

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 $2\ \Omega$ (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 $30\ \Omega$, a capacitor of $2\ \mu\text{F}$ 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 $6\ \Omega$ and inductive reactance of $8\ \Omega$. 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**

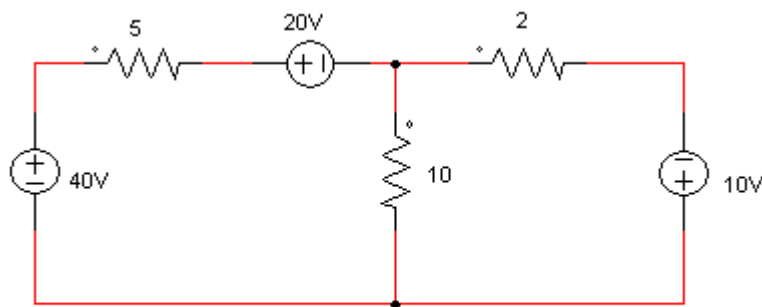


Fig. A
