EES-101

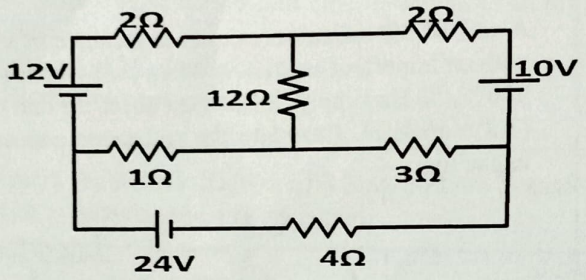
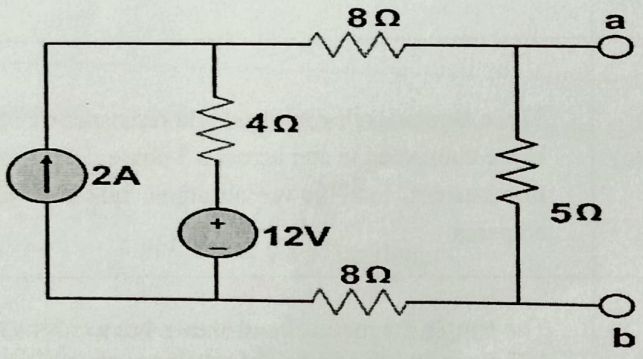
Roll No.

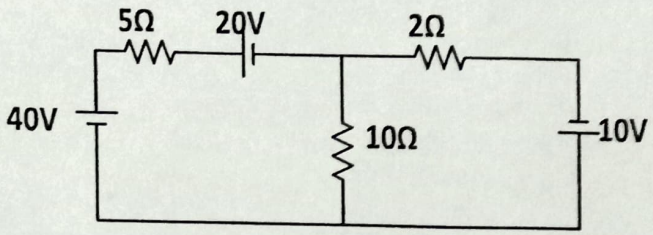
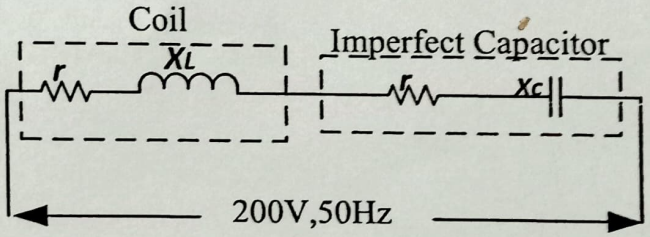
B. Tech (Electrical Engineering) 1th Semester Examination, 2023

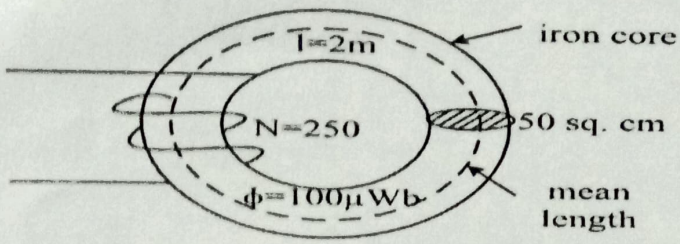
EES – 101 (BASICS OF ELECTRICAL ENGINEERING)

Time: 03 Hours **Maximum Marks:** 45

NOTE: 1. Attempt any two parts from each question.
2. Symbols and abbreviations used have their usual meanings.
3. Assume a suitable value for missing data, if any.

S.No		Questions	Marks (COs)
Q1.	(a)	By using Kirchhoff's Voltage Law (KVL)/ Mesh Analysis find the current flowing through a 4Ω Resistor. 	4.5 (CO1)
	(b)	State the Norton's Equivalent theorem. Find Norton's Equivalent circuit of the following circuit. 	4.5 (CO1)

	(c)	State the Super Position theorem. Find the value of current flowing through the 2Ω resistor by using super position theorem.  	4.5 (CO1)
Q2.	(a)	Briefly discuss about the Series RL Circuit and Series RC Circuit along with phasor diagram as well as waveforms. What are the advantages of three phase circuits over single phase circuits.	4.5 (CO2)
	(b)	A coil of 3Ω resistance and an inductance of 0.22 H is connected in series with an imperfect capacitor. When such a series circuit is connected across a 200 V, 50 Hz supply, it has been observed that their combined impedance is (3.8 + j6.4) Ω. Calculate the resistance and capacitance of the imperfect capacitor.  	4.5 (CO2)
	(c)	Three similar coils each having a resistance of 10 Ω and inductance of 0.04 H are connected in star across a 3 phase, 50 Hz, 200 V supply. Calculate the line current, total power absorbed, reactive volt amperes and total volt amperes.	4.5 (CO2)
Q3.	(a)	The simple magnetic circuit shown has a cross-sectional area of 50 cm^2 and mean length of 2m. The relative permeability of the core is 100. The coil has 250 turns and the flux produced is 100 μWb. Find: (a) Reluctance of the magnetic circuit (b) Current flowing through the coil	4.5 (CO3)

			
	(b)	Prove that the L = $\frac{N^2}{Reluctance}$ and M = $\frac{N_1 N_2}{Reluctance}$, where L is the Self Inductance, and M is the Mutual Inductance.	(4.5) (CO3)
	(c)	An Iron ring has a mean diameter of 20cm, a cross sectional area of 25 cm^2 and a radial air gap of 0.8mm cut across it. When excited a current of 1A through a coil of 1000 turns wound on the iron core, it produces an air gap flux of 1mWb. Calculate (i) Total Reluctance of Magnetic Field. (ii) Relative Permeability of iron.	4.5 (CO3)
Q4.	(a)	Draw and Explain the Phasor diagram of a Single-Phase Transformer when it is loaded with inductive and capacitive load.	4.5 (CO4)
	(b)	An Iron loss of 80 kVA, 1000/250 V, single-phase, 50 Hz transformer is 500 W. The copper loss when the primary carries a current of 50 A is 400 W. Find (i) area of cross section of limb if working flux density is 1.T and there are 1000 turns on the primary, (ii) efficiency at full load and pf 0.8 lagging, and (iii) efficiency at 75% of full load and unity pf.	4.5 (CO4)
	(c)	A 5 kVA, 1000/200 V, 50 Hz, single-phase transformer gives the following test results: OC test (LV side) 200 V, 1.2 A, 90 W SC test (HV side) 50 V, 5 A, 110 W Determine efficiency at half load at 0.8 pf lagging.	4.5 (CO4)
Q5.	(a)	Explain Different types of Electrical Machines and its working principles. Also discuss about their domestic and Industrial Applications.	4.5 (CO5)
	(b)	Draw the neat sketch of DC generator. State the function of each part. Derive the emf equation of DC generator.	4.5 (CO5)

	(c)	(i). Explain the Principle of Operation of a 3-phase Induction Motor. (ii). Define the Slip of an Induction Motor and why an Induction Motor cannot run at Synchronous Speed?	4.5 (CO5)