Con. 5918-13

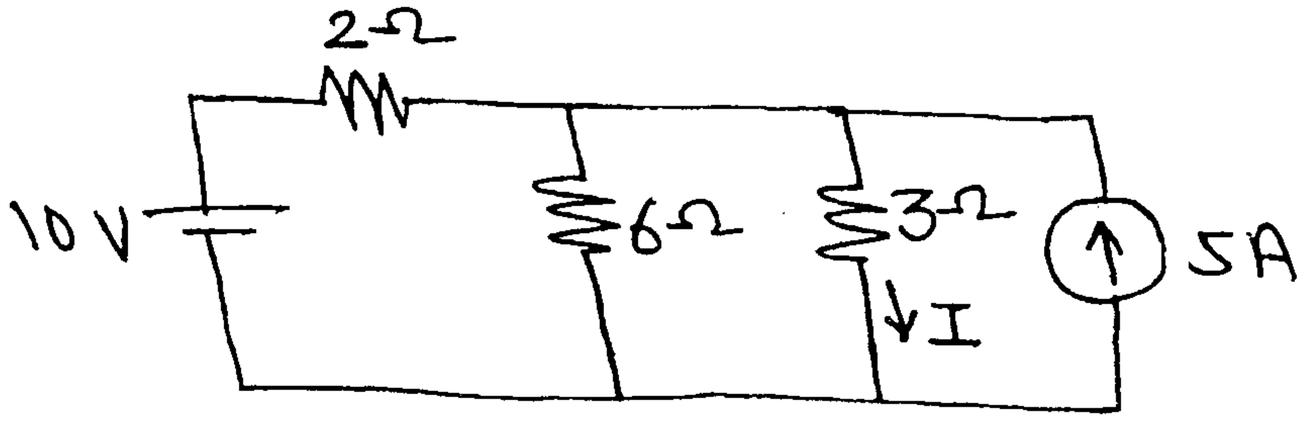
GX-10011

(Revised Course)

(3 Hours) **[Total Marks : 80**

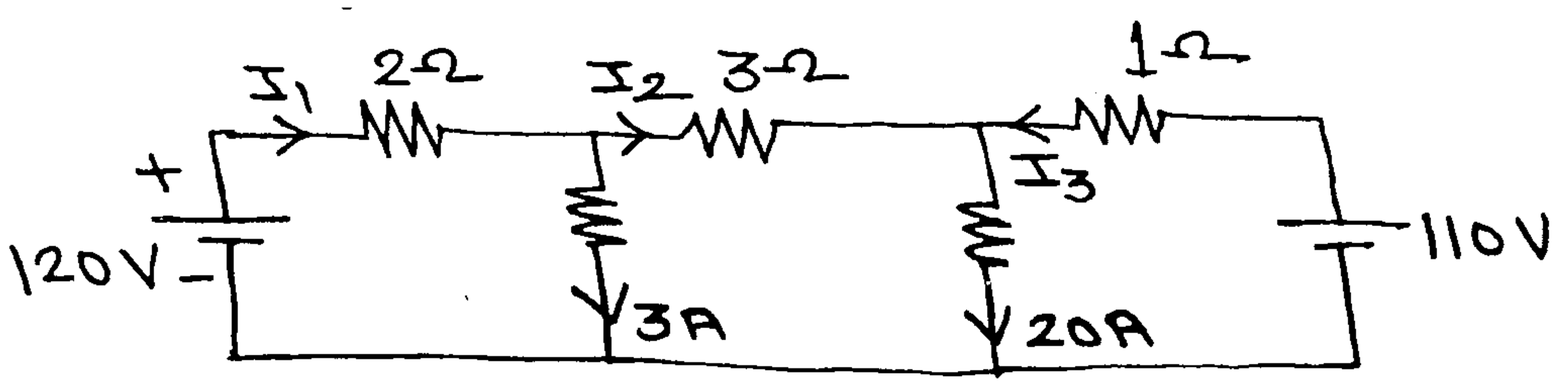
N.B. : (1) **Question** No. **1** are **compulsory**.
(2) Solve any **three** questions out of the remaining **five** questions.
(3) Assume data if required , clearly stating the assumptions.

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

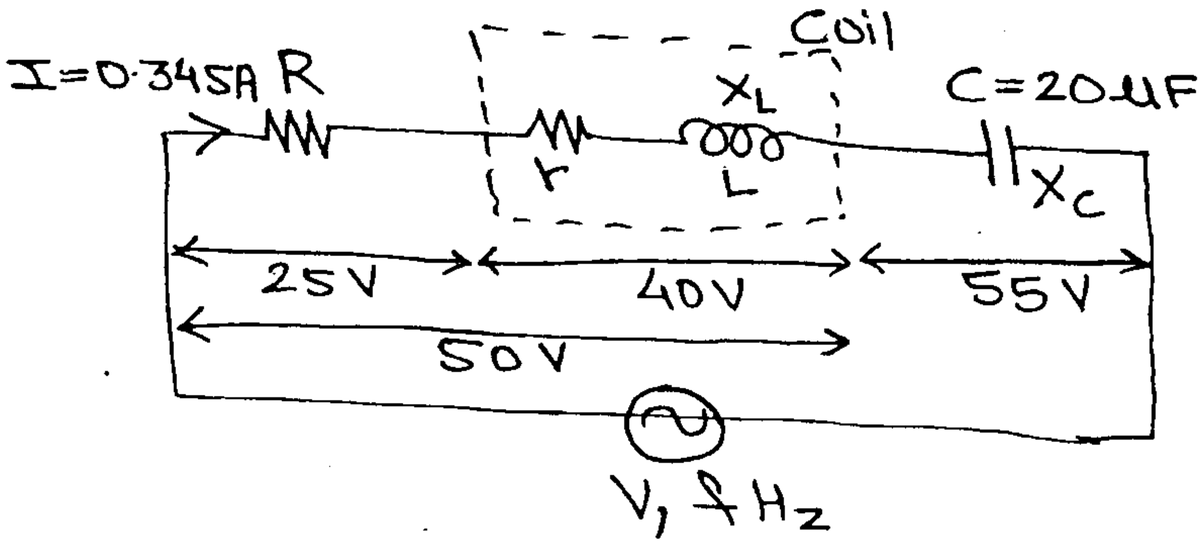


(b) State and Explain Norton's theorem. **3**
(c) Derive an expression for the average value of a sinusoidally varying current in terms of Peak Value. **3**
(d) Derive the condition for resonance in a series circuit. **3**
(e) Give relation between line current and phase current, line voltage and phase 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 **6**
(i) on no load
(ii) Leading power factor load.

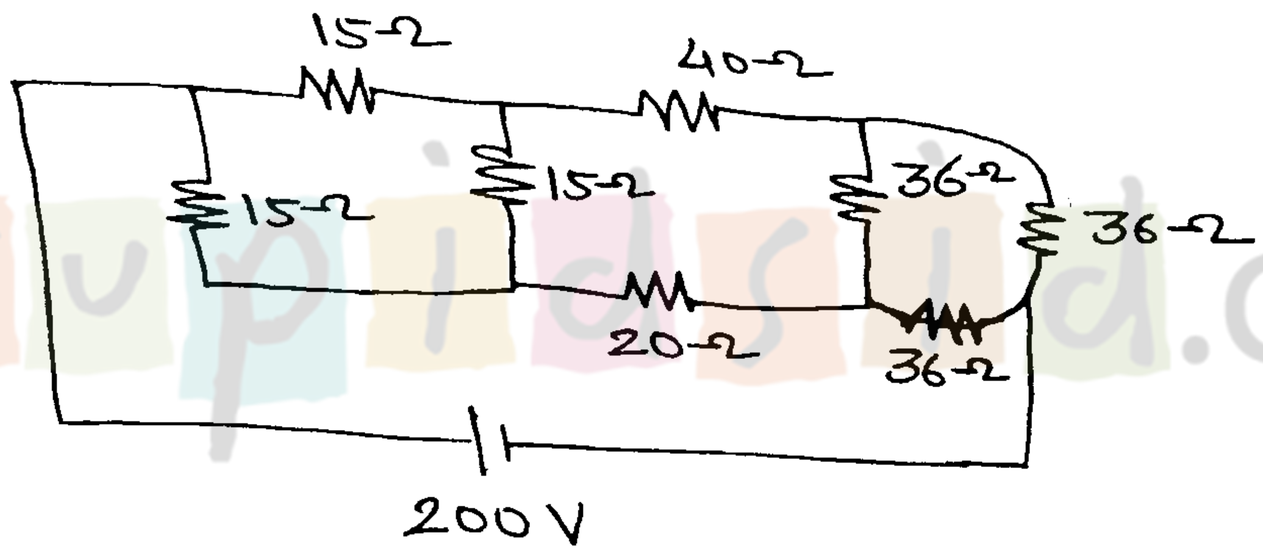
3. (a) Find the values of circuit elements and reactive voltampere drawn for a balanced 3 phase load connected in delta and draws a power of 12kW at 440V. The power factor is 0.7 leading. **8**

(b) The following results were obtained on a 40 KVA, 2400/120 V transformer. **6**
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.

(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**

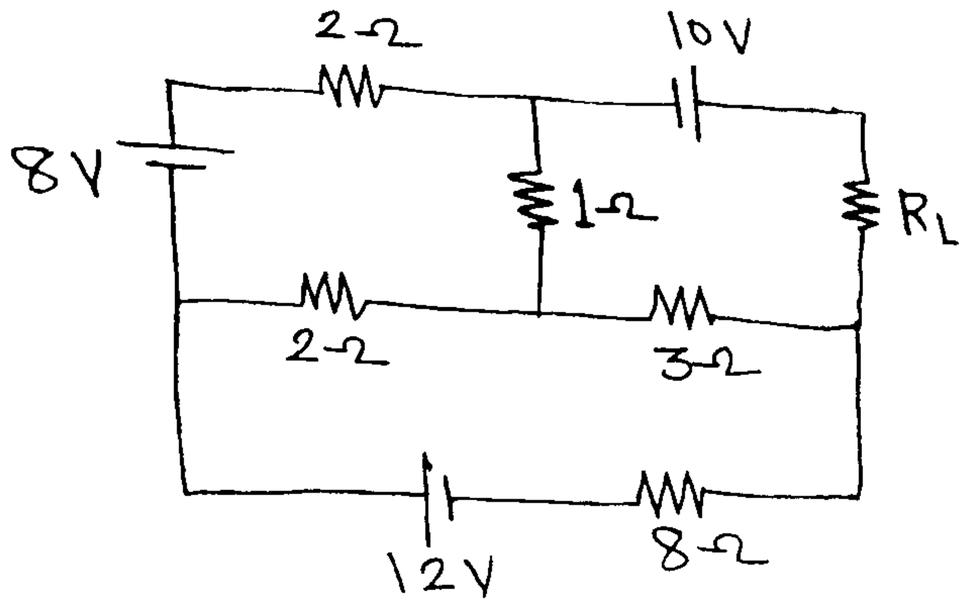


(b) Two currents are represented by $I_1 = 15\,Sin\,(wt + \frac{\pi}{3})$ and $I_2 = 25\,Sin\,(wt + \frac{\pi}{4})$. These currents are fed into common conductor. Find the total current. If the conductor has resistance 50Ω, what will be energy loss in 10 hours. **5**

(c) In a three phase power measurement by two waltmeter 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**

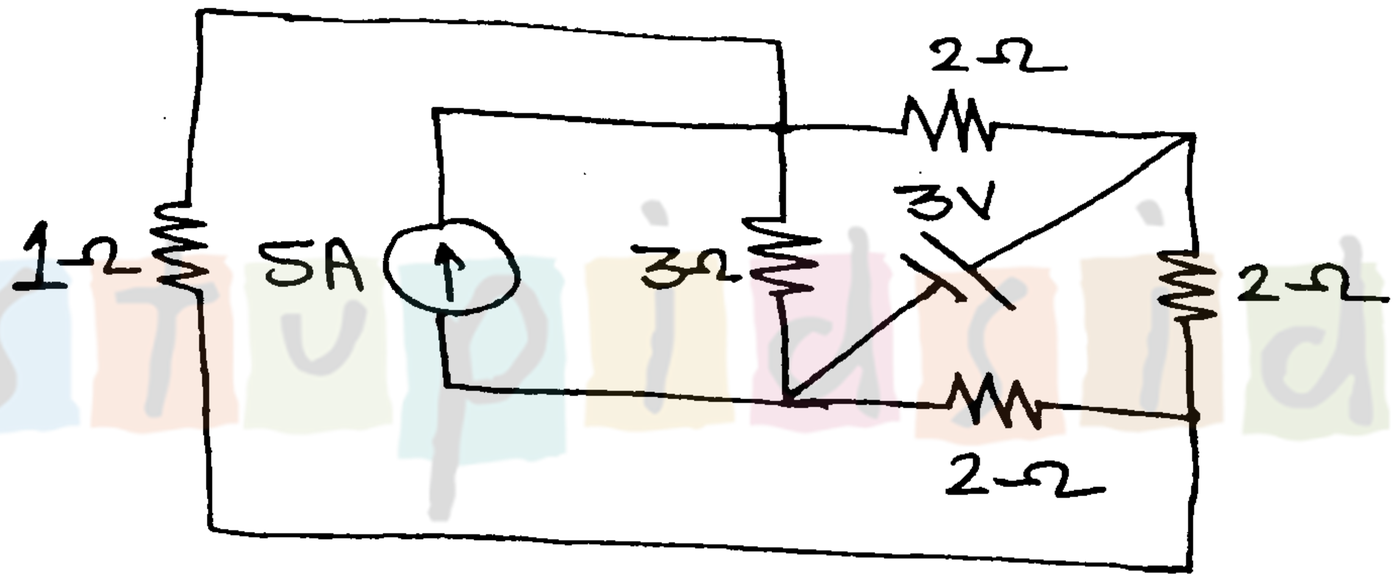
5. (a) For the given circuit find the value of 'R_L' so the maximum power dessipated in it. Also find Pmax. **8**



(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 1Ω resistor using superposition theorem. **7**



(b) An inductive coil of resistance 10Ω and inductance 0.1H is connected in parallel with 150 μF capacitor to a variable frequency, 200V 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 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**

F.E Sem I (Rev) CBGS May 14.
Sub- BEEG

2015/14

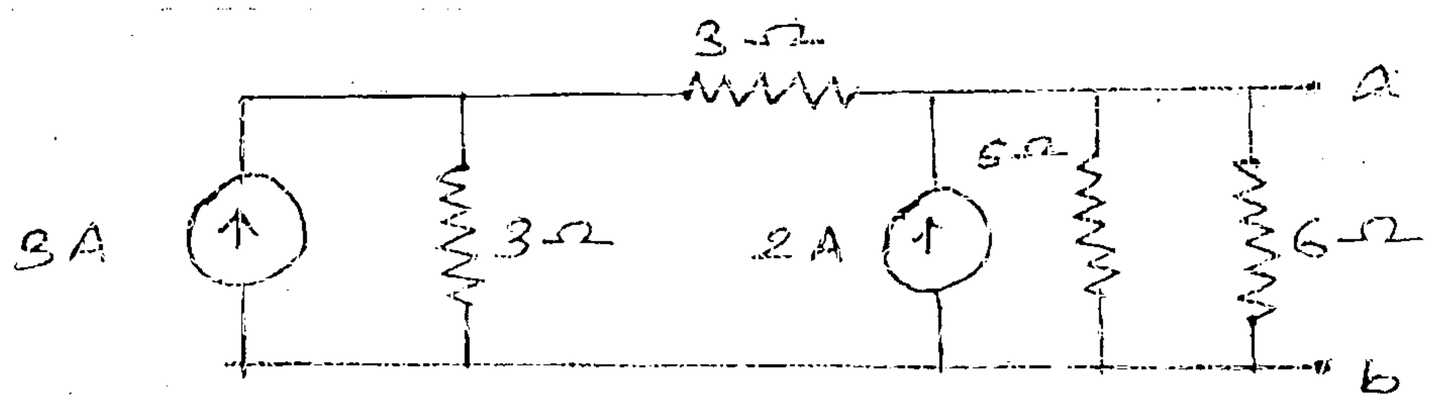
(REVISED COURSE)

QP Code : NP-17698

(3 Hours) **[Total Marks : 80**

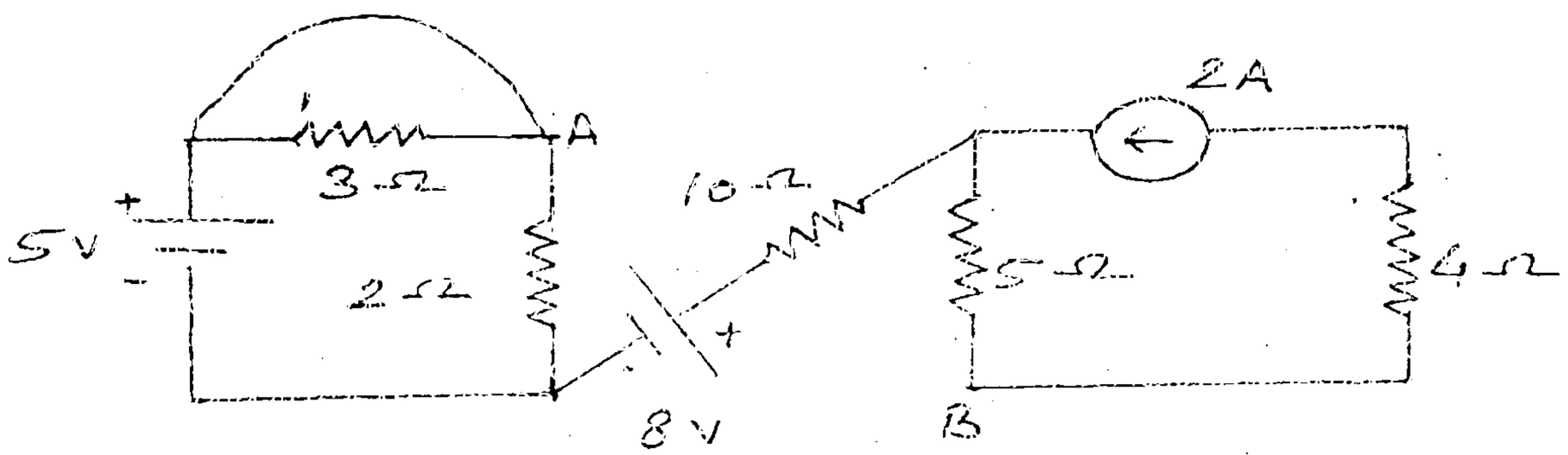
N.B. : (1) Question **No. 1** is **Compulsory.**
(2) Solve any **three** questions from the remaining **five** questions.
(3) Assume data if required.
(4) **Figures** to the right indicate **full marks.**

1. (a) Using Source conversion, seduce 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 [fr] 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) Vph (ii) Iph (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 VAB 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° behind the supply voltage, while voltage across inductor is 171 volt. Find the resistance of resistor, resistance & reactance of the inductor. 8

(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

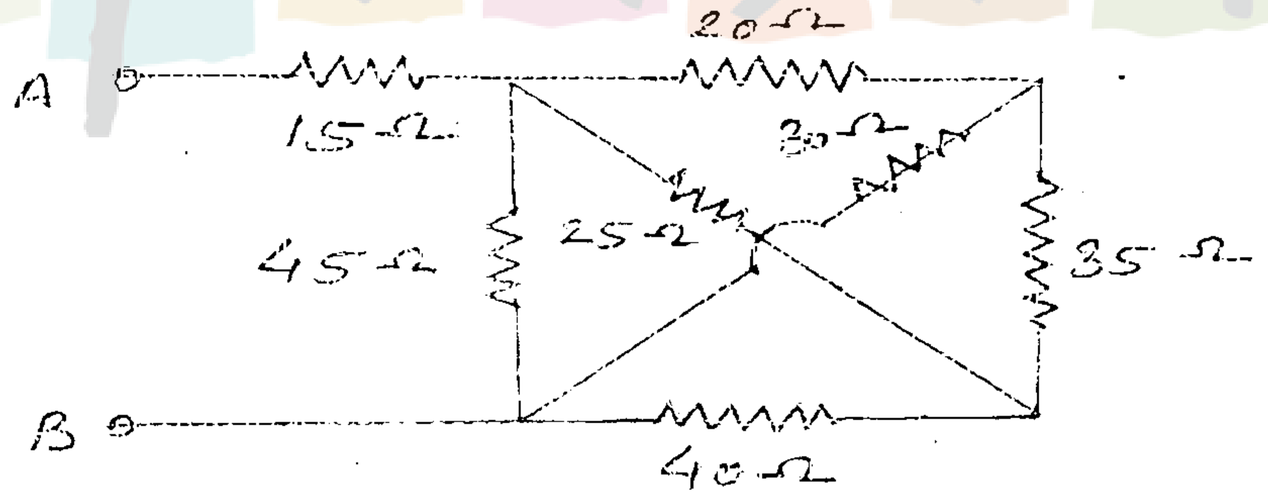
(i) Draw the equivalent circuit of the transformer referred to LV side insert all parametes values.

(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 $i_1 = 10 \text{ Sin } \omega t$, $i_2 = 20 \text{ Sin } (\omega t + 60^\circ)$, and $i_3 = 75 \text{ Sin } (\omega t - 30)$. Find the resultant current and express it in the form $i = \text{Im Sin } (\omega t + \phi)$. if the supply frequency is 50Hz, calculate the resultant current when (i) $t = 0$, (ii) $t = 0.001$ sec. 5

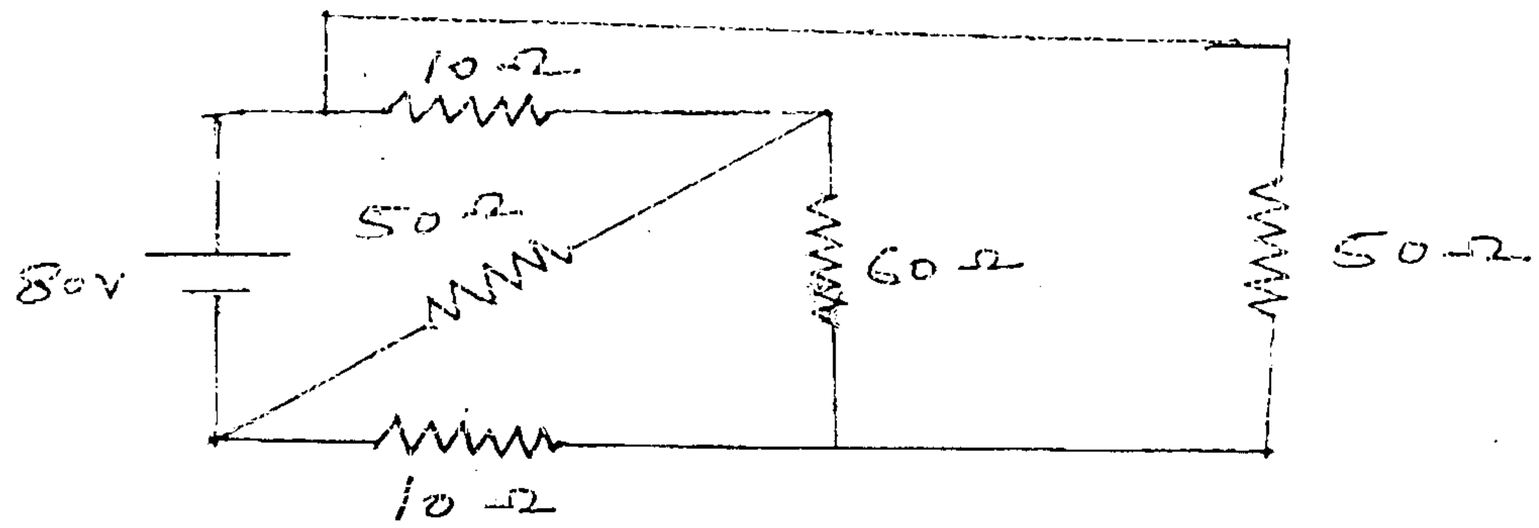
(c) A 3 phase, 10 KVA load has power factor of 0.342. The power is measured by two wattmeter method. Find the reading of each wattmeter when, 4

(i) Power factor is leading

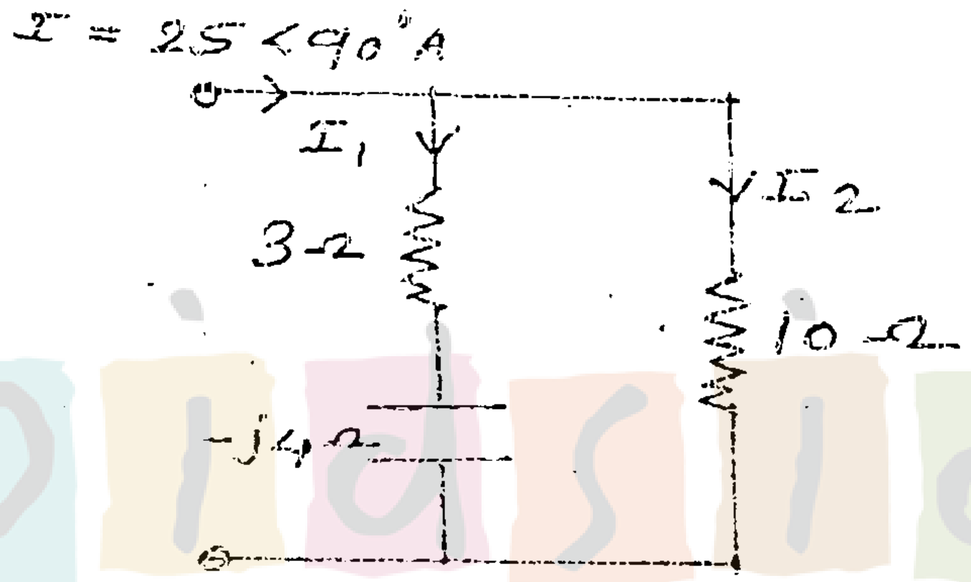
(ii) Power factor is lagging.

(d) Explain working of centre tap full wave rectifier with waveforms. 4

5. (a) Find the current through 6Ω resistance by using Thevenin's theorem. 8



(b) Find current I_1 and I_2 shown in figure. 4



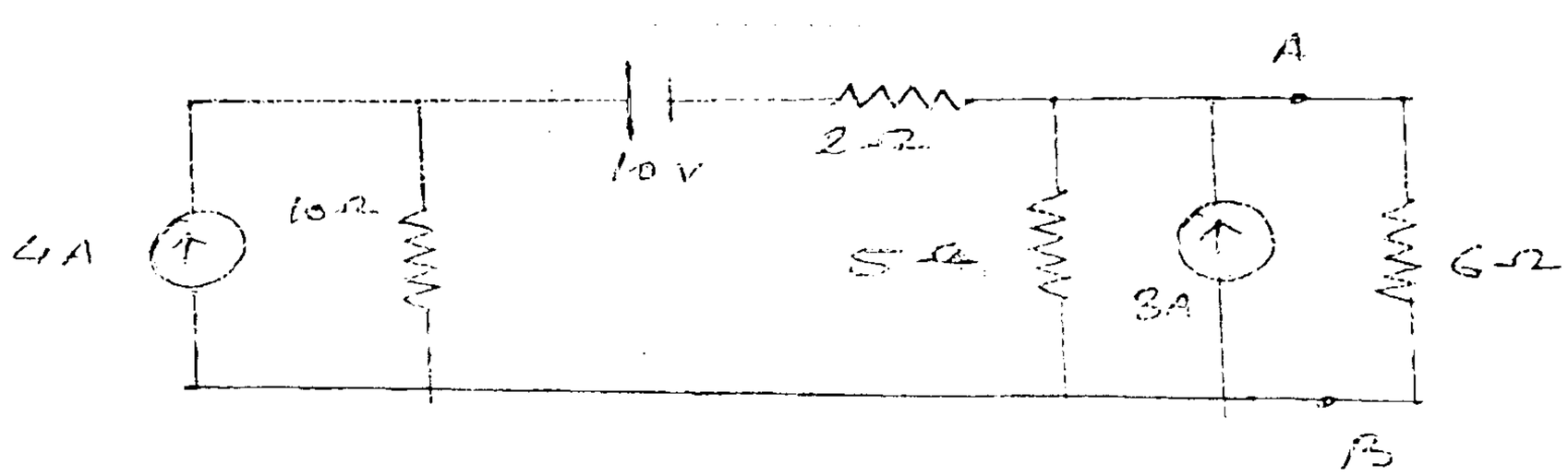
(c) A 50KVA, 4400/220 volt transformer bas $R_1 = 3.45\Omega$, $R_2 = 0.009\Omega$. The reactance are $X_1 = 5.2\Omega$ and $X_2 = 0.015\Omega$. calculate for the transformer, 8

(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 6Ω resistor using superposition theorem. 7



(b) A coil of inductance 31.8mH with resistance of 12Ω is connected in parallel with a capacitor across 250 volts, 50Hz 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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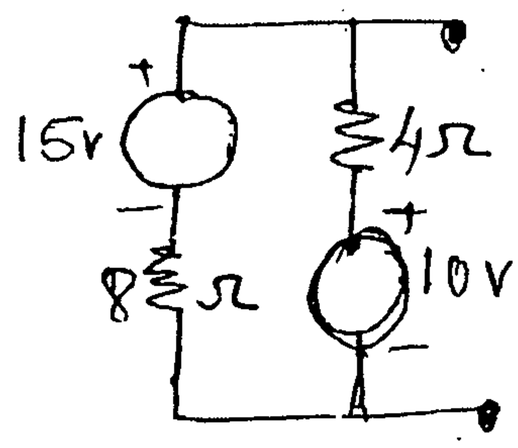
Con. 6889–13. **(REVISED COURSE)** **GS–5139**

(3 Hours) **[Total Marks : 80**

N.B. :(1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions out of **remaining**.
(3) Assume **suitable** data if **necessary**.

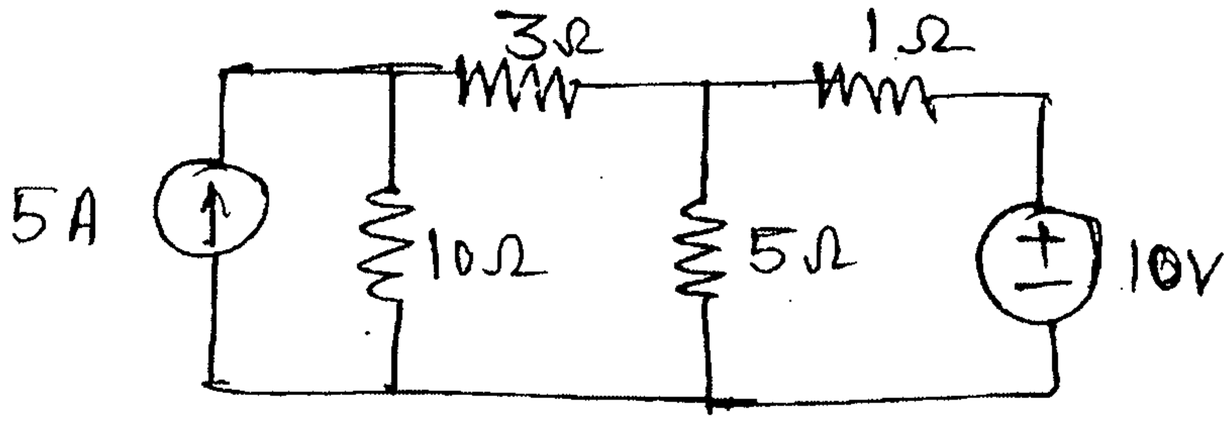
1. (a) Using source transformation convert the circuit given below to a single voltage source in series with a resistor. **3**



(b) Derive the condition for maximum power transfer through the network. **3**
(c) Determine the rms value of voltage wareform shown below :— **3**

(d) Give the comparison between series and parallel resonance circuits. **3**
(e) Draw the phasor diagram of 3–phase star connected load with lagging power factor. **2**
(f) State the working principle of Transformer and derive expression for emf induced. **4**
(g) Define Ripple factor and Voltage Regulation for rectifier circuits. **2**

2. (a) For the network given below find current through 3Ω resistor using nodal analysis. **6**



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(b) Two coils A and B are connected in series across 240V, 50H_z supply. The resistance of A is 5Ω and inductance of B is 0·015H. If the input from supply is 3kW and 2 kVAR. Find inductance of A and resistance of B. Calculate voltage across each coil. **8**

(c) A 3000/200-V, 50 Hz, single phase transformer has a cross-sectional area of 150 cm^2 for the core. If number of turns on the low voltage winding is 80, determine number of turns on the high voltage winding and maximum value of flux density in the core. **6**

3. (a) Each phase of a delta connected load consist of a 50 mH inductor in series with a parallel combination of 5Ω resistor and a 5μF capacitor. The load is connected to a three phase, 550V, 50Hz ac supply. **8**
Find (i) Phase current, (ii) Line current (iii) Power drawn (iv) power factor, (v) Reactive power and kVA rating of the load.

(b) A 5 kVA, 1000/200V, 50 Hz, single phase transformer gives following test results— **6**

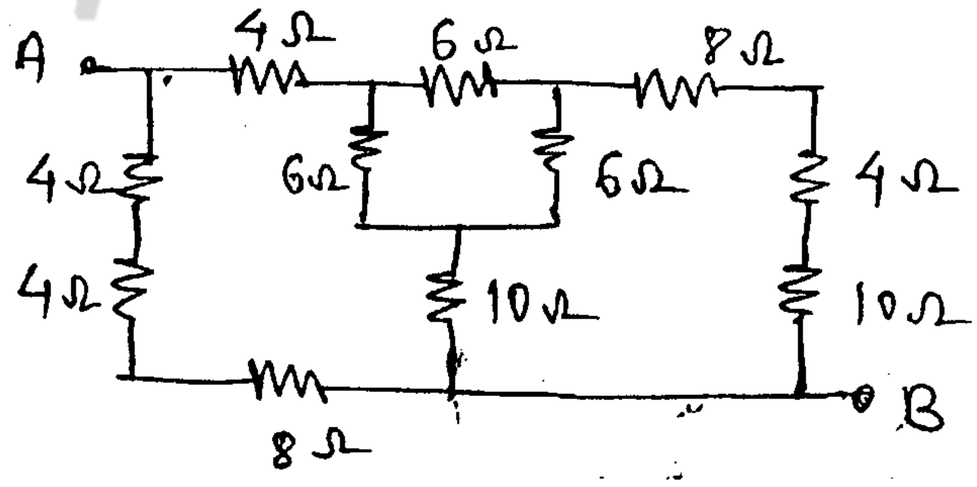
OC test (LV side)	200V	1·2 A	90 W
SC test (HV side)	50V	5 A	110 W

Determine efficiency as half load at 0·8 p.f. lagging.

(c) What is the function of filter in rectifier circuits. Explain with appropriate waveforms. **2**

(d) Draw and explain output characteristics of transistor in CE configuration. **4**

4. (a) For the circuit shown below find the resistance between terminals A and B. **7**



(b) The voltage drops across four series connected impedances are given :— **5**

$$V_1 = 60 \sin\left(wt + \frac{\pi}{6}\right),\ V_2 = 75 \sin\left(wt - \frac{5\pi}{6}\right)$$

$$V_3 = 100 \cos\left(wt + \frac{\pi}{4}\right),\ V_4 = V_{4m} \sin\left(wt + \phi_4\right)$$

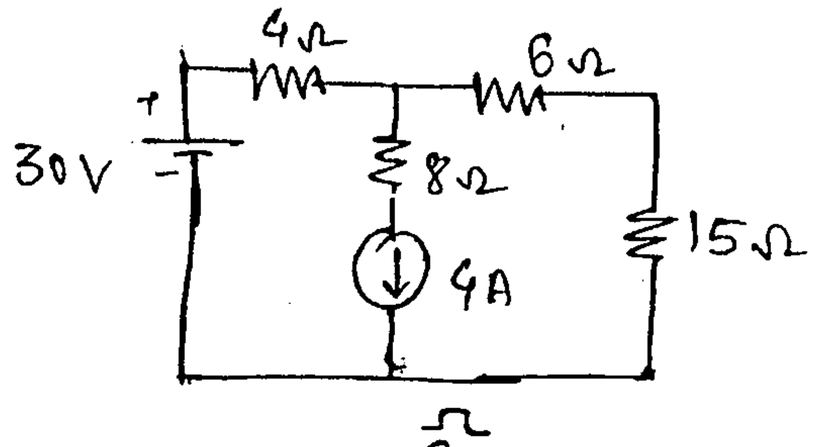
Calculate the values of V_{4m} and ϕ_4 if the voltage applied across series circuit is

$$140 \sin\left(wt + \frac{3\pi}{5}\right)$$

(c) Draw the circuit for measurement of 3–phase power using two wattmeters and state its advantages over other methods of 3-phase power measurement. **4**

(d) Draw and explain Half wave rectifier with appropriate waveforms. **4**

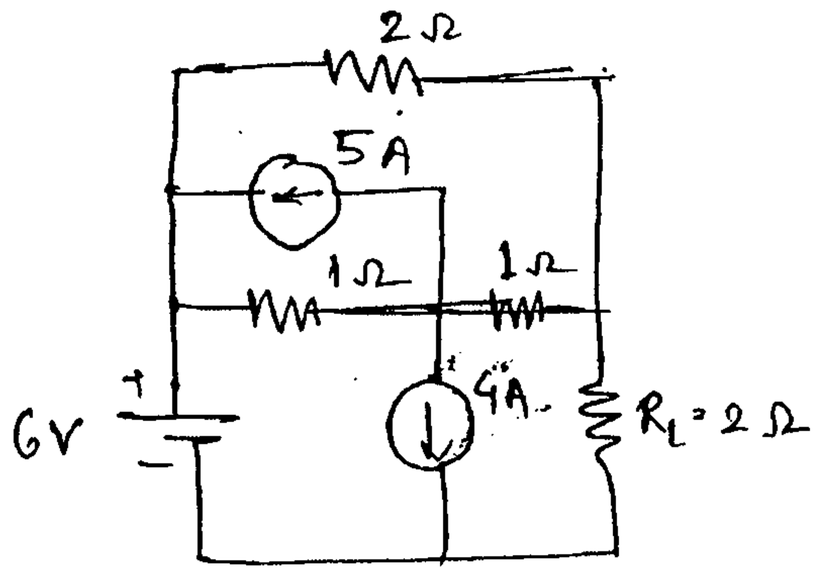
5. (a) Using Norton's theorem, calculate the current flowing through 15Ω load resistor in the given circuit. **8**



(b) A 46 mH inductive coil has a resistance of 10Ω. (i) How much current will it draw if connected across a 100V, 60Hz supply ? (ii) What is the power factor of the coil ? (iii) Determine the value of capacitance that must be connected across the coil to make the power factor of overall circuit units. **4**

(c) A 30kVA, 2400/120V, 50Hz transformer has a high voltage winding resistance of 0·1Ω and a leakage reactance of 0·22Ω. The low voltage winding resistance is 0·035Ω and the leakage reactance is 0·042Ω. Calculate the equivalent winding resistance, reactance and impedance referred to (i) high voltage side (ii) low voltage side and (iii) total copper loss of the transformer. **8**

6. (a) Determine current through $R_L = 2\Omega$ in the circuit shown below using superposition theorem. **7**



(b) An inductor having a resistance of 25Ω and Q_0 of 10 at a resonant frequency of 10kHz is fed from 100 $\angle 0°$ supply. Calculate (i) Value of series capacitance required to produce resonance with the coil. (ii) The inductance of the coil (iii) Q_0 using L/C Ratio (iv) Voltage across capacitor (v) Voltage across coil. **7**

(c) The input power of 3-phase motor was measured by two wattmeter method. The reading of two wattmeters are 5·2kW and –1·7kW and the line voltage is 415V. Calculate the total Active power, Power factor and Line current. **6**
