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 mm^2. Each of the outer limbs has a cross section of 500 mm^2. 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 μF & when connected in parallel is 0.16 μF. Find the capacitance of the both the capacitors. **04**

(c) Capacitor of 50 μF 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 - 20º) volts is applied to this series combination, the current flowing is i = 15 cos (3000t - 60º) 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 :

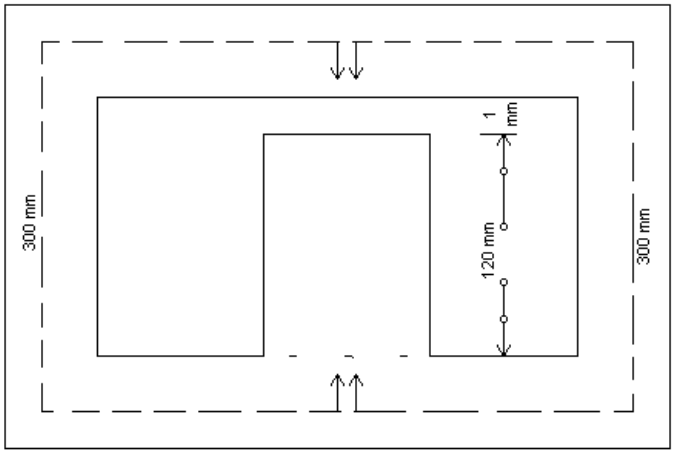
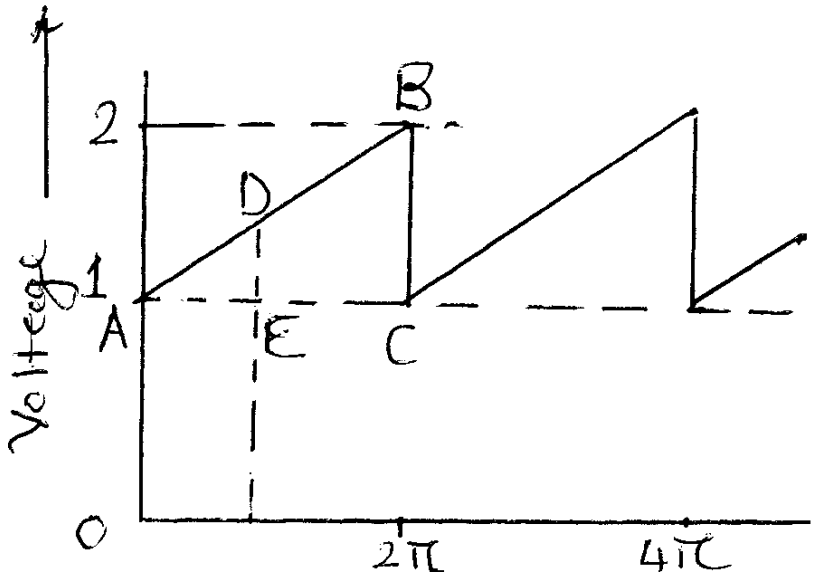


Figure No. 2 :



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