

**Manipal Institute of Technology Bengaluru**  
**Department of Electrical and Electronics Engineering**

**Assignment – 1<sup>st</sup> (II Semester, 2022-23)**

**Subject - Basic Electrical Technology (ELE1071)**

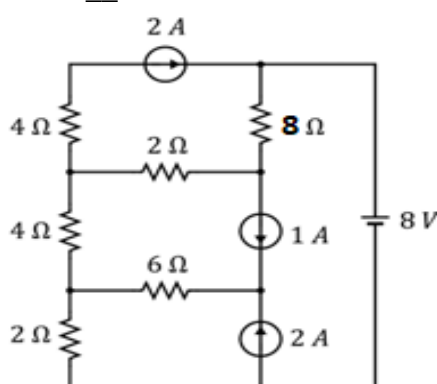
Due Date: 12-05-23

Max. Marks – 10

<b>Name:</b>	<b>Reg No.:</b>
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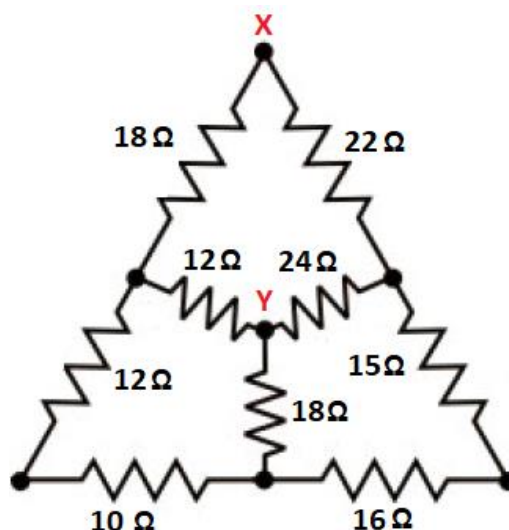
Q1. For the circuit in **Figure 1** find the following.

- A. The power supplied / absorbed by the **8 V** source is \_\_W (Supplied or Absorbed)
- B. The power absorbed by the **8 Ω** resistor is \_\_W
- C. The voltage across the **6 Ω** resistor is \_\_V



**Figure 1**

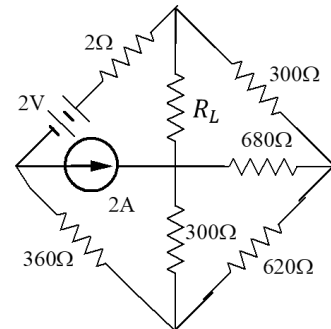
Q2. The equivalent resistance between terminals **X** and **Y** of the circuit in **Figure** is ?



**Figure 2**

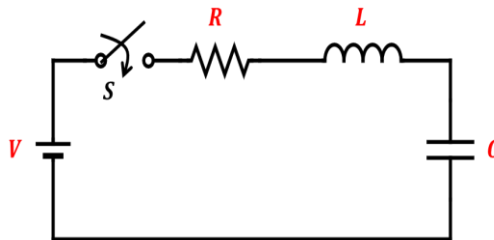
Q2(b). For the circuit shown in **Figure 3** find the Thevenin parameters to determine the following, w.r.t.

- A. Thevenin's voltage ( $V_{Th}$ ) is ?
- B. Thevenin's resistance ( $R_{Th}$ ) is ?
- C. Power Dissipation in  $R_L$   $\Omega$  resistor is ?



**Figure 3**

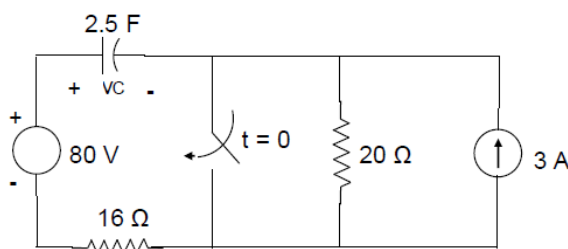
Q3. For the circuit in **Figure 4**, assuming switch was open for a sufficiently long time and then closed at  $t = 0$ , the  $\frac{di}{dt}$  at  $t = 0^+$  is \_\_\_\_\_ A/s.



**Figure 4**

Q3(b). For the in **Figure 5**, the switch was in open position for a long time, and then operated as shown.

- A. The capacitor voltage at  $t = 0$  is ?
- B. The capacitor voltage at  $t = \infty$  is ?
- C. The capacitor voltage becomes  $x$  V at time ?



**Figure 5**

Q4. A core, having **square cross-section**, is shown in **Figure 6**. It is made of two ferromagnetic materials, **A** and **B** with a relative permeability of **600** and **1200** respectively.

- A. A coil of **Y turns** is wound on the core. The current required in the coil to produce a flux of **X Wb** is ?
- B. If an air gap of **2 mm** is made in part **A** by a saw-cut, the total reluctance of the circuit is ?
- C. With respect to question 1B above, the current required to produce **X Wb** flux with **Y turns** is ?

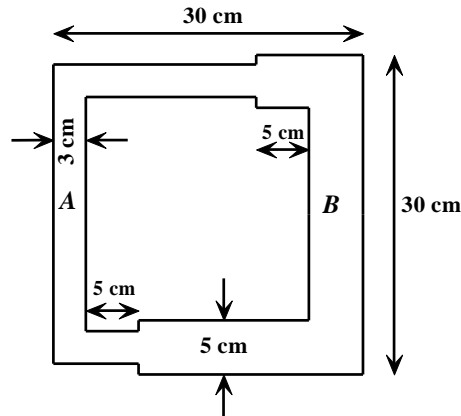
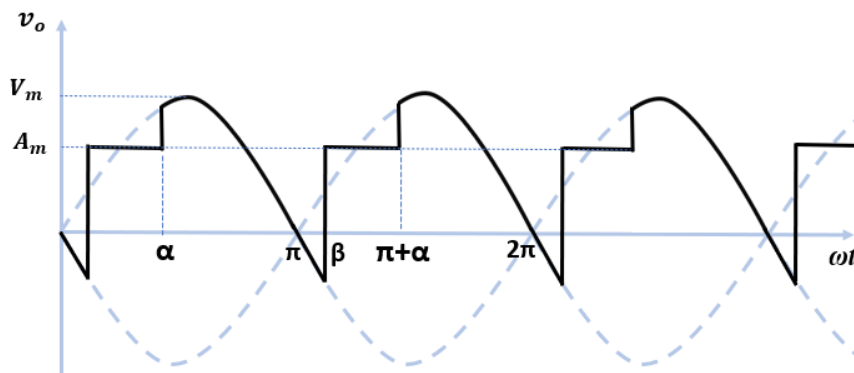


Figure 6

Q5. Determine the following.

- Determine the average value of the waveform if  $\alpha=75^\circ$ ,  $\beta=200^\circ$ ,  $V_m = x$ ,  $A_m = y$
- Determine the rms value of the waveform if  $\alpha=75^\circ$ ,  $\beta=200^\circ$ ,  $V_m = x$ ,  $A_m = y$



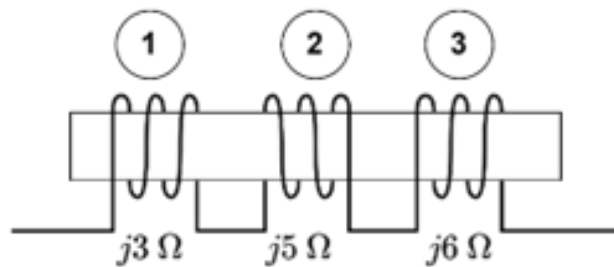
Q6. Three circuits A, B and C are connected in parallel across a single-phase AC supply.

- Circuit A consists of a bank of lamps taking a current of **10 A** at **unity power factor**.
- Circuit B consists of a coil taking a current of **20 A** at a **power factor of 0.8**.
- Circuit C consists of a resistor and capacitor in series, taking a current of **10 A** at a **power factor of 0.9**.
- The power consumed in circuit A is **2000 W**
  - The magnitude of the supply current will be?
  - The magnitude of the supply voltage is ?
  - The total power dissipated by the circuit is ?
  - The power factor of the whole circuit is ?

Q7. Three similar coils, each having a resistance of **8  $\Omega$**  and an inductive reactance of **8  $\Omega$**  are connected in **star** across a **415 V, 3-phase, 50 Hz** supply. Calculate active, reactive, and

apparent power of the load and individual wattmeter readings if the power is measured by two-wattmeter method.

Q8. The following circuit is supplied from a **50 Hz** source with current entering from **RHS**. Draw the dotted equivalent circuit and determine the equivalent inductance if the coefficient of coupling between coils 1 & 2 and coils 2 & 3 is **0.7** each and that between coils 1 & 3 is **0.4**.



Q9. The **3-phase star** connected balanced load has an impedance of  $\mathbf{Z = (8 + j6)\ \Omega}$  per phase. If the load is connected to **3-phase, 208 V** supply and two-wattmeter method is used to measure the power, find the readings of the wattmeters and load power factor using wattmeter readings. Also find the total active, reactive, and apparent power.

Q10. The current  $I_4$  in the following circuit is equal to

