

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-I & II (NEW) EXAMINATION – SUMMER 2024**

**Subject Code:3110005**

**Date:03-07-2024**

**Subject Name:Basic Electrical Engineering**

**Time:02:30 PM TO 05:00 PM**

**Total Marks:70**

**Instructions:**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

		<b>Marks</b>
<b>Q.1</b>	(a) Define the following terms related to Electrical Circuits. 1. Branch 2. Node or Junction point 3. Mesh or Loop	<b>03</b>
	(b) A 100 W,230 V lamp is connected in series with a 50W, 150 V lamp across 250 V supply mains. Calculate Voltage across each lamp.	<b>04</b>
	(c) Explain Superposition theorem with suitable example.	<b>07</b>
<b>Q.2</b>	(a) A R-L-C series circuit consists of R=10-ohm, L= 0.1 H and C= 50 $\mu$ F. Find 1. Impedance 2. Current and 3. Active power, when it is connected to a a.c. source of 230V,50Hz.	<b>03</b>
	(b) Draw the voltage and current waveforms of R-L and R-C series circuits.	<b>04</b>
	(c) Derive the equation of three equivalent star connected resistances in terms of delta connected resistances.	<b>07</b>
	<b>OR</b>	
	(c) Using Thevenin's theorem find current in branch BD of the network shown in Fig. 1	<b>07</b>
<b>Q.3</b>	(a) Define the following terms in connection with A.C. wave forms. 1. Time period 2. R.M.S. Value 3. Average Value	<b>03</b>
	(b) Three currents are represented by: $i_1 = 10 \sin \omega t$ , $i_2 = 20 \sin (\omega t - \pi/6)$ and $i_3 = 30 \sin (\omega t + \pi/4)$ . Find magnitude and phase angle of resultant current.	<b>04</b>
	(c) Prove that current through pure inductor is always lagging by $90^\circ$ to its voltage and power consumed is zero with necessary waveform and phasor diagram.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Write the characteristics of Series Resonant Circuit.	<b>03</b>
	(b) Give advantages and disadvantages of Two Wattmeter method.	<b>04</b>
	(c) Derive the relationship of voltages and currents for Star connection in 3-phase a.c. circuit.	<b>07</b>
<b>Q.4</b>	(a) Derive E.M.F. equation of single-phase transformer.	<b>03</b>
	(b) Compare core type and shell type transformers.	<b>04</b>
	(c) Describe an auto transformer with its advantages, limitations and applications.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Give classification of D.C. Motors.	<b>03</b>
	(b) Prepare list of different parts of D.C. machine and explain any one part with figure.	<b>04</b>
	(c) Explain construction of synchronous generator with diagram.	<b>07</b>

- Q.5** (a) List the various safety devices used for domestic purpose. **03**  
 (b) Explain necessity of earthing. **04**  
 (c) Explain different methods for power factor improvement. **07**

**OR**

- Q.5** (a) What is MCCB? Where it is used? **03**  
 (b) State the advantages and applications of underground cables. **04**  
 (c) Calculate the electricity bill amount for a month of March, if 5 bulbs of 40 W for 5 h, 6 tube lights of 60 W for 5 h, a TV of 100 W for 6 h, a washing machine of 400 W for 2 h, a water pump of 0.5 HP for 30 minutes are used per day. The cost per unit is Rs 3.50. Consider 1 HP = 746 watts **07**

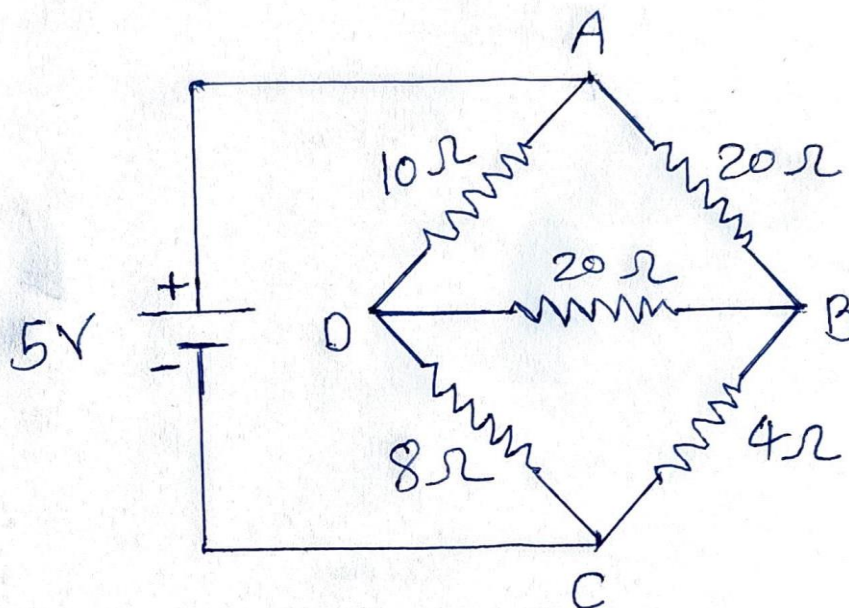


Fig: 1