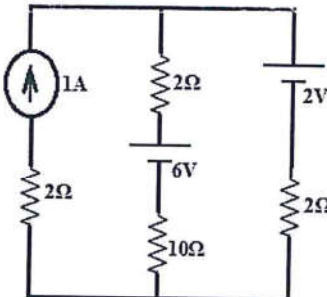
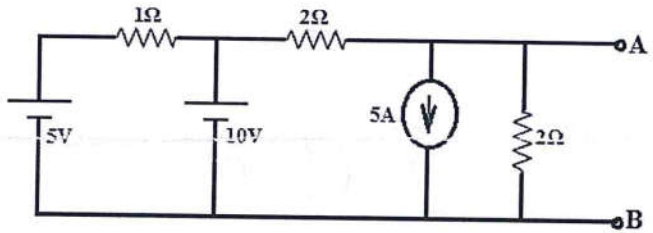
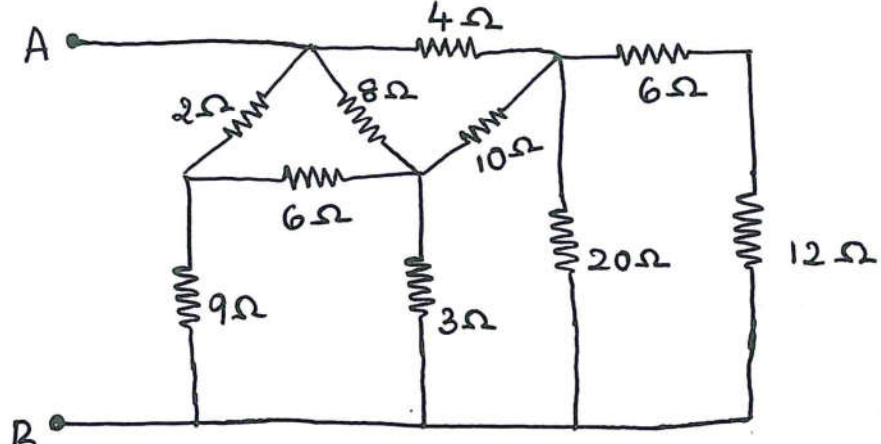


**END SEMESTER ASSESSMENT B.TECH - I SEM**  
**BASIC ELECTRICAL ENGINEERING**  
**DECEMBER 2019**

Time: 3 Hours

Answer All Questions

Max Marks: 100

1.	<p>a) Find the current through <math>10\Omega</math> resistor in the network shown using Superposition Theorem:</p> 	6
	<p>b) Obtain the Thevenin's Equivalent across the terminals A &amp; B in the network shown below:</p> 	6
	<p>c) Employ <math>\Delta/Y</math> conversion technique as appropriate to determine <math>R_{AB}</math>.</p> 	8

2.	a)	There are 3 conducting wires connected to a junction. The currents flowing into the junction in 2 wires are $i_1 = 10\sin(314t - 30^\circ)$ A and $i_2 = 15\cos(314t + 45^\circ)$ A. What is the instantaneous expression of current leaving the junction in the third wire? What is its value at $t = 0$ ?	6
	b)	A series RLC network draws a net reactive power of 3KVAR from a 500V, 50Hz AC supply and has an overall powerfactor of 0.8 Lag. Determine i) Total resistance in the network ii) Inductance if the Capacitance is $159.15\mu\text{F}$ iii) What is the new powerfactor if an extra resistance of $10\Omega$ is added in series in the existing network?	6
	c)	The power consumed in the inductive load is 5 kW at 0.6 lagging power factor. The input voltage is 230 V, 50 Hz. Find the value of the capacitor C which must be placed in parallel, such that the resultant power factor of the input current improves to 0.8 lagging.	8
3.	a)	With a neat circuit diagram and proper notation, derive the relationship between Line current and Phase current in a balanced delta connected three phase system.	6
	b)	Two watt-meters connected to measure three phase power for a balanced star connected three phase load measure 10KW and 5KW respectively. If the line current is 20A at a Lagging power factor, determine i) Line Voltage ii) Phase Voltage iii) Resistance per phase iv) Inductance per phase ( $f = 50\text{Hz}$ )	6
	c)	A balanced delta connected three phase load of impedance $(8+j6)\Omega$ per phase is supplied from the secondary of a star connected transformer which has phase voltage of 231V. Determine i) Magnitude of Line Voltage ii) Magnitude of Phase current in the Load iii) Magnitude of Line current iv) Total Reactive Power drawn by the Load  Draw the phasor diagram representing only the three phase voltages and phase currents in the Load.	8
4.	a)	A 12 pole, 3-phase Induction Motor operates from a balanced three phase supply of frequency 50Hz. Determine i) Synchronous speed ii) Speed when the slip is 5% iii) Frequency of rotor currents when running at 400rpm	6
	b)	With proper nomenclature, derive the EMF equations of a single phase transformer.	6

	c)	A DC Shunt machine connected to 200V DC mains has armature winding and field winding resistances of $0.5\Omega$ and $100\Omega$ respectively. Determine its efficiency i) when working as generator supplying an output current of 20A ii) when working as motor drawing 20A from supply mains Given, Mechanical and Iron Losses to be 200W and 100W respectively.	8
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5.	a)	What are the components of an earthing system? Mention the methods of earthing.	4																																				
	b)	Write a short note on the following devices: i) Fuse ii) MCB	6																																				
	c)	The following table gives average consumption hours for various loads in a typical household:  <table border="1"> <thead> <tr> <th>Sl.No.</th><th>Name of the Appliance</th><th>Wattage</th><th>Average consumption hours per day</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Three LED Bulbs</td><td>15W per bulb</td><td>10 hours each</td></tr> <tr> <td>2.</td><td>Two Ceiling Fans</td><td>75W per fan</td><td>8 hours each</td></tr> <tr> <td>3.</td><td>Water Pump</td><td>750W</td><td>1 hour</td></tr> <tr> <td>4.</td><td>Refrigerator</td><td>100W</td><td>24 hours</td></tr> <tr> <td>5.</td><td>Television</td><td>50W</td><td>10 hours</td></tr> <tr> <td>6.</td><td>Geyser</td><td>1KW</td><td>1 Hour</td></tr> </tbody> </table> Considering a 30 day month, Determine 1. The total number of units consumed in a month. 2. Monthly bill for the above consumption units considering a domestic connection of 3KW sanctioned load with the tariff details listed in a table below  <table border="1"> <thead> <tr> <th>Sl.No.</th><th>Type of Charges</th><th>Tariff Details</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Fixed Charges for sanctioned load</td><td>Rs. 50/- for first KW  Rs. 60/- for every additional KW</td></tr> <tr> <td>2.</td><td>Energy Consumption Charges</td><td>0 to 30 units ----- Rs. 3.50 per unit 31 to 100 units ----- Rs. 4.95 per unit 101 to 200 units ----- Rs. 6.50 per unit 201 to 300 units ----- Rs. 7.55 per unit</td></tr> </tbody> </table> Consider a tax of 8% on total charges. Neglect any other charges.	Sl.No.	Name of the Appliance	Wattage	Average consumption hours per day	1.	Three LED Bulbs	15W per bulb	10 hours each	2.	Two Ceiling Fans	75W per fan	8 hours each	3.	Water Pump	750W	1 hour	4.	Refrigerator	100W	24 hours	5.	Television	50W	10 hours	6.	Geyser	1KW	1 Hour	Sl.No.	Type of Charges	Tariff Details	1.	Fixed Charges for sanctioned load	Rs. 50/- for first KW  Rs. 60/- for every additional KW	2.	Energy Consumption Charges	0 to 30 units ----- Rs. 3.50 per unit 31 to 100 units ----- Rs. 4.95 per unit 101 to 200 units ----- Rs. 6.50 per unit 201 to 300 units ----- Rs. 7.55 per unit
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**END OF THE QUESTION PAPER**