find V_a , V_b and V_c and also find voltage drop in 2 Ω resistor. [6]



- b) Find the current through 20 Ω resistor using Thevenin's theorem. [6]



3. a) State and explain Compensation Theorem with an appropriate example. [6]
 b) Calculate the average, rms value, form factor and peak factor for the following waveform. [6]



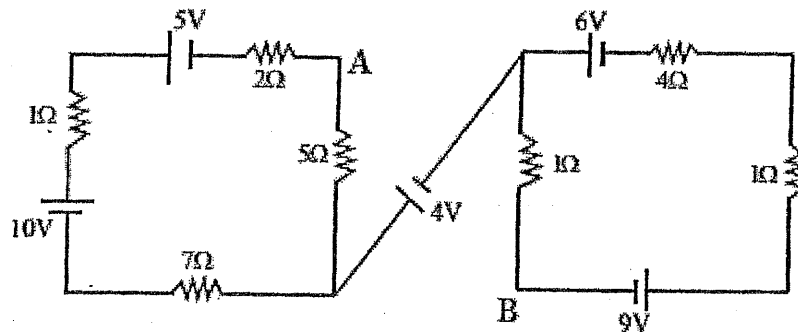
4. a) Derive the relationship between voltage and current for the purely capacitive circuit excited by ac voltage source. Also show that the power consumed by circuit is zero. [6]
 b) A RC series circuit ($R_1=40\ \Omega$, $C=10\ \mu\text{F}$) and RL series circuit ($R_2=50\ \Omega$ and $L=0.2\text{H}$) are connected in parallel to each other and a source of 100 V, 50 HZ is applied across the overall circuit. Calculate: [6]
 i) Current drawn by RC branch, RL branch and overall current taken from supply.
 ii) Construct phasor diagram.
5. a) A 440 V, 50 Hz, 3-phase supply has delta-connected load having $50\ \Omega$ between R and Y, $159\ \text{mH}$ between Y and B and $15.9\ \mu\text{F}$ between B and R. Find the line currents for the sequence RYB and the power supplied. [6]
 b) What is Capacitance? Derive the expression for series and parallel connection of capacitance. [2]

Exam.	Back (New Course -2080 Batch)		
Level	BE	Full Marks	60
Programme	BEL	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

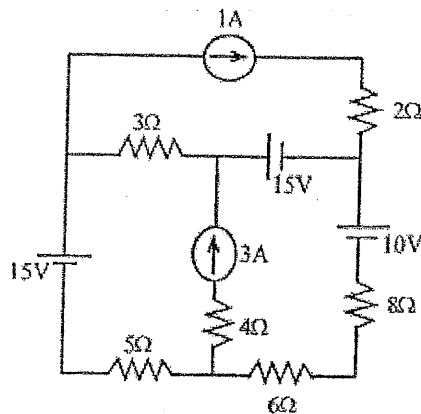
Subject: - Electric Circuit I (EE 101)

- ✓ 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.

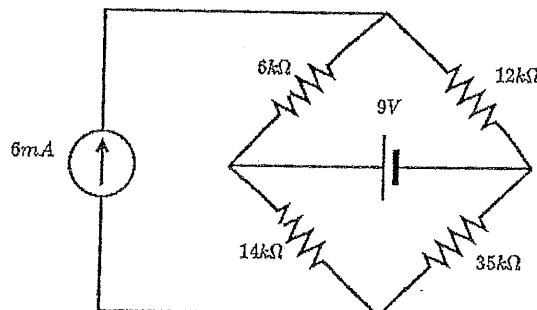
1. Define ohmic and non-ohmic resistance. A 100 W, 230 V incandescent filament lamp is switched on at 20°C . The operating temperature of the filament is 1800°C . Determine the current taken by the lamp at the instant of switching on. The temperature coefficient of resistance of the filament material is $0.0045/^{\circ}\text{C}$. [2+4]
2. Define short circuit and open circuit. Determine the potential difference between A and B of the given circuit diagram using Kirchhoff's laws. [2+4]



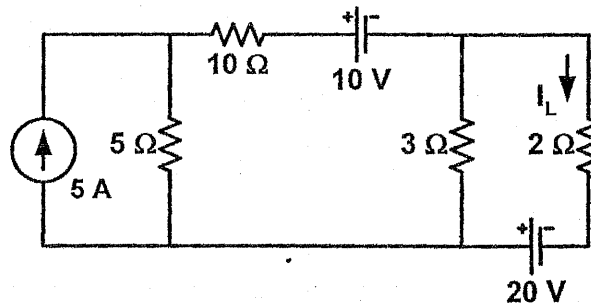
3. Determine the current through 3Ω resistor of the given circuit using mesh analysis technique and hence find the power dissipation of this resistor. [6]



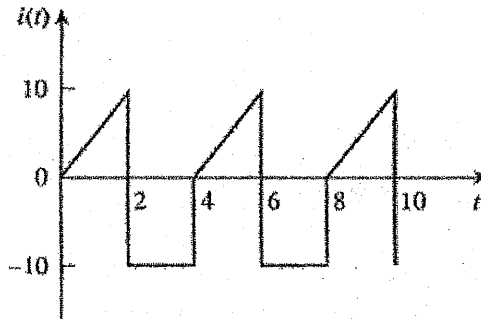
4. Using Superposition Theorem, find the value of current flowing through $12k\Omega$ resistor. [6]



5. Use Thevenin's theorem to determine the current I_L through the $2\ \Omega$ resistor of the network shown. [6]



6. a) Derive the expression for energy storage in an inductor. [3]
 b) What are the causes and way to improve the low power factor? [3]
7. Determine the average value, root mean square value, form factor and crest factor of the given alternating current waveform. [6]



8. Explain the condition of resonance in series RLC circuit with necessary circuit diagram and Phasor diagram & hence derive the expression for corresponding resonant frequency and bandwidth. [6]
9. Two impedances Z_1 and Z_2 are connected in parallel. The first branch takes a leading current of 16 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 kW, the applied voltage being $(100 + j 100)\text{ V}$. Determine the complex expressions for branch currents, total current, and for the circuit constants. [6]
10. In a 3-phase, 4-wire Y-connected system load in each phase are as follow: [6]
 R-phase load : $Z = 4 + j3$
 Y-phase load: $Z = 3 - j4$
 B-phase load: $Z = -j6$
 The source voltage is 230V (per phase). Calculate the Neutral current and total power consumed.

4. a) Derive the relationship between voltage and current for the purely inductive circuit excited by ac voltage source. Also show that the power consumed by purely inductive circuit is zero. [4]
- b) A RC series circuit ($R_1=40\ \Omega$, $C=10\mu\text{F}$) and RL series circuit ($R_2=50\Omega$ and $L=0.2\text{H}$) are connected in parallel to each other and a source of 100V, 50Hz is applied across the overall circuit. Calculate, [6]
- i) Current drawn by RC branch, RL branch and overall current taken from supply.
ii) Construct phasor diagram.
5. a) A 440 V, 50 Hz, 3-phase supply has delta-connected load having $(31 + j59)\ \Omega$ between R and Y, $(30 - j40)\ \Omega$ between Y and B and $(80 + j60)\ \Omega$ between B and R. Find the line currents, phase currents and the power supplied for the sequence RYB. [6]
- b) Justify the use of two watt-meter to calculate the power of 3-phase load. [4]
- c) Two capacitors A and B are connected in series across a 100 V supply and the p.d.s. across them are 60 V and 40 V respectively. When a capacitor of $2\ \mu\text{F}$ is now connected in parallel with A, the p.d. across B rises to 90 V. Calculate the capacitance of A and B. [4]

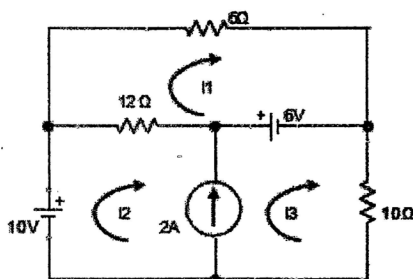
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2081 Chaitra

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BEL	Pass Marks	24
Year / Part	I / I	Time	3 hrs.

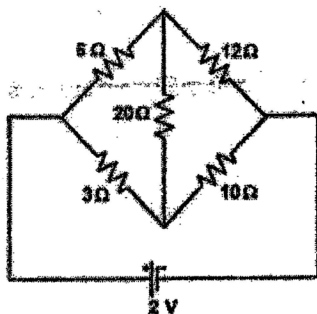
Subject: - Electric Circuit I (ENEE 101)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
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- ✓ Assume suitable data if necessary.

1. a) What is an ideal and practical voltage source? Explain the effect of on resistance of voltage and current source on their terminal characteristics. [2+4]
- b) Two coils connected in series have resistances of $600\ \Omega$ and $300\ \Omega$ with temperature coefficient of 0.1% and 0.4% respectively at 20°C . Find the resistance of the combination at a temperature of 50°C . What is the effective temperature coefficient of combination? [6]
2. a) Determine the mesh currents in figure. [6]



- b) Find the current through $20\ \Omega$ resistor using Thevenin's theorem. [6]



3. a) State and explain superposition theorem with an appropriate example. [6]
- b) Calculate the average, rms value, form factor and peak factor for the following saw tooth waveform. [6]

