

Q.P. Code : 25676

(3 Hours)

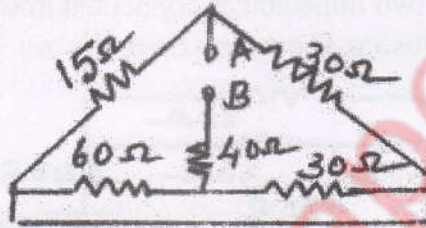
[Total Marks : 80

- 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 :

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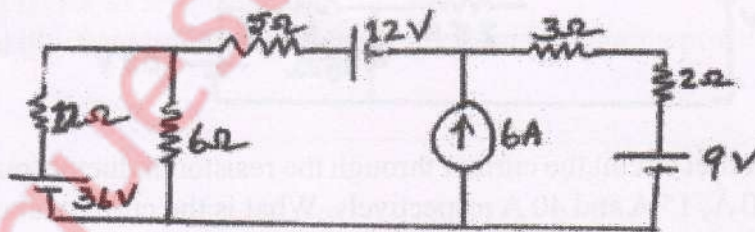
- (a) What is the difference between ideal source and actual source? Illustrate the concept using the V-I characteristics of voltage and current source.
 (b) In a balanced three phase circuit the power factor is 0.866. What will be the ratio of two wattmeter reading if the power is measured using two 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 .

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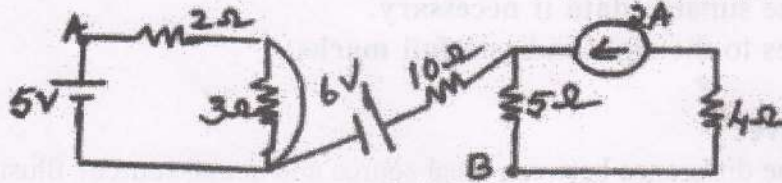
- (b) An emf of 250 V is applied to an impedance $Z_1 = (12.5 + j20)\Omega$. An impedance Z_2 is added in series with Z_1 , the current become half of the original and lead the supply voltage by 20° . Determine Z_2 .

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TURN OVER

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

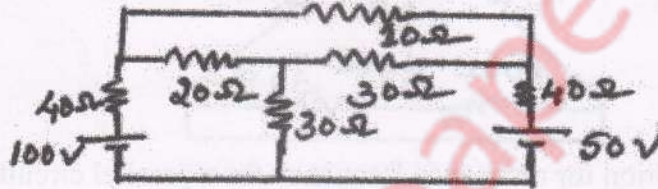
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3. (a) When a voltage of 100 V, 50 Hz is applied to an impedance A current taken is 8 A lagging and power is 120 W. When it is connected to an impedance B the current is 10 A leading and power is 500 W. What current and power will be taken if it is applied to the two impedances connected in series.
- (b) Find current through 10 Ω using Thevenin's theorem.

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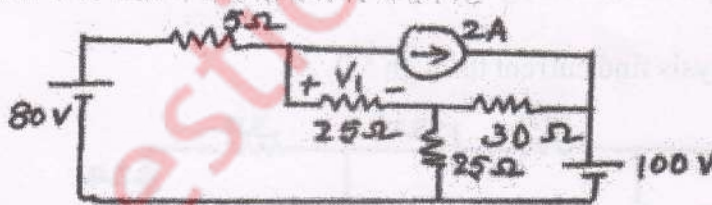


(c) With the help of equivalent circuit of a single phase transformer show how total copper loss can be represented in primary of a transformer.

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

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(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.

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(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 electro-dynamometer 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 .

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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 20Ω and resistance of 10Ω 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 500Ω at resonant frequency. The cut of frequency observed are 10kHz and 100 Hz. Determine : **06**
- (i) Resonant frequency.
- (ii) Value of R, L and C.
- (iii) Q factor at resonance.
- (c) Draw and illustrate transformer phasor diagram for lagging power factor. **06**