

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE –SEMESTER 1&2(NEW SYLLABUS)EXAMINATION- WINTER 2018**

**Subject Code: 3110005**

**Date: 18-01-2019**

**Subject Name: Basic Electrical Engineering**

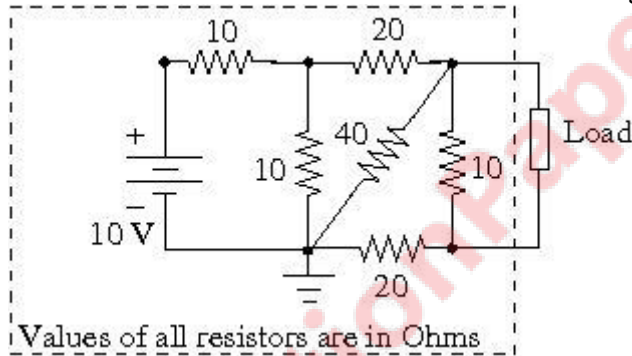
**Time: 10:30 am to 01:00 pm**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- |            |   | Marks     |
|------------|---|-----------|
| <b>Q.1</b> | (a) Define Amplitude, Frequency and Time period for alternating quantities.   | <b>03</b> |
|            | (b) Briefly describe the operating principle of a transformer.  | <b>04</b> |
|            | (c) Obtain the value of Norton's equivalent current and Norton's equivalent resistance for the network shown in the following figure. | <b>07</b> |



- |            |  |           |
|------------|--|-----------|
| <b>Q.2</b> | (a) Prepare a list of parts of a DC machine. Explain any one part in detail.   | <b>03</b> |
|            | (b) Briefly describe the auto transformer and its applications.  | <b>04</b> |
|            | (c) The maximum values of voltage and current in a circuit are 400 V and 20 A respectively. Both the quantities are sinusoidal with 50 Hz frequency. The instantaneous values of voltage and current at time $t=0$ second are 283 V and 10 A respectively (both increasing and positive). Obtain the equations of voltage and current in this circuit at time 't' second. Also find out the active power consumption in the circuit. | <b>07</b> |

**OR**

- |  |   |           |
|--|---|-----------|
|  | (c) In a series R-L circuit, a voltage of 10 V at 50 Hz frequency produces a current of 750 mA. In the same circuit with same magnitude of applied voltage with a frequency of 75 Hz produces a current of 500 mA. Find out the values of R and L in the circuit. | <b>07</b> |
|--|---|-----------|

- |            |   |           |
|------------|---|-----------|
| <b>Q.3</b> | (a) Briefly describe pipe earthing.   | <b>03</b> |
|            | (b) Mention the types of single phase induction motor. Explain any one of them.                                     | <b>04</b> |
|            | (c) Derive the equations of active, reactive and apparent powers in a series R-L circuit with sinusoidal AC supply. | <b>07</b> |

**OR**

- Q.3** (a) Give a list of safety devices used for home appliances. **03**  
 (b) Give a comparison between squirrel cage induction motor and wound rotor induction motor. **04**  
 (c) Derive the equations of capacitor voltage and circuit current in a series R-C circuit connected to a DC supply through a switch. Assume that switch is initially open and it is closed at time  $t=0$  second. **07**
- Q.4** (a) Discuss the difference between MCB and Fuse. **03**  
 (b) Why the consumers should improve their power factor? **04**  
 (c) Explain Thevenin's theorem. Take suitable example and explain the steps to apply Thevenin's theorem for a resistive circuit with a constant DC voltage source. **07**
- OR**
- Q.4** (a) What is MCCB? Where is it used? **03**  
 (b) Compute the monthly energy charges for an air conditioner having consumption of 2 kW. Daily usage of the air conditioner is 10 hours. Energy charges are Rs 8 per unit. **04**  
 (c) Explain the term power factor. Explain the steps to obtain power factor of an AC circuit with parallel connection of R, L and C elements. **07**
- Q.5** (a) Describe the stator construction of a single phase induction motor. **03**  
 (b) Write a short note on Miniature Circuit Breaker (MCB) **04**  
 (c) Explain the term rotating magnetic field with proper diagrams in case of a three phase induction motor. **07**
- OR**
- Q.5** (a) Describe the construction of rotor for a slip ring type three phase induction motor. **03**  
 (b) Write a short note on Earth Leakage Circuit Breaker (ELCB). **04**  
 (c) Explain the working principles of a synchronous generator and a synchronous motor. **07**

\*\*\*\*\*