GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. Sem-I Remedial Examination March / April 2010

Subject code: 110005
Subject Name: Elements of Electrical Engineering
Date: 05 / 04 /2010   **Time: 12.00 Noon – 02.30 pm**
Total Marks: 70

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

Q.1 **(a)** Explain effect of temperature on resistance. Define temperature co-efficient   **07**
& obtain expression $\alpha_{t2} = \dfrac{1}{1/\alpha_{t1} + (t_2 - t_1)}$

(b) Explain KCL and KVL.   **04**
(c) Why are domestic appliances connected in parallel   **03**

Q.2 **(a)** Derive expression for delta to star conversion of resistive network.   **06**
(b) A parallel plate capacitor has a plate area of 4 cm^2.The plates are separated by   **08**
Three slabs of different dielectric materials of thicknesses 0.3, 0.4 , & 0.3 mm
With relative permittivities of 3, 2.5 and 2 respectively. Calculate the
capacitance of each material and the voltage across them if the supply is 200 V

OR

(b) Derive equation for charging of capacitor in RC circuit. also define time constant   **08**
of circuit.

Q.3 **(a)** An iron ring of 40 cm mean diameter and 7 cm^2 cross section has an air gap of 2   **07**
mm. It is informally wound with 750 turns of wire and carries a current of 3A
The iron takes 60% of the total mmf. Neglect magnetic leakage. Find the total
mmf, magnetic flux , reluctance and flux density.

(b) State & explain Faraday's laws of electromagnetic induction.   **04**
(c) Explain magnetic hysteresis.   **03**

OR

Q.3 **(a)** Define following terms with respect to a.c.waveform   **06**
(i) Frequency (ii) Power factor (iii) R.M.S. value (iv) Amplitude
(v) Average value (vi) Form Factor.

(b) A circuit takes a current of 3A at a power factor of 0.6 lagging when connected   **08**
to 115V, 50Hz supply. Another circuit takes a current of 5A at a power factor of
0.707 leading when connected to same supply. If the two circuits are connected
in series across 230V, 50 Hz supply. Calculate the
(i) current (ii) power consumed (iii) Power factor.

Q.4 **(a)** Explain the method of measuring 3-Φ power by two wattmeters.   **07**
(b) Prove that current through pure inductor is always lagging by 90º to its voltage   **07**
and power consumed is zero.

OR

Q.4 **(a)** Three impedances $Z_1 = 5-j10\ \Omega$, $Z_2 = 2+j20\ \Omega$ and $Z3 = 4+j2\ \Omega$ are connected in parallel. If the total current is 20A, Find the current shared by each. **06**

(b) Explain in brief (i) self inductance (ii) Mutual inductance **04**

(C) Compare series and parallel resonance. **04**

Q.5 **(a)** Discuss the various types of lighting scheme **06**

(b) Explain various types of grouping of cells, also discuss rating of battery. **08**

OR

Q.5 **(a)** Draw staircase lighting schematic diagram. **03**

(b) What is the importance of earthing in electrical laboratory ? **04**

(C) Explain working of ELCB &MCB **07**

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