Seat No.: _____ Enrolment No._____

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 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.	**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 90º.	**06**
	(c)	Two currents are given by expressions : $i_1 = 40 \sin(314t + 30º)$ and $i_2 = 20 \sin(314t - 60º)$. Find expression for $(i_1 - i_2)$.	**05**
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**

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