Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2nd EXAMINATION (New Syllabus) – WINTER 2013

Subject Code: 2110005 Date: 24-12-2013

Subject Name: Element of Electrical Engineering

Time: 10:30 am – 01:00 pm Total Marks: 70

Instructions:

1. **Question No. 1 is compulsory. Attempt any four out of remaining six questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Objective Question

(a) **07**

1. Define : rms value for alternating circuit.
2. Three equal resistance of magnitude 5 Ohm each are connected in delta. The resistance between any two pair of terminals of the delta will be _____ ohms.
3. Write Lenz law.
4. Define power factor.
5. The Q factor of coil is given by _____.
6. A 12 Ω resistor, a 40 μF capacitor, and an 8 mH coil are in series across an ac source. The resonant frequency is _____ .
7. To tune a parallel resonant circuit to a higher frequency, the capacitance should be

(b) **07**

1. Write any one similarity between electric and magnetic circuit.
2. The R.M.S. value of a half wave rectified sinusoidal alternating current with peak value Im is _____.
3. Write function of 'fuse' in electrical circuit.
4. The 'gauss' is unit of _____ .
5. Write ohm's law.
6. The five 0.050uF capacitors are connected in parallel. The equivalent capacitance is _____.
7. Define luminance

Q.2 **(a)** Establish relationship between line and phase voltages and currents in balanced delta connection. Draw complete phasor diagram of voltages and currents. **07**

(b) Explain series resonance circuit. Draw resonance curve. **07**

Q.3 **(a)** An inductive coil of resistance R and inductance L is connected in parallel with capacitor of C. Derive an expression for the resonant frequency and Q factor. **07**

(b) 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. **07**

Q.4 **(a)** Define temperature co-efficient of resistance. How does the resistance of different materials vary with temperature? **07**
Prove that $\alpha t = \alpha 0/(1+ \alpha 0t)$ and $\alpha 2 = 1/ [(1/ \alpha 1) + (t2-t1)]$

(b) Three capacitors having capacitances of 10 μF, 20 μF and 40 μF are connected in series to a 400 V d.c. source. Find (i) total capacitance (ii) total charge in circuit (iii) total energy stored. **07**

Q.5 **(a)** Derive the expression for the decay of current in an inductive circuit. Define time constant. **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)** Prove that current in purely capacitive circuit leads its voltage by 90° and average power consumption in pure capacitor is zero. **07**

(b) A delta connected load having branch impedances of (15 +j20) Ω is connected to a220V, 3 phase AC supply. Find **07**

a. Line currents.
b. Per phase power consumed.
c. What is the phasor sum of the line currents? Why does it have this value?

Q.7 **(a)** Explain construction of cable in detail. **07**

(b) Short note on ELCB **07**

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