

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-I &II (NEW) EXAMINATION – SUMMER-2019

Subject Code: 3110005

Date: 20/06/2019

Subject Name: Basic Electrical Engineering

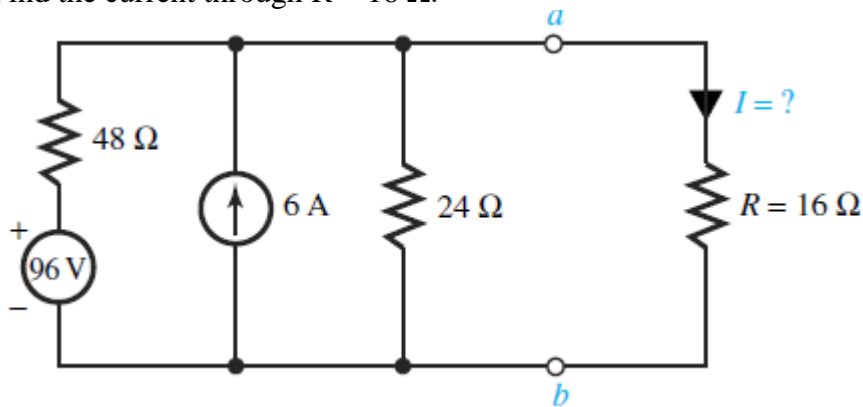
Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

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

- | | | Marks |
|------------|---|--------------|
| Q.1 | (a) State and explain Kirchoff's voltage and current laws. | 03 |
| | (b) Compare the resistive series and parallel circuit. | 04 |
| | (c) Consider the circuit shown in Figure. Reduce the portion of the circuit to the left of terminals a-b to (a) a Thévenin equivalent and (b) a Norton equivalent. Find the current through $R = 16 \Omega$. | 07 |



- | | | |
|------------|---|-----------|
| Q.2 | (a) For series resonant circuit with brief description draw the phasor diagrams for following conditions (i) At resonant (ii) Below resonant (iii) Above resonant. | 03 |
| | (b) Prove that the sum of readings of two watt meters connected to measure power in three phase circuit gives total power consumed by the circuit. | 04 |
| | (c) A series RLC circuit with $L = 160 \text{ mH}$, $C = 100 \mu\text{F}$ and $R = 40 \Omega$ is connected to a sinusoidal voltage $V(t) = 40 \sin \omega t$, with $\omega = 200 \text{ rad/sec}$. Find (i) What is the Impedance of the circuit. (ii) Let the current at any instant in the circuit be $I(t) = I_0 \sin(\omega t - \Phi)$. Find I_0 (iii) What is the Phase Φ ? | 07 |

OR

- | | | |
|------------|---|-----------|
| | (c) A balanced star connected load of $(4+j3) \Omega$ per phase is connected to a balance 3 phase 400 V supply. Find the line current, power factor, active power and reactive power. | 07 |
| Q.3 | (a) For A.C. sinusoidal current prove that $I_{\text{rms}} = 0.707 I_m$. | 03 |
| | (b) Explain voltage step-up and step-down operation in autotransformer with diagram. | 04 |
| | (c) Explain various connections of three phase transformer with diagram. | 07 |

OR

- | | | |
|------------|---|-----------|
| Q.3 | (a) Explain in brief single phase RC parallel circuit with phasor diagram | 03 |
| | (b) Derive the E.M.F. equation of a single phase transformer. | 04 |

- (c) Explain with diagram construction of core type and shell type transformer. **07**
- Q.4** (a) State significance of the back emf in DC motor. **03**
(b) Classify and compare various DC motor. **04**
(c) Explain construction of synchronous generator with diagram. **07**
- OR**
- Q.4** (a) Give the classification of Induction motor. **03**
(b) Discuss how the rotating magnetic field is produced in three phase induction motor. **04**
(c) Explain the working of single phase induction motor with diagram. **07**
- Q.5** (a) State function of various parts of HT cable. **03**
(b) Give the comparison of fuse and MCB. **04**
(c) Explain plate earthing with diagram. **07**
- OR**
- Q.5** (a) What is power factor and why improvement is required in that? **03**
(b) State and explain in brief important electrical characteristics of battery. **04**
(c) Calculate the electricity bill amount for a month of April, if 4 bulbs of 40 W for 5 h, 4 tube lights of 60 W for 5 h, a TV of 100 W for 6 h, a washing machine of 400 W for 3 h, a water pump of 0.5 HP for 15 minutes are used per day. The cost per unit is Rs 3.50. Consider 1 HP = 746 watts **07**
