Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–1/2 EXAMINATION – WINTER 2021

Subject Code:3110005 Date:29/03/2022

Subject Name:Basic Electrical Engineering

Time:10:30 AM TO 01:00 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.**

Q.1	**(a)**	Calculate current, resistance and energy consumed by an oven rated 230V, 1KW when used for 20 hours. Also calculate the electricity bill at the rate of Rs. 7/- per unit.	**03**
	(b)	Define Power Factor. What are the disadvantages of Low Power Factor?	**04**
	(c)	Summarize; Mathematical & Waveform representation of an alternating sinusoidal quantity (voltage or current). Demonstrate time period, peak value, Peak to Peak value, Average value, RMS value. Write definition of all.	**07**
Q.2	**(a)**	Write statement of Superposition, Norton and Thevenin theorem.	**03**
	(b)	Write classification of Electric Networks.	**04**
	(c)	Write applications of Thevenin's theorem. Find the current passing through 2 Ω (Fig. A) resistance using Thevenin's theorem. All resistances are in Ω.	**07**
		OR	
	(c)	Derive the expression for the rise of current in R-L series circuit when a D.C. supply is switched on to it. Define time constant of it.	**07**
Q.3	**(a)**	Define Form factor. State the value of form factor for Sinusoidal waveform.	**03**
	(b)	A series resonance network consisting of a resistor of 30Ω, a capacitor of 2μF and an inductor of 20mH is connected across a sinusoidal supply voltage which has a constant output of 9 volts at all frequencies. Calculate, the resonant frequency, the current at resonance, the voltage across the inductor and capacitor at resonance, the Quality factor and the bandwidth of the circuit.	**04**
	(c)	With the help of waveforms and phasor diagrams, comment on phase relationship between voltage and current in single phase RLC series circuit.	**07**
		OR	
Q.3	**(a)**	Define Q-factor of RLC series circuit. What is the importance of it?	**03**
	(b)	Draw Impedance triangle and Admittance triangle.	**04**
	(c)	A balanced 3-phase load consists of 3 coils each of resistance of 6 Ω and inductive reactance of 8 Ω. Determine line current and power absorbed when the coils are 1. Star connected and 2. Delta connected across 400V, 3-phase supply.	**07**
Q.4	**(a)**	State advantages of polyphase systems.	**03**
	(b)	Mention Merits and Demerits of Induction Motor.	**04**

	(c)	Explain construction of single phase Transformer.	**07**

OR

Q.4	**(a)**	Write applications of Auto Transformer.	**03**
	(b)	Explain the principle of operation of an Alternator.	**04**
	(c)	Describe construction of a DC machine.	**07**
Q.5	**(a)**	Mention advantages of MCB over Fuse.	**03**
	(b)	Mention basic guidelines (Safety Rules) regarding safe handling of electricity.	**04**
	(c)	Explain construction of cable in detail with neat diagram. Label all the parts.	**07**

OR

Q.5	**(a)**	Briefly explain block diagram of ELCB.	**03**
	(b)	Mention important points regarding Earthing of Electrical Installation.	**04**
	(c)	Write short technical notes on Battery Maintenance. What precautions to be taken for Lead Acid Batteries?	**07**

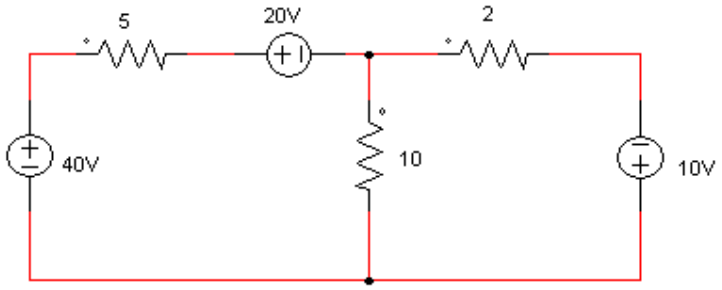

Fig. A

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