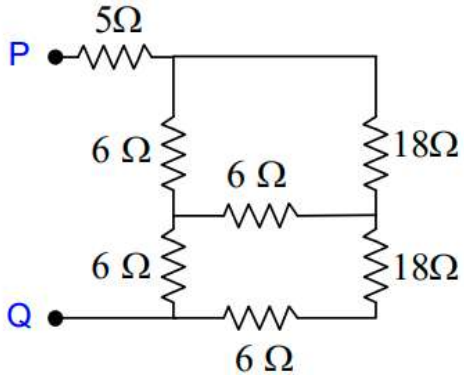
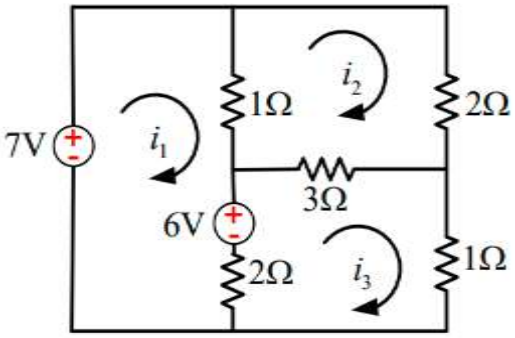
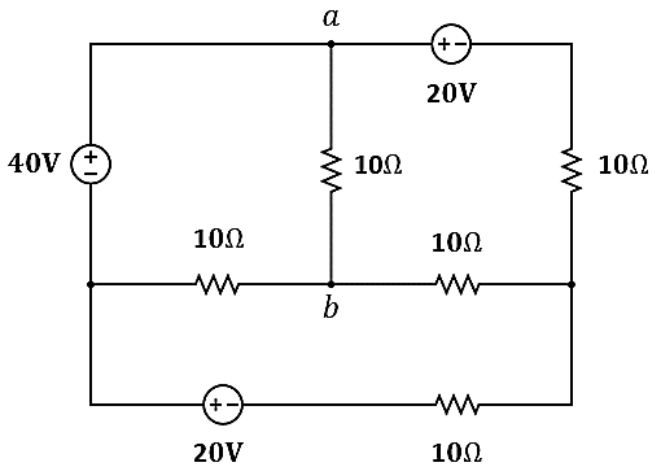
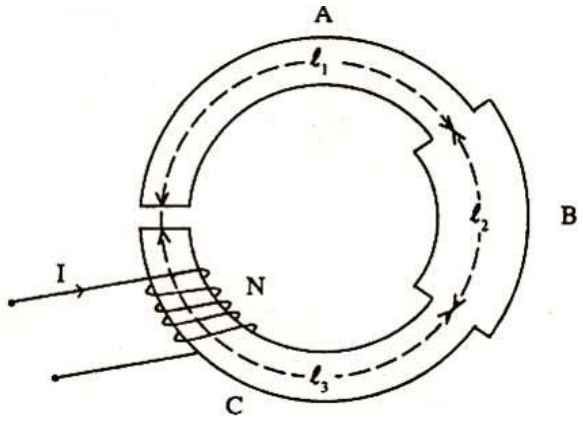
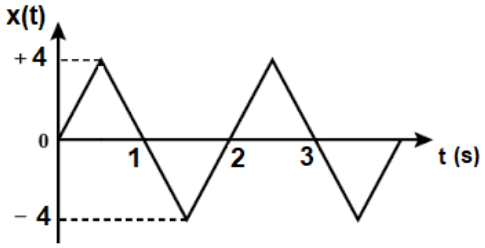
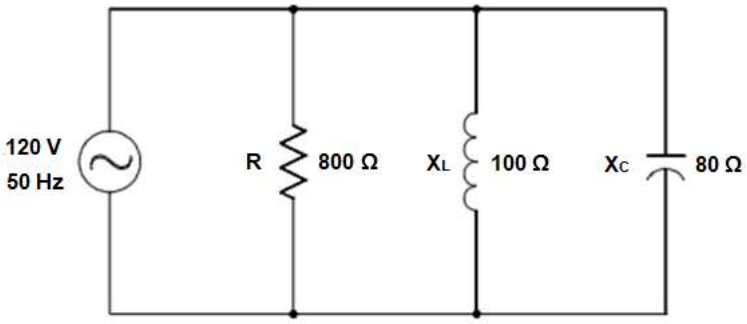
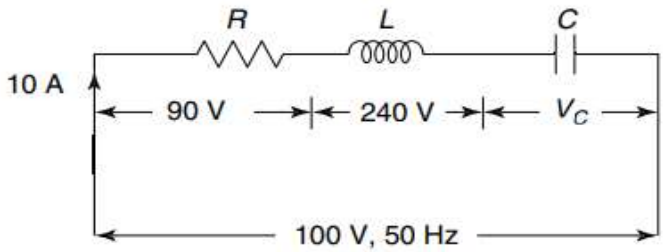
Question Paper – Basic Electrical Technology (ELE 1071) – Makeup Exam – II Sem – 03 July 2023				
Q No	**Description**	**Marks**	**CO**	**Level**
1 A	Determine the input resistance between terminals **P** & **Q** of the given network. 	**3**	**1**	**3**
1 B	In the circuit shown, determine the mesh currents i_1, i_2 and i_3. 	**3**	**1**	**3**
1 C	For the given network, determine the current through the resistance **10 Ω** connected between points **a** & **b** using **Thevenin's** theorem. 	**4**	**1**	**3**

2 A	A DC supply voltage of **100 V** is applied across a relaxed series **R-C** circuit with **C = 5 μF** at the time **t = 0 s**. Find the value of resistance **R** such that the voltage across the capacitor becomes **50 V** in **5 ms** after the circuit is switched on. If the series **R-C** circuit is shorted at **5 ms**, what is the capacitor voltage at **t = 7 ms**?	**3**	**1**	**3**
2 B	The iron ring as shown is made up of three sections **A**, **B** and **C** having a relative permeability of **1000** and has a flux density of **1.8 Tesla** in the air gap. For the given dimensions of l_1 **= 0.15 m**, l_2 **= 0.2 m**, l_3 **= 0.2 m**, l_{ag} **= 1 cm**, **A1 =** $A_3 = A_{ag} = 2 \times 10^{-4}$ **m²**, and $A_2 = 3 \times 10^{-4}$ **m²**, if the number of turns is **11000**, Compute the current through the coil. $(\text{Absolute permeability of air } = 4\pi \times 10^{-7} \text{ H/m})$ 	**4**	**2**	**3**
2 C	There are two inductive coils connected in series in such a way that the net inductance is **2.2 H**. When their connections are reversed the total inductance changes to **0.95 H**. Find the self-inductances of the two coils. The coefficient of coupling between them is **0.4**.	**3**	**2**	**3**
3 A	Determine the **RMS** value of the following signal. 	**3**	**3**	**3**

3 B	For the given parallel AC circuit, find the total current, power factor and active, reactive & apparent powers. 	**3**	**3**	**3**
3 C	A circuit consists of a pure resistor, a pure inductor, and a capacitor connected in series as shown below. When the circuit is supplied with **100 V**, **50 Hz** supply, the voltages across inductor and resistor are **240 V** and **90 V** respectively. If the circuit takes a **10 A** leading current, calculate (a) value of inductance, resistance, and capacitance, (b) power factor of the circuit, and (c) voltage across the capacitor. 	**4**	**3**	**3**
4 A	A **1-Φ** motor takes **12 A** at a power factor of **0.5** lagging from a **240 V, 50 Hz** supply. What value must a shunting capacitor have to raise the power factor to **0.9** lagging? Obtain the line current for the new power factor.	**4**	**3**	**3**
4 B	Three similar coils, each of resistance **7 Ω** and inductance **0.03 H,** are connected in **delta** to a **400 V**, **3-Φ, 50 Hz, RYB** system. Assuming $\mathbf{V_{RY}}$ as the reference voltage phasor, calculate a) line currents and b) active, reactive, and complex powers.	**6**	**4**	**3**
5 A	The phase of a lightly loaded **3-Φ**, **450 V**, **Δ** connected motor draws a current of **13.86 A** at a power factor of **0.47** lagging. The two-wattmeter method is used to measure the **3-Φ** power supplied to the motor. a) What would each wattmeter read? b) Determine the active and reactive power using wattmeter readings.	**4**	**4**	**3**
5 B	Discuss the function and utility of an electrical substation. List out the major substation components.	**3**	**5**	**2**
5 C	Explain the working principle of a 3-phase induction motor. List their classification.	**3**	**5**	**2**