

(REVISED COURSE)

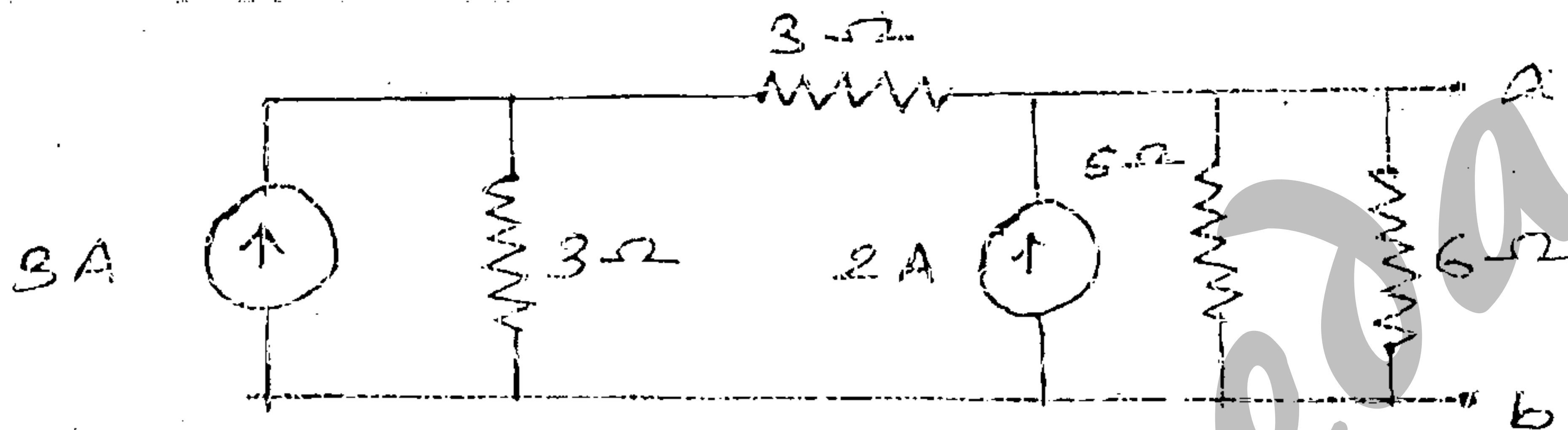
QP Code : NP-17698

(3 Hours)

[ Total Marks : 80

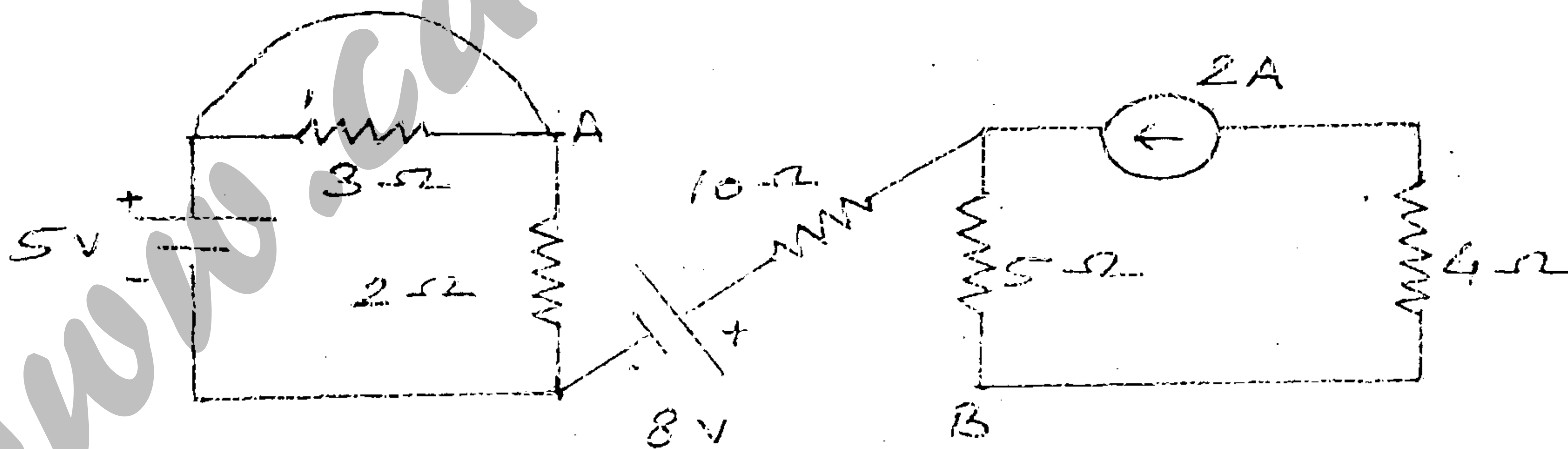
- N.B. : (1) Question No. 1 is Compulsory.  
 (2) Solve any **three** questions from the remaining five questions.  
 (3) Assume data if required.  
 (4) **Figures** to the right indicate full marks.

1. (a) Using Source conversion, reduce the circuit shown in figure into single current source in parallel with single resistance. 3



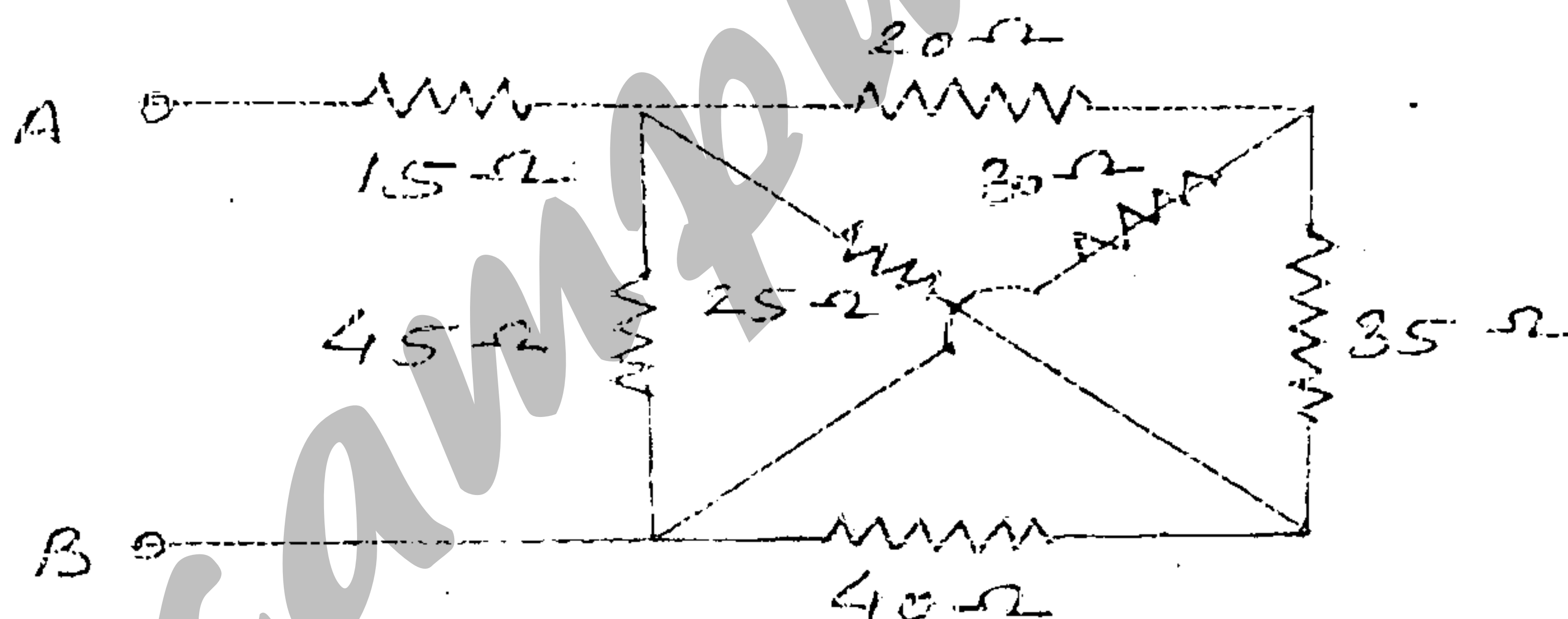
- (b) Derive the condition for maximum power transfer through the network. 3  
 (c) An alternating current takes 3.375 ms to reach 15A for the first time after becoming instantaneously zero. The frequency of the current is 40 Hz. Find the Maximum value of the alternating current. 3  
 (d) Derive the equation for resonance frequency  $[f_r]$  in parallel resonance circuit. 3  
 (e) Three identical coils each  $[4.2 + j 5.6]$  ohm are connected in star Across 415V, 3 phase, 50Hz supply. determine (i)  $V_{ph}$  (ii)  $I_{ph}$  (iii) Power factor. 2  
 (f) What are the losses in the transformer? Explain why the rating of transformer in KVA not in KW. 4  
 (g) Draw complete V.I characteristics of a Diode. 2

2. (a) Determine the potential different  $V_{AB}$  for the given network. 6



- (b) When a resistor and an inductor in series are connected to a 240V supply, a current of 3A flows lagging  $37^\circ$  behind the supply voltage, while voltage across inductor is 171 volt. Find the resistance of resistor, resistance & reactance of the inductor. 3

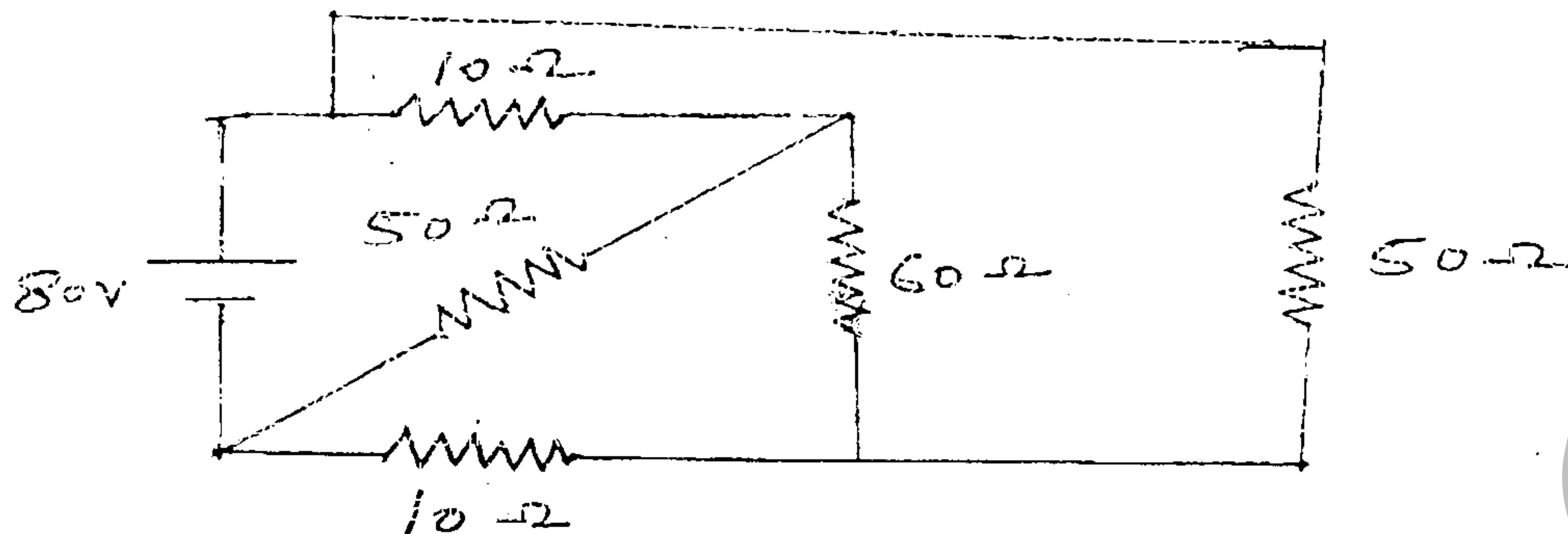
- (c) Draw phasor diagram of single phase transformer on resistive load [Unity power factor] and inductive load [lagging power factor]. 6
3. (a) Three similar coils, connected in star, take a total power of 18KW at a power factor of 0.866 lagging from a three phase 400 volts, 50Hz system. Calculate the resistance and inductance of each coil. Also draw the phasor diagram showing the currents and voltages. 8
- (b) A 5 kVA 200/400 volt, 50Hz, single phase transformer gave the following test results. 6
- |                     |      |      |      |
|---------------------|------|------|------|
| O.C. test [LV Side] | 200V | 0.7A | 60W  |
| S.C. test [HV side] | 22V  | 16V  | 120W |
- (i) Draw the equivalent circuit of the transformer referred to LV side insert all parameter values.
- (ii) Efficiency at 0.9 power factor leading if operating at rated load.
- (c) What is function of filter in rectifier circuit? Draw circuit of rectifier with inductor filter. 2
- (d) Explain with circuit diagram working of CE configuration of BJT. 4
4. (a) Find an equivalent resistance between A and B. 7



- (b) A circuit consists of three parallel branches. The branch currents are given as  $i_1 = 10 \sin \omega t$ ,  $i_2 = 20 \sin (\omega t + 60^\circ)$ , and  $i_3 = 75 \sin (\omega t - 30^\circ)$ . Find the resultant current and express it in the form  $i = I_m \sin (\omega t + \phi)$ . if the supply frequency is 50Hz, calculate the resultant current when (i)  $t = 0$ , (ii)  $t = 0.001$  sec. 5
- (c) A 3 phase, 10 KVA load has power factor of 0.342. The power is measured by two wattmeter method. Find the reading of each wattmeter when, 4
- (i) Power factor is leading
- (ii) Power factor is lagging.
- (d) Explain working of centre tap full wave rectifier with waveforms. 4

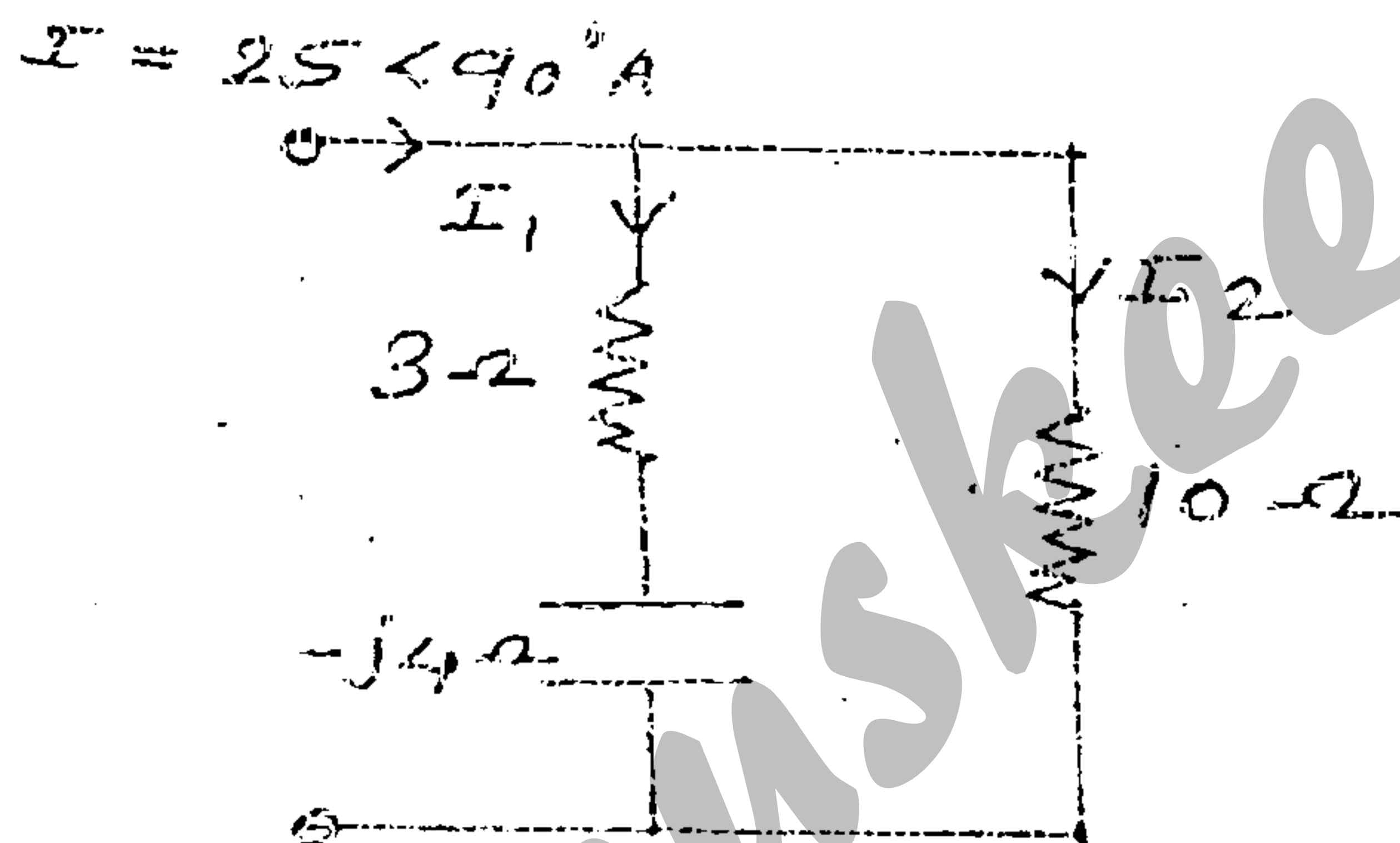
5. (a) Find the current through  $60\Omega$  resistance by using Thevenin's theorem.

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(b) Find current  $I_1$  and  $I_2$  shown in figure.

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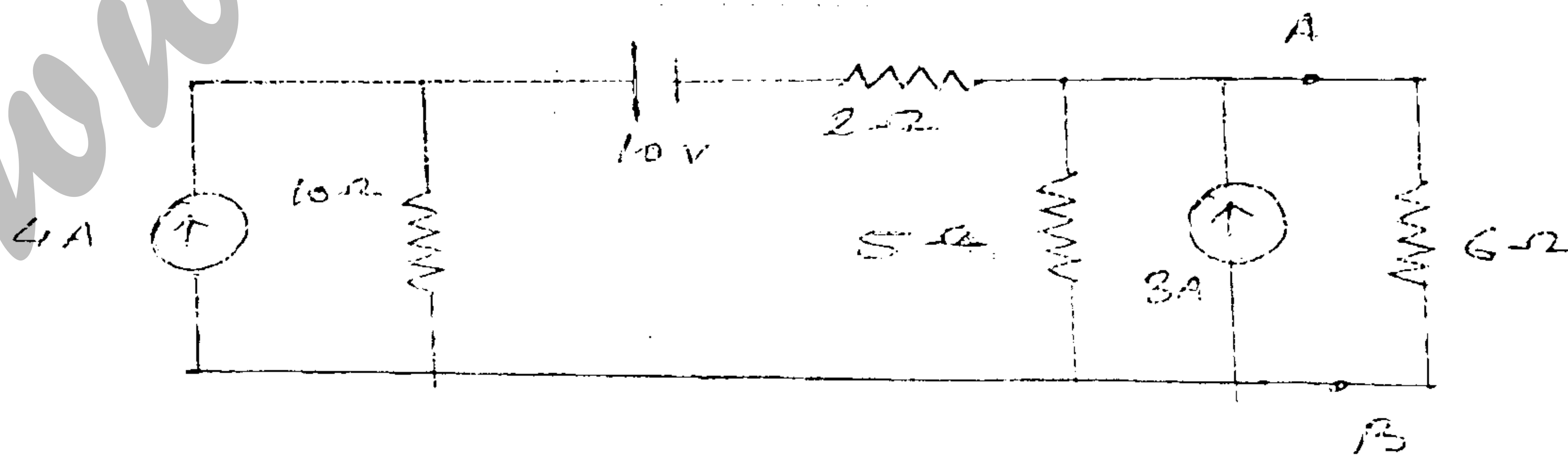
(c) A 50KVA, 4400/220 volt transformer has  $R_1 = 3.45\Omega$ ,  $R_2 = 0.009\Omega$ . The reactance are  $X_1 = 5.2\Omega$  and  $X_2 = 0.015\Omega$ . calculate for the transformer,

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- (i) Full load currents on Primary and Secondary side,
- (ii) Equivalent resistance, reactances, impedances referred to primary side and secondary side, and
- (iii) Total copper loss using individual resistances and equivalent resistances.

6. (a) Find the current through  $6\Omega$  resistor using superposition theorem.

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- (b) A coil of inductance  $31.8\text{mH}$  with resistance of  $12\Omega$  is connected in parallel with a capacitor across  $250\text{ volts}$ ,  $50\text{Hz}$  supply. Determine the value of capacitance, if no reactive current is taken from the supply. 7
- (c) Explain Measurement of three phase power using two wattmeter method. 6
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