

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER- 1st / 2nd • EXAMINATION – SUMMER 2013

Subject Code: 110005**Date: 13-06-2013****Subject Name: Elements of Electrical Engineering****Time: 02:30 pm – 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.

- Q.1** (a) Explain effect of temperature on resistance. **03**
 (b) Derive equivalent resistances for delta to star transformation. **06**
 (c) A 100 V, 100 W lamp is connected in series with a A 100 V, 60 W lamp across 200 V supply. Determine current drawn and power consumed by each lamp. **05**
- Q.2** (a) Draw wiring diagram for staircase wiring. **03**
 (b) Derive expression for voltage across capacitor (v_c) during charging of capacitor. **06**
 (c) Three capacitors having capacitances of 10 μ F, 20 μ F and 40 μ F are connected in series to a 400 V d.c. source. Find (i) total capacitance (ii) total charge in circuit (iii) total energy stored. **05**
- Q.3** (a) State similarities between magnetic circuit and electrical circuit. **04**
 (b) Explain self induced emf and mutually induced emf. **06**
 (c) An iron ring has mean diameter of 57.3 cm. It carries a coil having 450 turns and the current flowing through coil is 2 A. The relative permeability of the iron is 1200. Calculate the flux density produced. **04**
- Q.4** (a) Define : (i) Frequency (ii) Average value (iii) power factor. **03**
 (b) Prove that current in pure inductive circuit lags its voltage by 90°. **06**
 (c) Two currents are given by expressions : **05**
 $i_1 = 40 \sin(314t + 30^\circ)$ and $i_2 = 20 \sin(314t - 60^\circ)$.
 Find expression for $(i_1 - i_2)$.
- Q.5** (a) Explain series resonance circuit. Draw resonance curve. **07**
 (b) A coil resistance 15 Ω and inductance 0.05 H is connected in parallel with a non-inductive resistance of 20 Ω . The circuit is connected across 200 V, 50 Hz supply. Determine (i) current in each branch (ii) total current supplied (ii) power factor of the combination. **07**
- Q. 6** (a) Establish relation between line voltage & phase voltage and current relation in 3-phase star connection. Draw phasor diagram. **07**
 (b) Explain two wattmeter method for 3-phase power measurement. **07**
- Q.7** (a) State types of fuse and explain any one. **04**
 (b) Explain different types of lighting schemes. **05**
 (c) Explain construction of cable. **05**
