25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 Chaitra

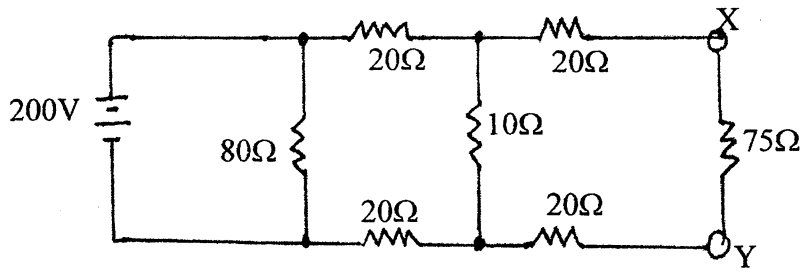
Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BIE, B.Agri.	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

Subject: - Basic Electrical Engineering *(EE401)*

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

1. a) Explain the methods for converting practical current source in to practical voltage source. [4]

b) Calculate the power which would be dissipated in a 75 Ω resistor connected across XY in the network shown below. [4]



c) Find the currents I_1, I_2, I_3 using Kirchhoff's Law and also find the power output of each voltage source of figure below? [8

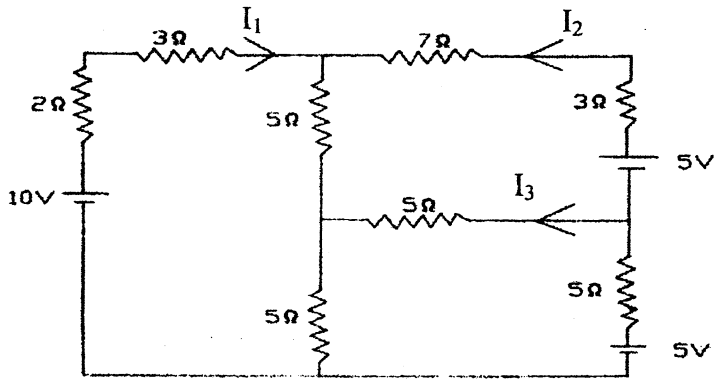
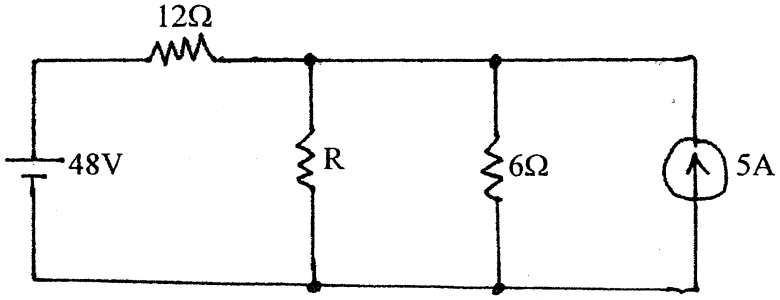


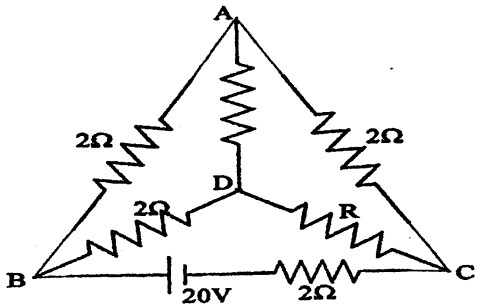
Fig: 1.2

2. a) The resistivity of a metal alloy is $50\times10^{-8}\Omega$-m. A sheet of material 15 cm long, 6 cm wide and 0.014 cm thick. Calculate the resistance in the direction: (a) along the length and (b) along the thickness. [

b) Use Norton's theorem to calculate the value of R that will absorb maximum power from the circuit shown in the figure below. Also calculate the maximum power drawn by it. [



c) In the network shown below, find the value of resistance R and the current through it when the current through branch DA is zero. [4]



3. a) Find the current through the 10 Ω resistor using loop-current method? [8]

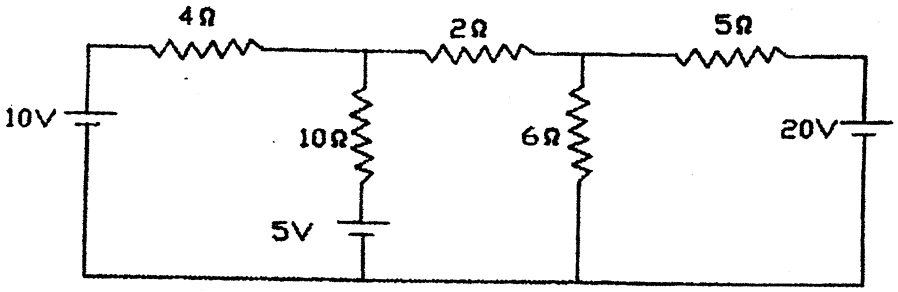
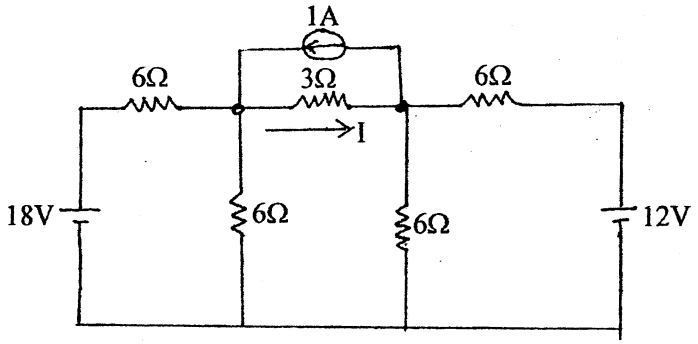


Fig: 3.1

b) Find the current I in the circuit of figure below by applying nodal voltage method. [8]



4. a) Explain generation of sinusoidal emf with diagram and define angular velocity. [6]

b) A sinusoidal voltage is applied to three parallel branches yielding branch currents, $i_1=14.14\ \text{Sin}(\omega t-45°)$, $i_2=28.3\ \text{Cos}(\omega t-60°)$ and $i_3=7.07\ \text{Sin}(\omega t+60°)$ (i) Find the complete time expression for the source current (ii) Draw the phasor diagram in terms of effective values. Use the voltage as reference. [6]

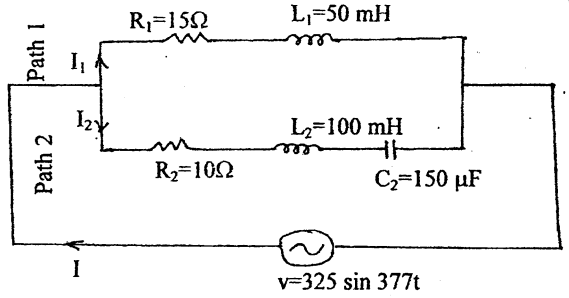
c) Define inductance and derive relation for connection of inductors connected in parallel connection. [4]

5. a) For the parallel circuit shown below, calculate: [8]

(i) RMS value for current, power factors and active power of path 1.

(ii) RMS value of current, power factor and reactive power of path 2.

(iii) RMS value of current and power factor of the whole circuit.



b) A three phase induction motor takes 50KW at 415V, 50Hz and a power factor of 0.72 lagging. Determine the KVAR rating of capacitor bank to improve the power factor to 0.9 lagging. What capacitance per phase is required if the capacitor bank is connected in star connection? What is the advantage of power factor correction from the source point of view and from the point of view of motor itself? [6+2]

6. a) In the network shown in figure below, determine: [8]

i) Total impedance
ii) Total current
iii) The current in each branch
iv) The overall power factor
v) Volt amperes, Active Power and Reactive Power

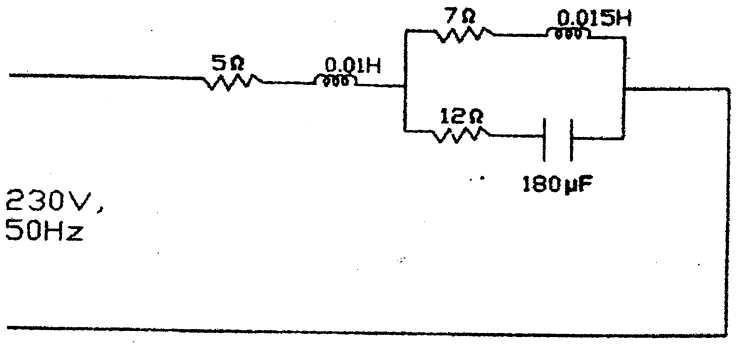


Fig: 5.1

b) In a 3-phase, 4 wire Wye connected system the phase voltage V_{ph} = 200V, and its frequency is 60Hz. The load impedance components are R_1 = 100Ω, R_2 = 100Ω, C_2 = 66.3 μF, R_3 = 100Ω, L_3 = 159.2mH. Calculate the three line currents and the neutral current. [8]

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