Seat No.: _____ Enrolment No._____

**GUJARAT TECHNOLOGICAL UNIVERSITY**
**BE- SEMESTER– 1st / 2nd (OLD) EXAMINATION – SUMMER 2018**

**Subject Code:110005** **Date: 28-05-2018**
**Subject Name: Elements of Electrical Engineering**
**Time: 02:30 pm to 05:00 pm** **Total Marks: 70**
**Instructions:**

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

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|---|---|---|---|
| **Q.1** | **(a)** | State and explain Kirchhoff's laws. | **07** |
| | **(b)** | Derive the equation of Star to Delta and Delta to Star transformation. | **07** |
| **Q.2** | **(a)** | Give comparison between electric circuit and magnetic circuit. | **07** |
| | **(b)** | An iron ring of mean length 1 m has air gap of 1 mm wound with 200 turns. The relative permeability is 500. If the current flow through coil is 1 A, calculate flux density. | **07** |
| **Q.3** | **(a)** | Derive the equation of capacitance of parallel plate capacitor with uniform dielectric medium and with composite dielectric medium. | **07** |
| | **(b)** | Two capacitors of capacity 2 μF and 4 μF are connected in series. A potential difference of 900 V. Calculate: (i) Voltage across each capacitor (ii) Charge on each capacitor | **07** |
| **Q.4** | **(a)** | Define (i) Frequency (ii) Peak Factor (iii) Average value (iv) Form factor (v) Power factor (vi) Instantaneous value (vii) Amplitude | **07** |
| | **(b)** | The following expressions represent the instantaneous values of e.m.f. in three coils connected in series<br>$e1 = 50 \sin \omega t$<br>$e2 = 40 \sin(\omega t+60°)$<br>$e3 = 60 \sin (\omega t-30°)$<br>Find an expression for the resultant e.m.f. | **07** |
| **Q.5** | **(a)** | Explain series R-L-C circuit with the phasor diagram. | **07** |
| | **(b)** | Prove that average power consumption in pure inductor is zero when A.C. voltage is applied. | **07** |
| **Q.6** | **(a)** | Derive the relation between line voltage and phase voltage, line current and phase current in star connection. | **07** |
| | **(b)** | What is the construction of three core cable? Explain each parts and its importance | **07** |
| **Q.7** | **(a)** | Explain charging of battery from AC supply with schematic diagram | **07** |
| | **(b)** | Explain the working of earth leakage circuit breaker (ELCB) with diagram. | **07** |

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