U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

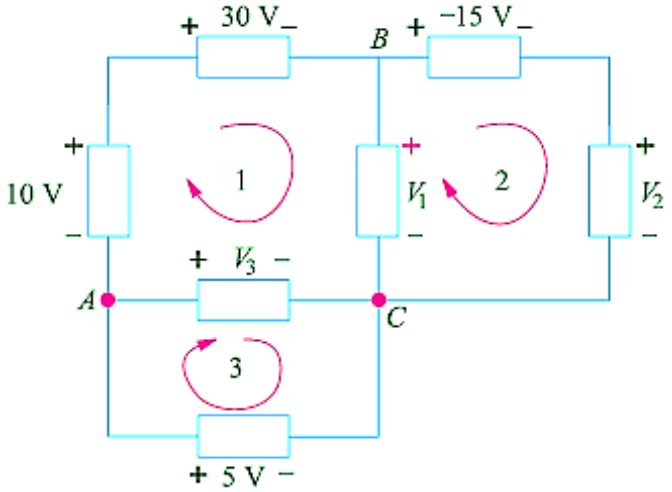
Autonomous Institute Affiliated to VTU

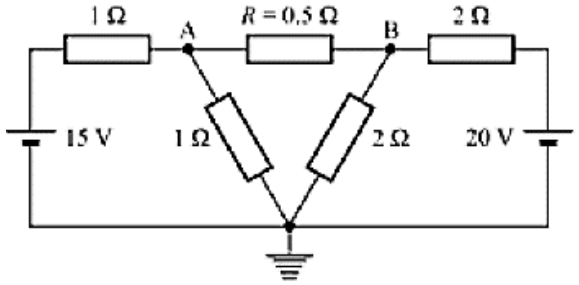
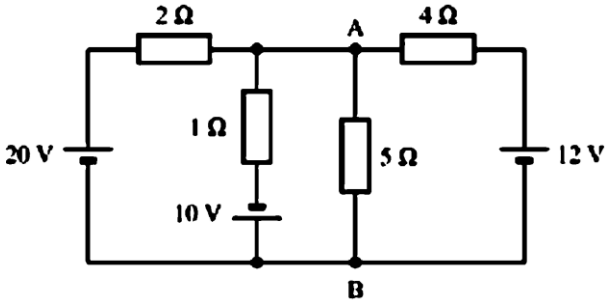
September 2024 Supplementary Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EE1ESIEE / 22EE2ESIEE **Max Marks: 100**
Course: Introduction to Electrical Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			CO	PO	Marks
		UNIT - I			
1	a)	Applying Kirchhoff's laws to different loops in Fig. 1.a, find the values of V1 and V2.  Fig. 1.a	CO2	PO2	**06**
	b)	With a neat single-line diagram, explain the general structure of electrical power system.	CO3	PO6	**07**
	c)	Explain Hydel power plant with a neat block diagram.	CO1	PO1	**07**
		UNIT - II			
2	a)	Define the following: i. Faraday's Laws of Electromagnetic induction. ii. Lenz's Law.	CO1	PO1	**05**
	b)	Two coils, coil A of 12,500 turns and coil B of 16,000 turns, lie in parallel planes so that 60% of flux produced in coil A links coil B. It is found that a current of 5A in coil A produces a flux of 0.6 mWb while the same current in coil B produces 0.8 mWb. Determine (i) mutual inductance and (ii) coupling coefficient.	CO2	PO2	**06**

		c)	For given circuit shown in Fig 2.(c), Determine the current through the resistor R=0.5 Ω using superposition theorem.  Fig 2.(c)	*CO2*	*PO2*	**09**
			OR			
	3	a)	Define and derive the equations for self-inductance and mutual inductance. Arrive at an expression for coefficient of coupling.	*CO1*	*PO1*	**10**
		b)	For given circuit shown in Fig 3.(b), Find the voltage across 5 Ω resistor using Thevenin's theorem.  Fig 3.(b)	*CO2*	*PO2*	**10**
			UNIT - III			
	4	a)	Show that current through the pure capacitor is leading by an angle π/2 radian w.r.t. the voltage across it. Sketch the waveforms of voltage and current.	*CO1*	*PO1*	**06**
		b)	A series RLC circuit is supplied with an AC voltage of 'V' Volts at a frequency of 'f' Hz. Derive an expression for the current in the circuit for the following conditions: (i) $X_L = X_C$ (ii) $X_L > X_C$ (iii) $X_L < X_C$ Draw the vector diagram indicating voltage across different elements in the circuit.	*CO2*	*PO2*	**09**
		c)	Define the following: (i) RMS value. (ii) Form factor. (iii) Average value. (iv) Crest factor. (v) Phase angle.	*CO1*	*PO1*	**05**
			UNIT - IV			
	5	a)	In what way does the core type transformer differ from the shell type? With figures compare the two.	*CO1*	*PO1*	**06**
		b)	Arrive at the expression for Back EMF of a DC Motor.	*CO1*	*PO1*	**06**

		c)	A 25 kVA, 2000/200 V transformer has Iron and full load copper losses of 350 Watts and 400 Watts respectively. Calculate the efficiency at i. half of its full load upf. ii. 3/4th of its full load upf.	*CO2*	*PO2*	**08**
			OR			
	6	a)	Explain the types of DC Motor with relevant circuit diagram and equations.	*CO1*	*PO1*	**06**
		b)	Derive the condition for which the efficiency of transformer is maximum.	*CO1*	*PO1*	**06**
		c)	A 4 pole, 220 V. lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws a current of 40 A from the supply. The field resistance and armature resistances are 110 **Ω** and 0.1**Ω** respectively. The motor develops an output power of 6 kW. The flux per pole is 40 mwb. Calculate i) the speed ii) the torque developed by the armature and iii) the shaft torque.	*CO2*	*PO2*	**08**
			UNIT - V			
	7	a)	Compare MCB and fuse.	*CO3*	*PO6*	**05**
		b)	With the help of detailed block diagram, explain the working of Battery operated Electric Vehicle.	*CO3*	*PO6*	**07**
		c)	Define earthing. Why earthing is necessary? Explain any one type of earthing with a neat diagram.	*CO3*	*PO6*	**08**

****