D 26618

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Name.................................

Reg. No...............................

COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

IT/CS 2K 109—BASIC ELECTRICAL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

*Answer **all** questions.*

I. (a) Find the resistance of a coil of mean diameter 3 cm. containing 200 turns of manganin wire 0.05 cm. in diameter. The resistivity of manganin is $42\,\mu\Omega$ – cm.

(b) State and explain superposition's, theorem.

(c) A two branch parallel circuit has a resistance and inductance in one branch and a capacitance in the other. The transfer impedance of the circuit is $Z(s) = \dfrac{10^6\,(s+10)}{s^2 + 10s + 5 \times 10^6}$

Find parameters of the ciruit.

(d) Describe what do you understand by real power, reactive power and apparent power.

(e) Describe various losses in a transformer and also define efficiency.

(f) Explain the principle of working of a moving iron instrument.

(g) Explain the principle of action of a d.c. generator.

(h) In a given d.c. machine, if $p = 4$; $Z = 400$, $N = 300$ r.p.m. and $\phi = 100\,mwb$ calculate Eg. with winding (i) lap-connected and ; (ii) wave-connected.

(8 × 5 = 40 marks)

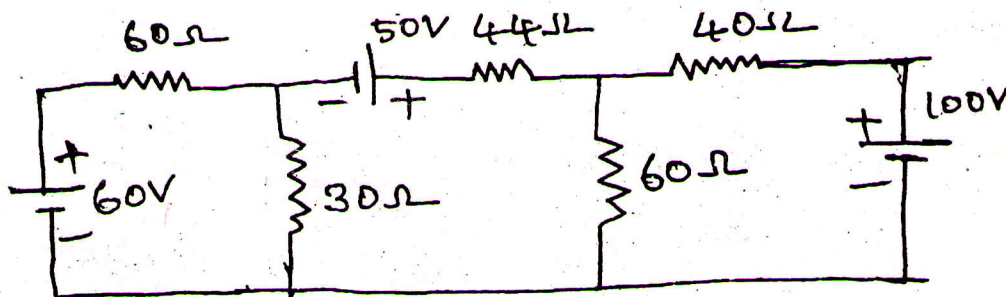II. (a) Use Norton's theorem to find current and voltage across 44 Ω resistor in the Network of Fig. 1 (given below) :

Fig.1

(15 marks)

Or

Turn over

(b) Use superposition theorem to find current through 4 Ω resistor in the network of Fig. 2 (given below) :
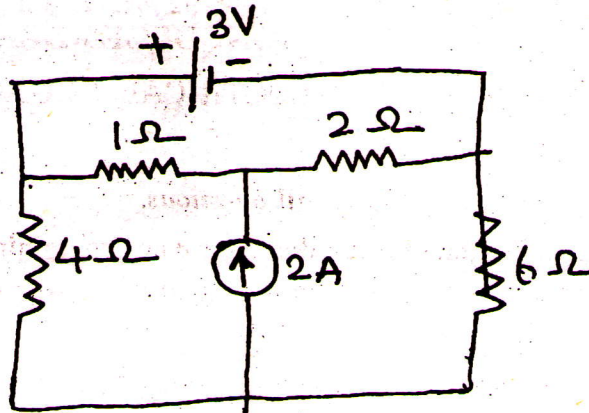

Fig. 2

(15 marks)

III. (a) (i) A coil of power factor 0.6 is in series with a 80 μF capacitor. When connected to a 60 Hz supply, the voltage across the capacitor is equal to the voltage across the coil. Find the resistance and reactance of the coil.

(7 marks)

(ii) Two impedances given by $Z_1 = (5 + j5)$ Ω and $Z_2 = (5 - j5)$ are connected in parallel across a voltage $200 \underline{|0^\circ}$ V. Calculate the branch currents and the total current. Also calculate the total power consumed.

(8 marks)

Or

(b) In the circuit of Fig. 3, (given below) find $i_1(t)$ and $i_2(t)$ when the switch is closed. Assume initial current is zero.
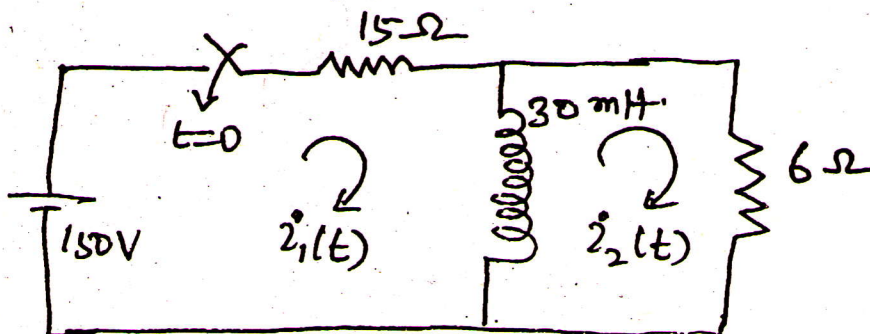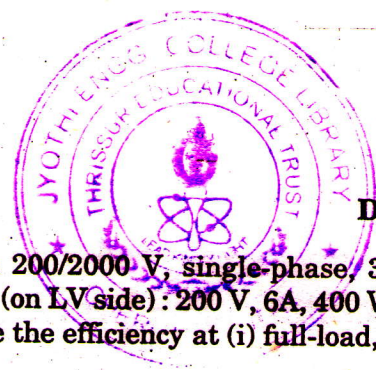

Fig. 3

(15 marks)

IV. (a) Obtain the approximate equivalent circuit of a given 200/2000 V, single-phase, 35 kVA transformer having the following test results : OC Test : (on LV side) : 200 V, 6A, 400 W. S.C. Test : (on H V side) = 75 V, 18 A, 650 W. Also calculate the efficiency at (i) full-load, 0.8 pf. and (ii) half-load, UPF.

(15 marks)

Or

(b) Describe with neat sketch and working principle of a dynamometer type wattmeter and show its connections.

(15 marks)

V. (a) Explain the principle of working of a synchronous motor. Also explain how a synchronous motor is made self-starting.

(15 marks)

Or

(b) Show that a rotatry mmf. is produced in the stator of a 3-phase induction motor when 3-phase voltage is applied to its stator winding. Also explain the principle of working of three-phase induction motor.

(15 marks)

[4 × 15 = 60 marks]