U.S.N.										

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

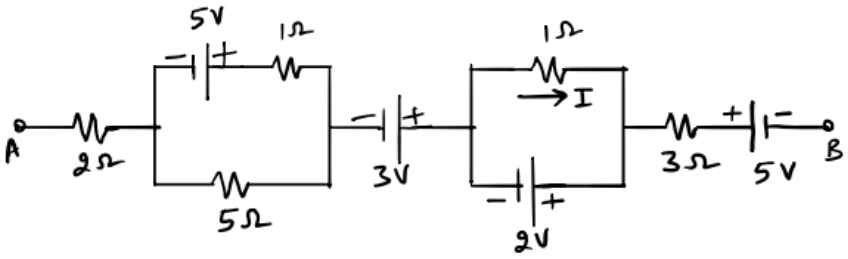
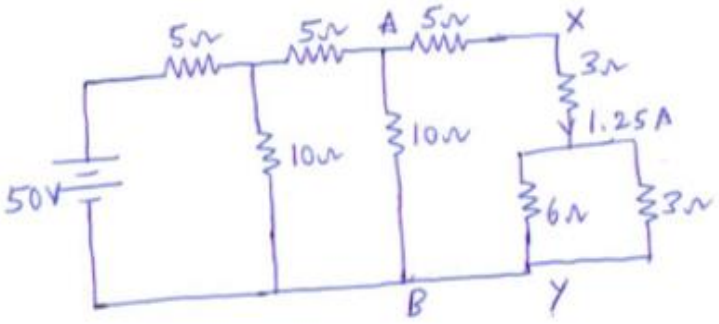
Autonomous Institute Affiliated to VTU

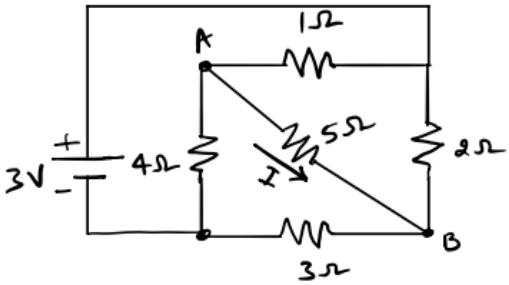
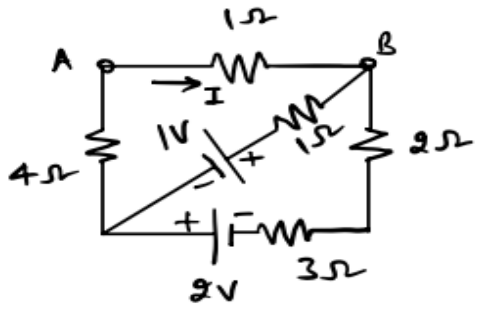
April 2025 Semester End Make-Up Examinations

Programme: B.E. **Semester: I**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EE1ESIEE **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.

		UNIT - I	CO	PO	Marks
1	a)	Explain construction and working of nuclear power plant, with neat diagram.	CO1	PO1	**08**
	b)	For the given network shown in Fig. 1(b) find, current (I) and V_{AB} using Kirchhoff's laws.  Fig. 1(b)	CO2	PO1	**08**
	c)	State Ohms law and list its limitations.	CO1	PO1	**04**
		OR			
2	a)	Explain the working of Hydel Power plant with a neat diagram.	CO1	PO1	**08**
	b)	Determine the current supplied by the source and voltage across 3 Ohm resistor. Also determine the equivalent resistance across the terminals AB.  Fig 2b)	CO2	PO1	**07**
	c)	State and explain KVL and KCL	CO1	PO1	**05**

			UNIT - II			
	3	a)	Derive an expression for energy stored in an Inductor. Also derive for co-efficient of coupling.	*CO1*	*PO1*	**08**
		b)	For the circuit shown in Fig 3(b), find current (I) in branch AB, using Thevenin's theorem  Fig. 3(b)	*CO2*	*PO2*	**08**
		c)	Differentiate between statically induced EMF and dynamically induced EMF.	*CO1*	*PO1*	**04**
			OR			
	4	a)	State Faraday's laws and Lenz's law of electromagnetic induction.	*CO1*	*PO1*	**06**
		b)	For the circuit shown in Fig 4(b), find current (I) in branch AB, using superposition theorem.  Fig. 4(b)	*CO2*	*PO2*	**08**
		c)	Two coupled coils of self-inductances 0.8 H and 0.20 H have a co-efficient of coupling 0.9. Find (i) Mutual inductance. (ii) N_1/N_2.	*CO2*	*PO2*	**06**
			UNIT - III			
	5	a)	How current behaves when a pure sinusoidal voltage of $V = V_m sin\omega t$ is applied across a series RLC circuit. Explain with proper phasor diagram and waveforms.	*CO2*	*PO2*	**10**
		b)	Define the terms with expressions: a) RMS value. b) Average value. c) Phase angle. d) Amplitude value. e) Form Factor.	*CO1*	*PO1*	**10**
			OR			
	6	a)	Define the following with respect to alternating current: i)Frequency ii) Time period iii) phase iv) phase difference v) peak factor	*CO1*	*PO1*	**10**

<table>
<tr><td></td><td></td><td>b)</td><td>Explain the nature of current in a series RL, pure resistive and pure inductive single phase AC circuit</td><td>CO1</td><td>PO1</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td>UNIT – IV</td><td></td><td></td><td></td></tr>
<tr><td></td><td>7</td><td>a)</td><td>Derive condition for maximum efficiency of a transformer.</td><td>CO2</td><td>PO2</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>A 200 kVA transformer has efficiency of 98% at full load upf lagging. If maximum efficiency occurs at $3/4^{th}$ of its full load 0.8 pf, calculate efficiency at half of its full load 0.8 pf.</td><td>CO2</td><td>PO2</td><td>08</td></tr>
<tr><td></td><td></td><td>c)</td><td>With necessary circuit and equations, explain different types of DC motors.</td><td>CO1</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>8</td><td>a)</td><td>Derive torque equation of a DC motor.</td><td>CO1</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>A 240 V, 4 pole DC shunt motor running at 1000 rpm delivers 5 kW with an armature current of 50 A and field current of 1 A. Armature winding is wave connected and has 540 conductors. Armature resistance is 0.1 ohms and drop at each brush is 1 V. Find a) Gross torque. b) Shaft torque. c) Useful flux/pole. d) Rotational losses.</td><td>CO2</td><td>PO2</td><td>08</td></tr>
<tr><td></td><td></td><td>c)</td><td>How transformers are classified based on construction of core. Differentiate with neat sketch.</td><td>CO1</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td></td><td>9</td><td>a)</td><td>With block diagram, explain working of Electric Vehicle.</td><td>CO1</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>A household has different electrical appliances which run for a certain duration in a day.
<table>
<tr><th>Sl. No</th><th>Appliance</th><th>Power rating (W)</th><th>Quantity</th><th>No. of Hours per day</th></tr>
<tr><td>1</td><td>Heater</td><td>1500</td><td>1</td><td>2</td></tr>
<tr><td>2</td><td>Fridge</td><td>200</td><td>1</td><td>2</td></tr>
<tr><td>3</td><td>Washing Machine</td><td>500</td><td>1</td><td>2</td></tr>
<tr><td>4</td><td>Mixer</td><td>400</td><td>1</td><td>0.5</td></tr>
<tr><td>5</td><td>Lighting Load</td><td>10</td><td>8</td><td>4</td></tr>
<tr><td>6</td><td>TV</td><td>60</td><td>1</td><td>3</td></tr>
<tr><td>7</td><td>Fan</td><td>60</td><td>4</td><td>3</td></tr>
</table>
If a 5 kW Energy Meter is installed in the house, cost/kW is Rs. 50 and cost/unit for first 100 units is Rs 7/- and remaining units is Rs 10/-. Calculate the electricity bill for the month of Feb 2025.</td><td>CO4</td><td>PO6</td><td>08</td></tr>
<tr><td></td><td></td><td>c)</td><td>What is earthing? explain plate earthing with a neat sketch.</td><td>CO4</td><td>PO6</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>10</td><td>a)</td><td>Discuss the precautions to be taken to avoid electric shock.</td><td>CO4</td><td>PO6</td><td>05</td></tr>
<tr><td></td><td></td><td>b)</td><td>Discuss plate earthing with a neat diagram.</td><td>CO4</td><td>PO6</td><td>08</td></tr>
<tr><td></td><td></td><td>c)</td><td>Explain the working of fuse and define the following:
i) Rated current of fuse ii) fusing current iii) fusing factor.</td><td>CO4</td><td>PO6</td><td>07</td></tr>
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