Q.P. Code : 25676

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

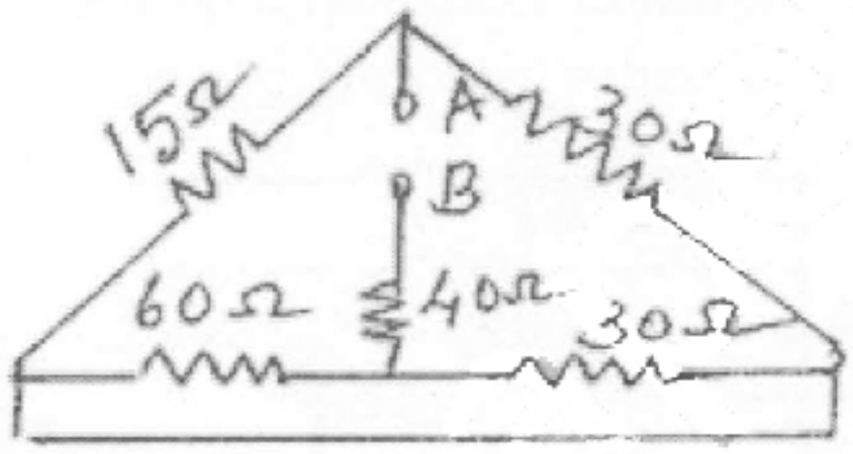
N.B. : (1) **Question No.1** is **compulsory**.
(2) Solve **any three** from remaining questions.
(3) Assume suitable **data** if **necessary**.
(4) **Figures** to the **right** indicate **full marks**.

1. Answer **any Five** : **20**

(a) What is the difference between ideal source and actual source? Illustrate the concept using the V-I characteristics of voltage and current source.

(b) In a balanced three phase circuit the power factor is 0.866. What will be the ratio of two wattmeter reading if the power is measured using two wattmeters.

(c) Calculate R_{AB}.

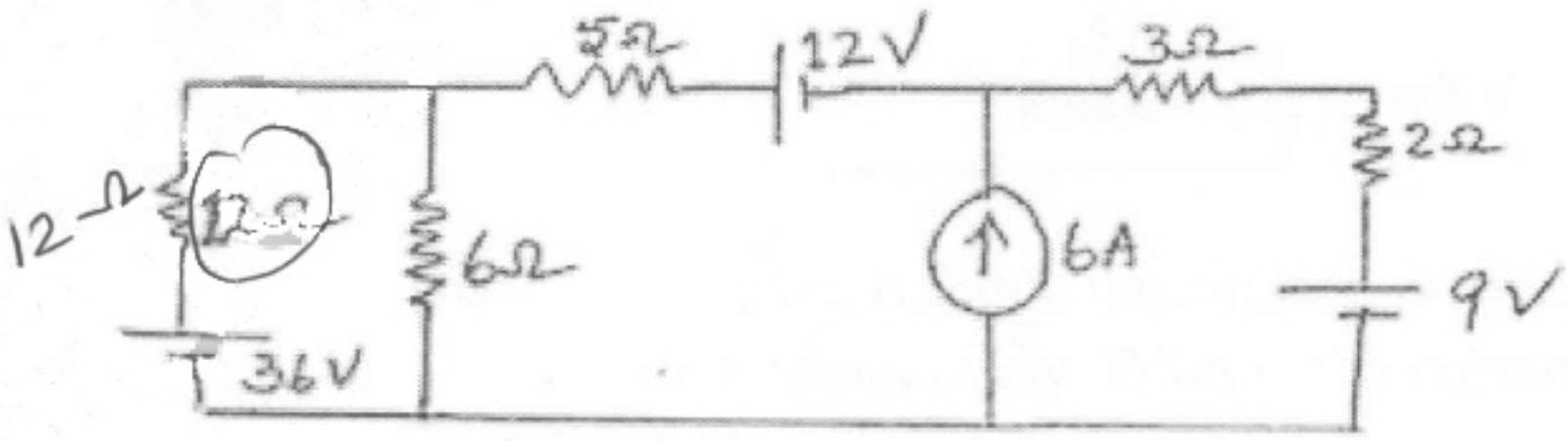


(b) Derive the equation for resonance frequency for a parallel circuit in which a capacitor is connected in parallel with a coil having resistance R and inductive reactance X_L. What is the resonance frequency if inductor is ideal?

(e) What are the classifications of DC motor? Specify one application for each one.

(f) Derive emf equation of a single phase transformer.

2. (a) Using mesh analysis find current through 5Ω. **08**



(b) An emf of 250 V is applied to an impedance $Z_1 = (12.5 + j20)\Omega$. An impedance Z_2 is added in series with Z_1, the current become half of the original and lead the supply voltage by 20°. Determine Z_2. **08**

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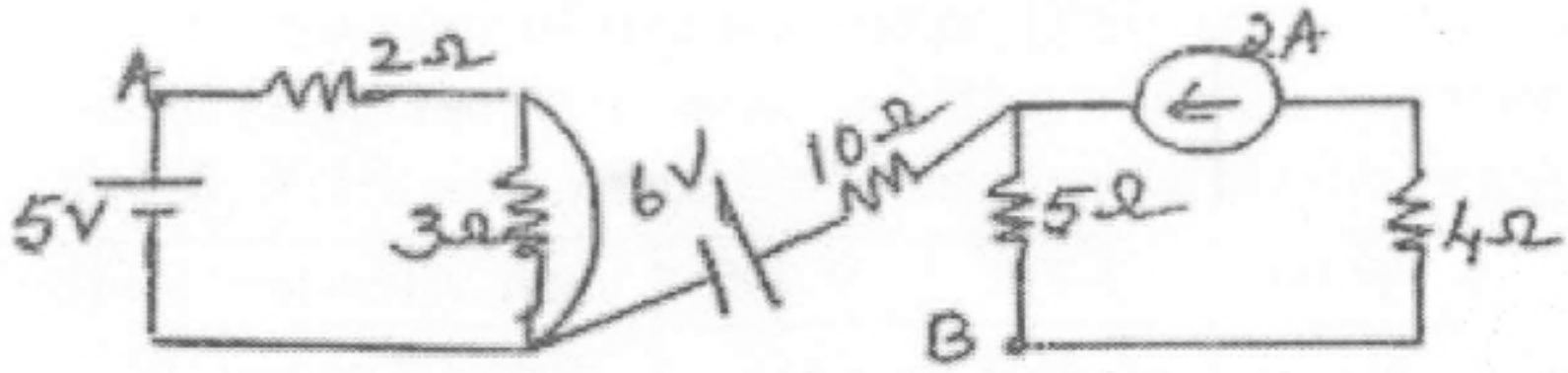
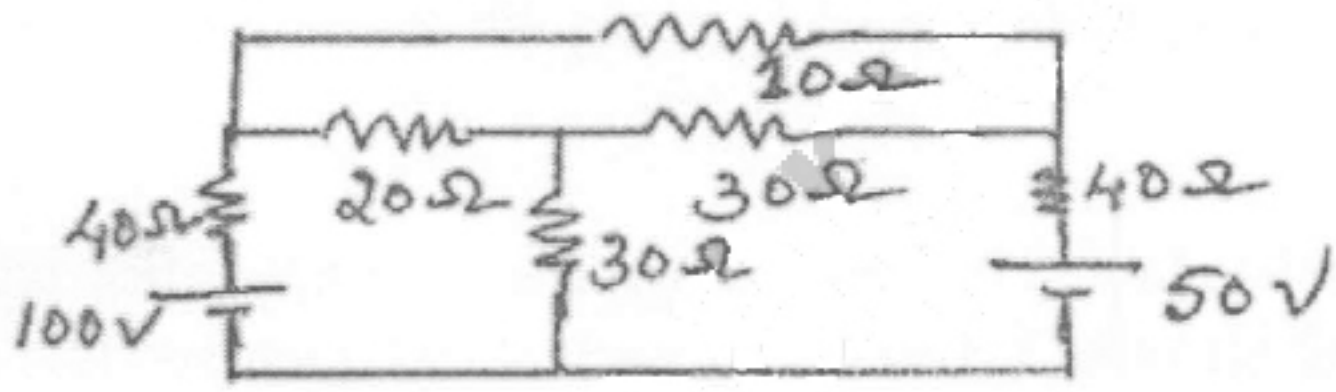
(c) Determine the potential difference V_{AB} for the given network. 04



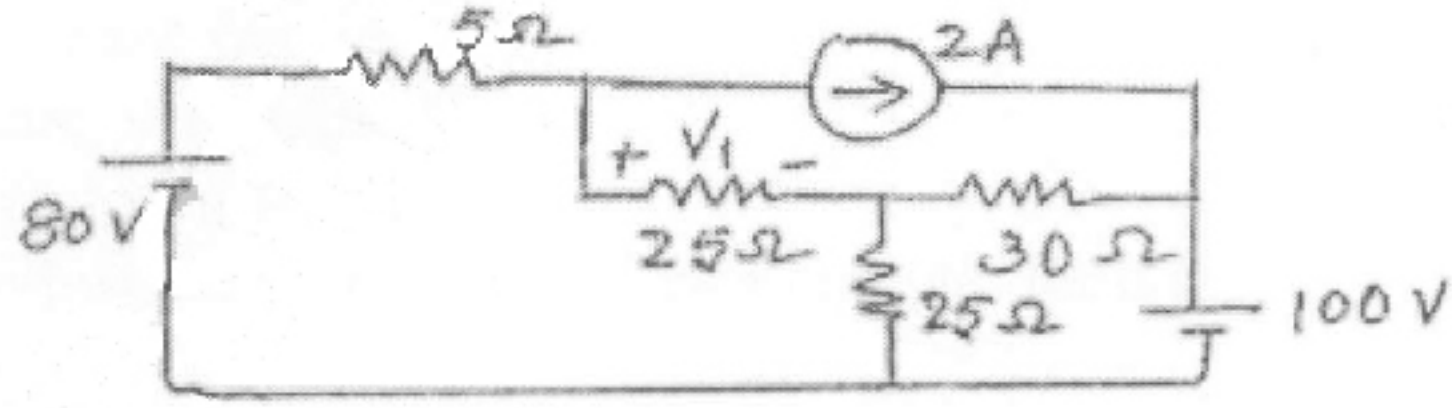
3. (a) When a voltage of 100 V, 50 Hz is applied to an impedance A current taken is 8 A lagging and power is 120 W. When it is connected to an impedance B the current is 10 A leading and power is 500 W. What current and power will be taken if it is applied to the two impedances connected in series. 08

(b) Find current through 10 Ω using Thevenin's theorem. 08



(c) With the help of equivalent circuit of a single phase transformer show how total copper loss can be represented in primary of a transformer. 04

4. (a) Find V_1 using super position theorem. 08



(b) In an R-L-C parallel circuit the current through the resistor, inductor (pure) and capacitor are 20 A, 15 A and 40 A respectively. What is the current taken from the supply? Draw phasor diagram. 04

(c) Two sinusoidal sources of emf have rms value E_1 and E_2. When connected in series, with a phase displacement α the resultant voltage read on an electrodynamometer voltmeter is 41.1 V and with one source reversed 17.52 V. When the phase displacement made zero a reading of 42.5 V is observed. Calculate E_1, E_2 and α. 08

5. (a) Prove that the power in a balanced three phase delta connected circuit can be deduced from the readings of two wattmeter. Draw relevant connections and vector diagrams. Draw a table to show the effect of power factor on wattmeter. **08**

(b) A 5 kVA 200/400, 50 Hz single phase transformer gave the following test results. **08**

OC test on LV side	200 V	0.7 A	60 W
SC test on HV side	22 V	0.16 A	120 W

(i) Draw the equivalent circuit of the transformer and insert all parameter values.
(ii) Efficiency at 0.9 pf lead and rated load.
(iii) Current at which efficiency is maximum.

(c) Prove that if the phase impedances are same, power drawn by a balanced delta connected load is three times the power drawn by the balanced star connected load. **04**

6. (a) Three identical coils each having a reactance of 20 Ω and resistance of 10 Ω are connected in star across a 440 V three phase line. Calculate for each method : **08**

(i) Line current and phase current.
(ii) Active, reactive and apparent power.
(iii) Reading of each wattmeter connected to measure the power.

(b) A series resonant circuit has an impedance of 500 Ω at resonant frequency. The cut of frequency observed are 10kHz and 100 Hz. Determine : **06**

(i) Resonant frequency.
(ii) Value of R, Land C.
(iii) Q factor at resonance.

(c) Draw and illustrate transformer phasor diagram for lagging power factor. **06**
