

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Ist /IInd SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 110005****Date: 09/06/2012****Subject Name: Elements of Electrical Engineering****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Each question carry equal marks

- Q.1** (a) Define Temperature co-efficient of resistance. Derive & obtain the expression $\alpha_2 = 1/(1/\alpha_1 + (t_2-t_1))$ with usual notation. **06**
- (b) Explain the method of transforming a delta connected network in to star network. **04**
- (c) Two wires of conducting material (different conducting materials) are connected in parallel. They share current in the ratio 5:6. If the wire of material 1 has 1.7 times length & double the cross section area than that of material 2, find the ratio of their specific resistances. **04**
- Q.2** (a) Define & explain following terms: **03**
 (1) Magneto Motive Force (M.M.F.) (2) Reluctance (3) Magnetic Field Intensity.
- (b) Define and derive the co-efficient of self inductance. **04**
- (c) A magnetic circuit is made of mild steel arranged as shown in fig.1. The central limb is wound with 500 turns and has cross section of 800 mm². Each of the outer limbs has a cross section of 500 mm². The air gap has a length of 1 mm. Calculate the current required to set-up a flux of 1.3 mWb in the central limb assuming no magnetic leakage and fringing. The mean lengths of various path are as shown in the fig. 1. B-H curve for mild steel is as follows: **07**
- | | | | | | | | |
|------------------------|-----|-----|-----|-----|------|------|-------|
| B (Wb/m ²) | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.625 |
| H (AT/m) | 400 | 500 | 650 | 850 | 1250 | 2000 | 3800 |
- Q.3** (a) Define & explain following terms: **03**
 (1) Electric Field Intensity (2) Electric Potential (3) Electric Flux Density.
- (b) The equivalent capacitance of two capacitors when connected in series is 0.03 μ F & when connected in parallel is 0.16 μ F. Find the capacitance of the both the capacitors. **04**
- (c) Capacitor of 50 μ F in series with 100 Ohm resistor with suddenly connected across 100 volts DC supply. Find (1) Time constant of the circuit (2) Initial Current (3) Current Equation as a function of time (4) Voltage across resistor after 6 m.sec. **07**
- Q.4** (a) Obtain the relation $L = (L_1L_2 - M^2) / (L_1+L_2+2M)$ for equivalent inductance when two inductors are connected in parallel such that the mutually induced emf opposes the self induced emf. **06**
- (b) A resistance R, inductance L = 0.5 H and a capacitance C are connected in series. When a voltage $v=350 \cos (3000t - 20^\circ)$ volts is applied to this series combination, the current flowing is $i = 15 \cos (3000t - 60^\circ)$ ampere. Find the values of R & C. **08**

- Q.5** (a) Explain the phenomena of electrical resonance in R –L –C series circuit connected to variable frequency supply. Draw relevant vector diagram & define Q factor of the circuit. **07**
- (b) Established relationship between line and phase voltages and currents in balanced delta connection. Draw complete phasor diagram of voltages and currents. **07**
- Q. 6** (a) Draw & explain staircase wiring with necessary sketch. **04**
- (b) Show that the power input to the three phase circuit can be measured by two wattmeters connected properly in the circuit. **05**
- (c) Calculate the RMS value & average value of the voltage wave for the fig.2 shown. **05**
- Q. 7** (a) List various protective devices used in the electrical circuit. Write a brief note on ELCB. **05**
- (b) Using schematic diagram, briefly explain charging of battery from AC supply. **05**
- (c) List lumens requirements for various categories of illumination. **04**

Figure No. 1 :

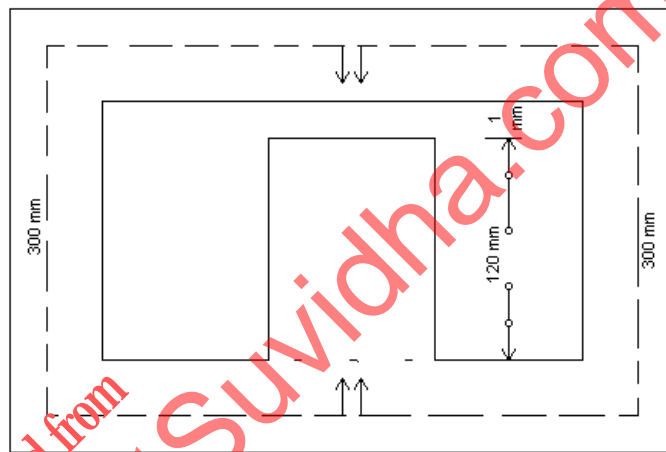


Figure No. 2 :

