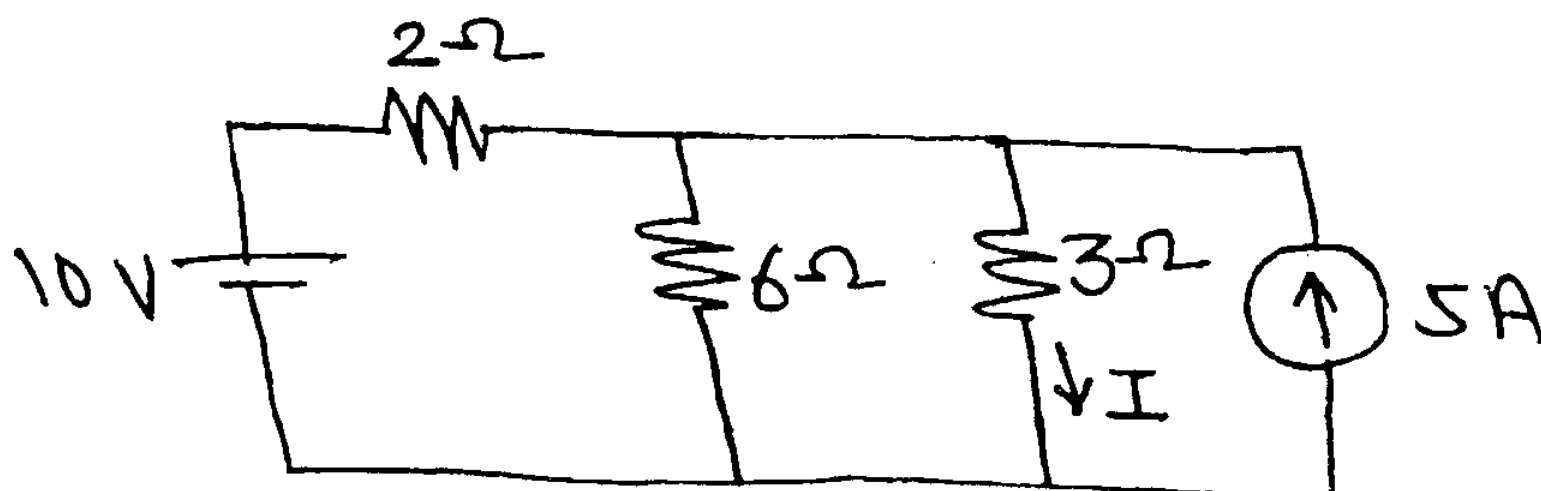


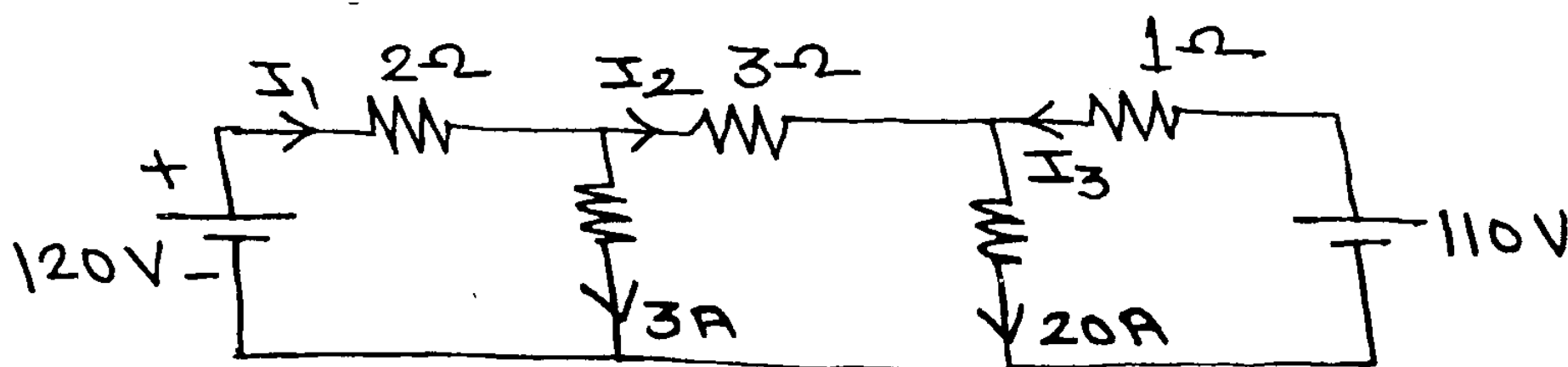
- N.B. :** (1) Question No. 1 are compulsory.  
 (2) Solve any **three** questions out of the remaining **five** questions.  
 (3) Assume data if required , clearly stating the assumptions.

1. (a) Using source transformation find I. 3

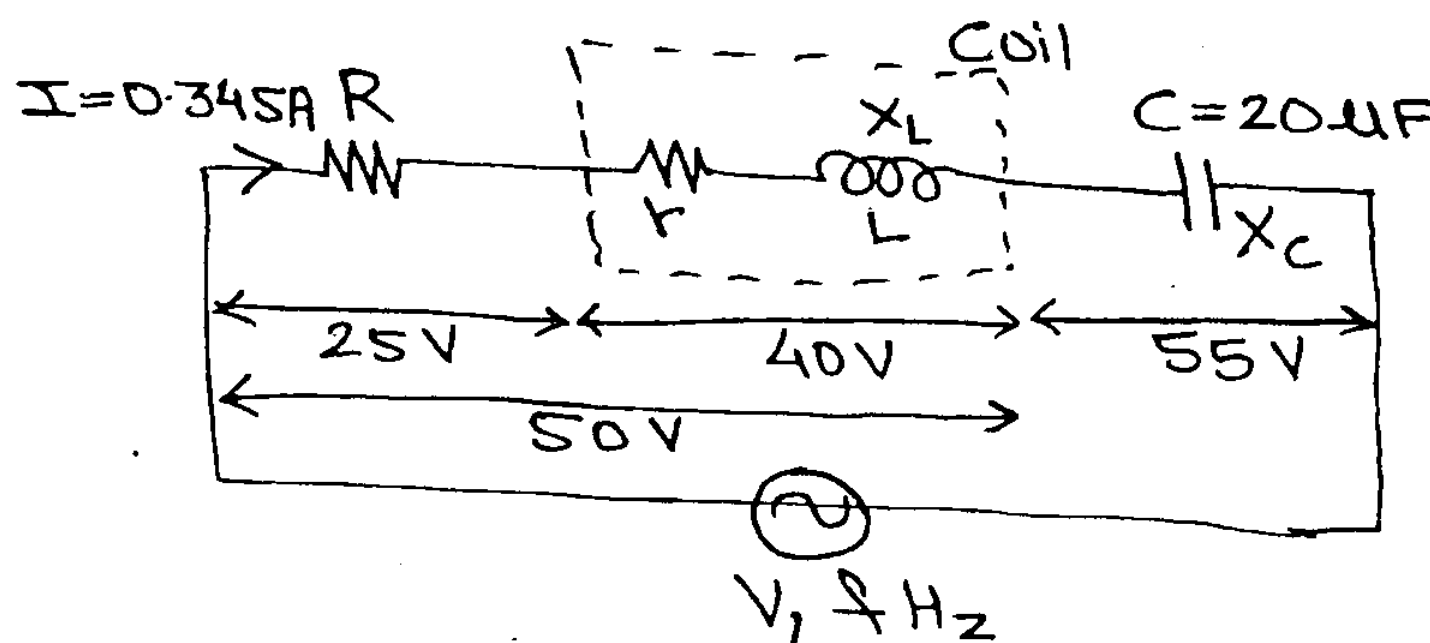


- (b) State and Explain Norton's theorem. 3  
 (c) Derive an expression for the average value of a sinusoidally varying current in terms of Peak Value. 3  
 (d) Derive the condition for resonance in a series circuit. 3  
 (e) Give relation between line current and phase current, line voltage and phase voltage in balanced star and delta connected load. 2  
 (f) What are assumptions for an ideal transformer ? 4  
 (g) Draw and explain circuit diagram for half wave rectifier. 2

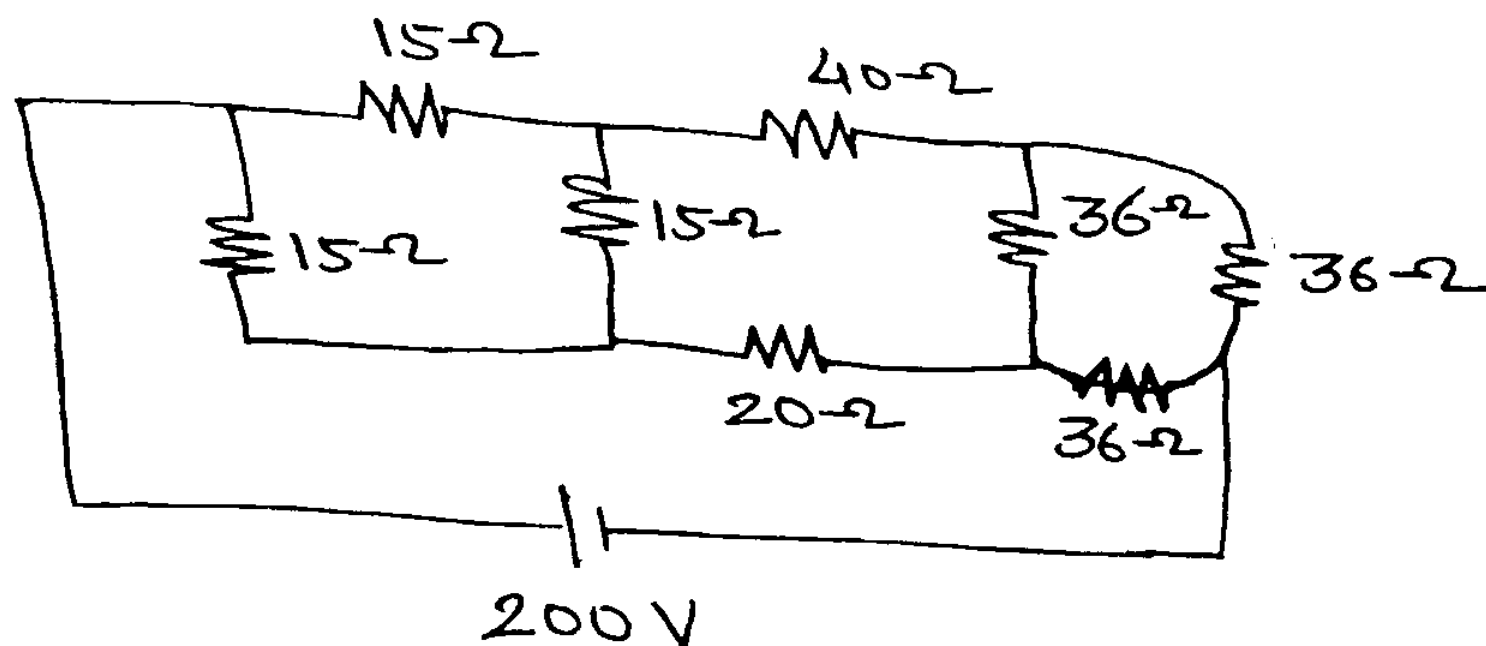
2. (a) Find the currents  $I_1, I_2, I_3$  in the given circuit by node voltage method. 6



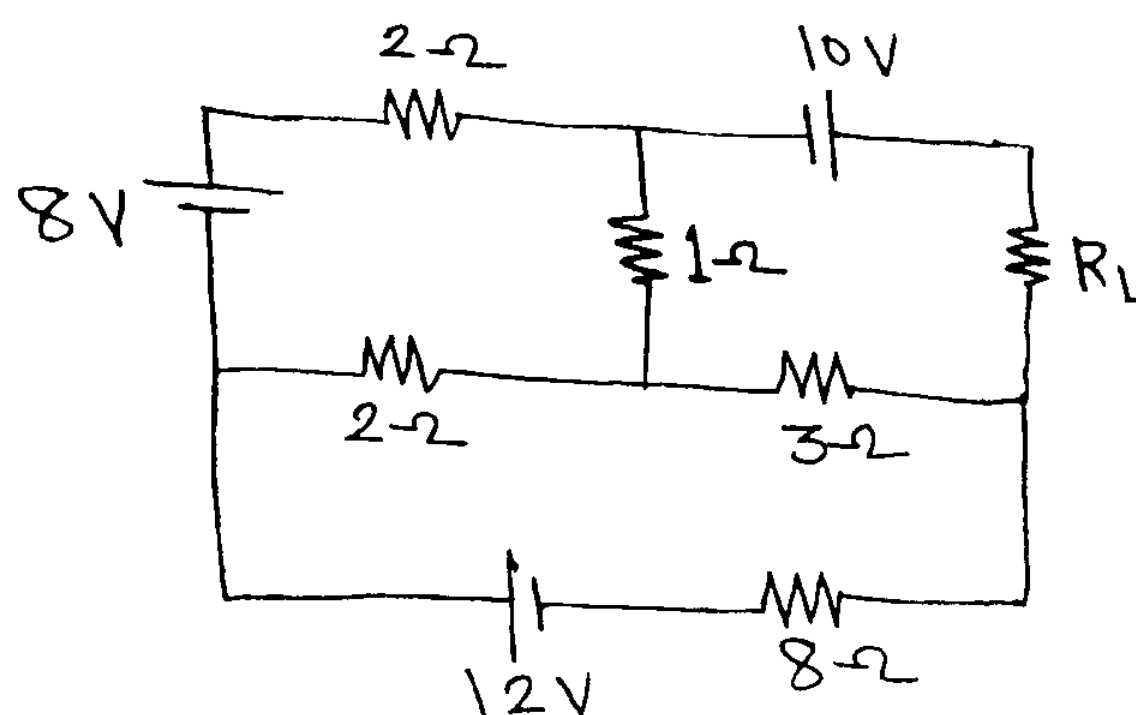
- (b) For the circuit shown determine the 8  
 (i) Supply frequency (f).  
 (ii) Coil resistance (r)  
 (iii) Supply voltage (v)



- (c) Draw and explain Phasor diagram of 1-Phase practical transformer when  
 (i) on no load  
 (ii) Leading power factor load. 6
3. (a) Find the values of circuit elements and reactive voltampere drawn for a balanced 3 phase load connected in delta and draws a power of 12kW at 440V. The power factor is 0.7 leading. 8
- (b) The following results were obtained on a 40 KVA, 2400/120 V transformer.  
 O. C. test : 120V, 9.65A and 396 W (on L.V. side)  
 S. C. test : 92V, 20.8A and 810 W (on H.V. side)  
 Calculate the parameters of approximate equivalent circuit referred to H. V. side. 6
- (c) Explain series inductor filter. 2
- (d) Explain circuit diagram and working of CE configuration of BJT. 4
4. (a) Determine current through 20Ω resistor in the following circuit. 7



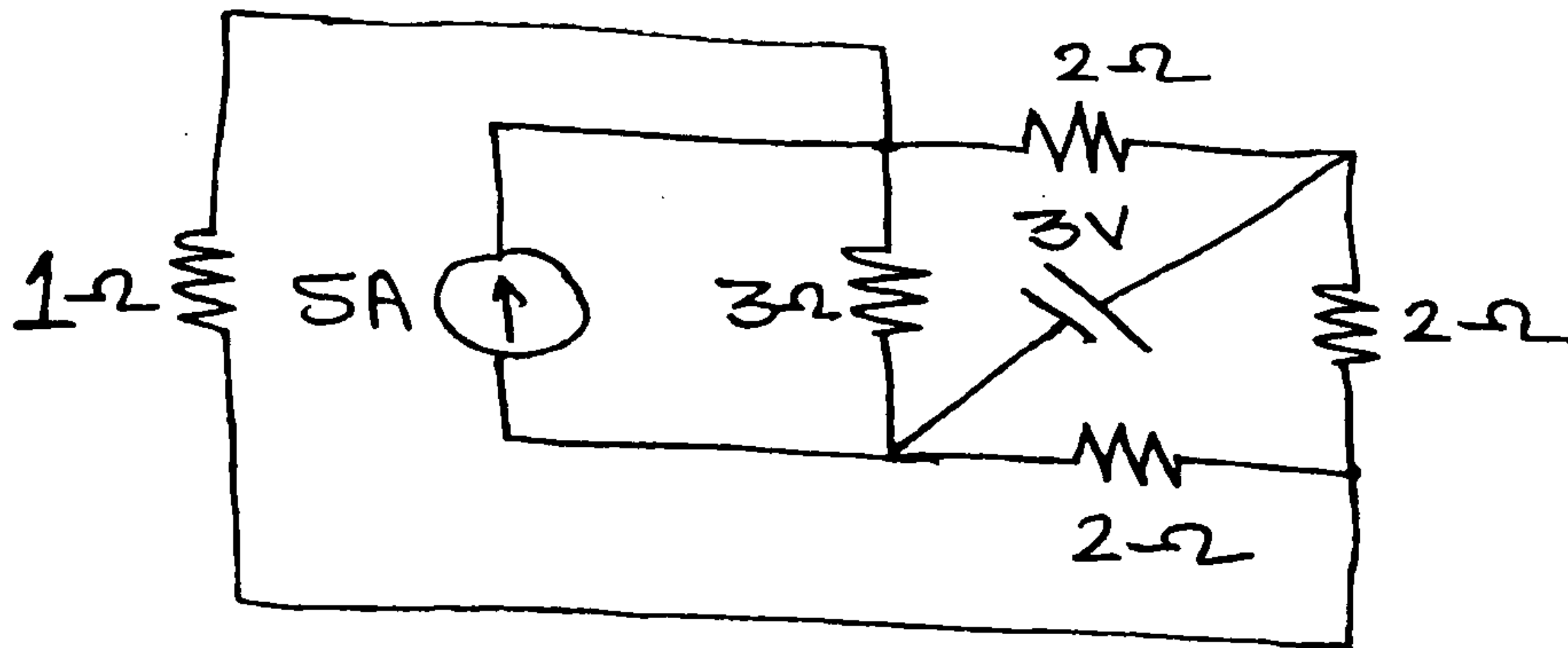
- (b) Two currents are represented by  $I_1 = 15 \sin(\omega t + \frac{\pi}{3})$  and  $I_2 = 25 \sin(\omega t + \frac{\pi}{4})$ . These currents are fed into common conductor. Find the total current. If the conductor has resistance 50Ω, what will be energy loss in 10 hours. 5
- (c) In a three phase power measurement by two wattmeter method, both the wattmeters read the same value. What is the power factor of the load? Justify your answer. 4
- (d) Explain the circuit diagram and waveforms of Bridge rectifier. 4
5. (a) For the given circuit find the value of ' $R_L$ ' so the maximum power dissipated in it. Also find  $P_{max}$ . 8



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- (b) With proper phase diagrams, explain behaviour of a pure capacitor in an AC circuit. 4
- (c) Derive condition for maximum efficiency of a transformer. Also derive equation for load at maximum efficiency. 8
6. (a) Determine current in  $1\Omega$  resistor using superposition theorem. 7



- (b) An inductive coil of resistance  $10\Omega$  and inductance  $0.1\text{H}$  is connected in parallel with  $150\ \mu\text{F}$  capacitor to a variable frequency,  $200\text{V}$  supply. Find the resonance frequency at which the total current taken from supply is in Phase with supply voltage. Also find value of this current. Draw the phasor diagram. 7
- (c) Two wattmeters are connected to measure power in a three phase circuit. The reading of one of the wattmeter is  $7\ \text{kW}$  when load power factor is unity. If the power factor of the load is changed to  $0.707$  lagging without changing the total input power, calculate the readings of the two wattmeters. 6