

TOTAL MARKS: 80

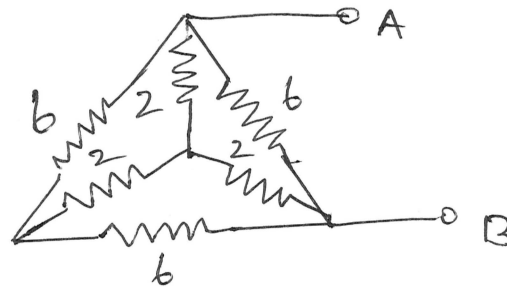
TIME: 3hrs

NB

- 1) Question No. 1 is compulsory.
- 2) Answer any three questions out of remaining five questions.
- 3) Assumption made should be clearly stated.
- 4) Answer to questions should be grouped together and written together.

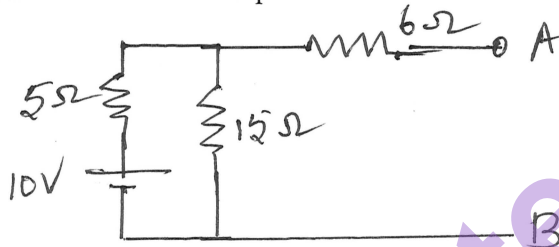
Q1 a. Find R_{AB}

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b. Find the Norton's equivalent across AB.

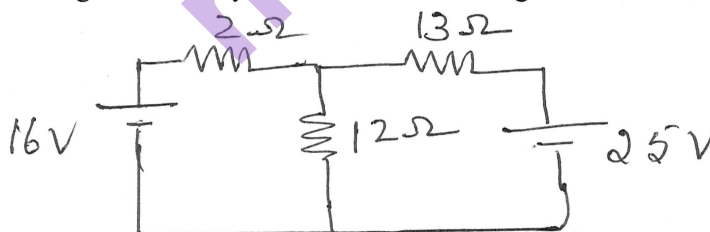
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- c. A pure inductor of 0.2 H is connected across single phase 200 V, 50 Hz supply. Write the instantaneous equation of voltage and current. 3
- d. Write any four conditions of series resonance. 3
- e. What is the phase relation in star connected system? 2
- f. Explain the working of a single phase transformer under load 4
- g. Illustrate the working of half wave rectifier. 2

Q2 a. Using Mesh analysis find current through 2 Ω resistor.

6



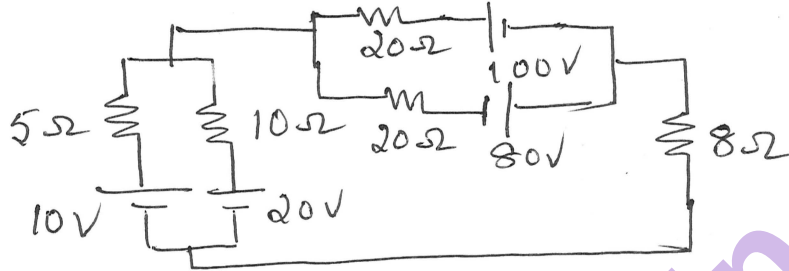
- b. The impedances $(8+j6) \Omega$ and $(10-j10)\Omega$ are connected in parallel across voltage of $230\angle 0$. Determine current in each branch and kVA, kVAR, kW and power factor of the whole circuit. 8

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- c. Derive emf equation of a single phase transformer 6

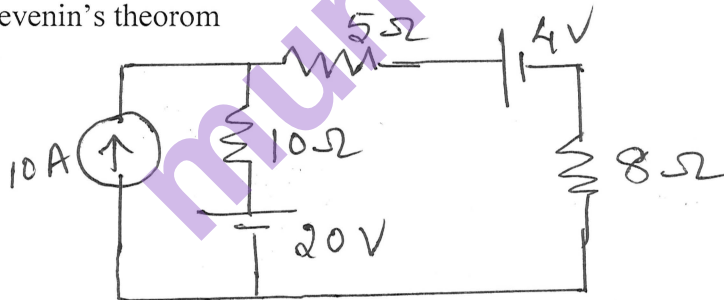
- Q3 a. Calculate the phase and line currents in a balanced delta connected load taking 75 kW at a power factor of 0.8 lag from a three phase 440 V supply. Also calculate the per phase impedance. 8
- b. Illustrate with neat circuit diagram the procedure for conducting open circuit test and short circuit test. 6
- c. Illustrate with neat diagram and explain the input characteristics of an NPN transistor in CE configuration. 4
- d. Draw the circuit diagram and output voltage waveform of a full wave rectifier with capacitor filter. 2

- Q4 a. Find current through $8\ \Omega$ resistor using source transformation. 7



- b. Three identical coils each having a resistance of $10\ \Omega$ and an inductive reactance of $10\ \Omega$ are connected in star across 400 V three phase supply. Find the reading on each of the watt meters connected to measure the power 4
- c. Define the rms value of an ac quantity. 5
- d. Derive rectification efficiency and ripple factor of a full wave bridge tapped rectifier. 4

- Q5 a. Determine the current through $8\ \Omega$ resistor in the network using Thevenin's theorem 8

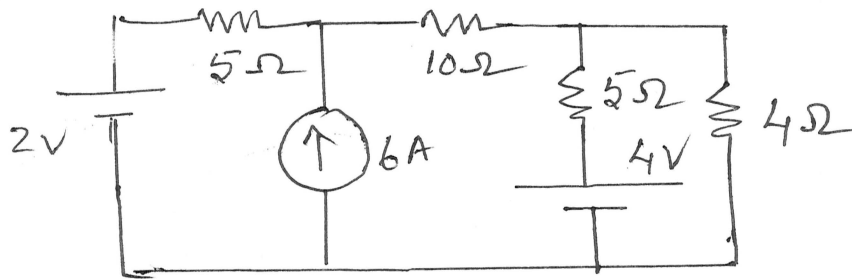


- b. An rms voltage of $100\angle 0$ is applied to an impedance $Z = 20\angle 30$. Find the current through the circuit and power factor of the circuit. 4
- c. Derive the conditions for maximum efficiency of a single phase transformer. 8

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Q6 a. Find current through $4\ \Omega$ resistor using superposition theorem.

7



- b. A series R-L-C circuit with $R=10\ \Omega$, $L=0.014\ \text{H}$ and $C=10\ \mu\text{F}$ is connected across 230V variable frequency supply. Calculate a) resonance frequency b) current at resonance c) Q-factor d) voltage across inductor and capacitor and e) power factor at resonance. 7
- c. Prove that the power and power factor in a balanced three phase circuit can be calculated from the reading of two watt meters. Draw relevant connections and phasor diagram. 6

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