

D 26617

(Pages : 3)

Name.....

Reg. No.....

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

AI 2K 109—BASIC ELECTRICAL ENGINEERING

(Common to EC/EE/IC/BM/BT)

Time : Three Hours

Answer all questions. Assume missing data.

- I. (a) State and explain Kirchhoff's laws.
(b) What are the advantages of series, parallel and series parallel circuit ?
(c) Write short notes on :
(i) Flux linkage. (ii) Self-induction.
(iii) Mutual induction. (iv) Lenz's law.
(d) Define RMS value and obtain the same for a sinusoidal voltage wave.
(e) What is an impedance triangle ? Draw the impedance triangle for R.L., R.C. and R-L-C series circuit.
(f) Define natural response. In a series RLC circuit $R = 200 \Omega$, $L = 0.1 \text{ H}$ and $C = 1 \mu\text{F}$. Determine the frequency of oscillation when subjected to an impulse input.
(g) Write brief note on V-I relationships of L and C.
(h) State :
(i) Norton's Theorem.
(ii) Constant change Theorem.
(iii) Maximum Power Transfer Theorem.

(8 × 5 = 40 marks)

- II. (a) For the network shown in Fig. 1. Solve for the node voltages and calculate current I_x .
(7 marks)
(b) Replace the voltage source in the network shown in Fig. 1 with a dependent voltage source [+ reference mark at the right] that has a control equation of $V = 1.5 V_1$. Solve for the node voltages and current I_x .

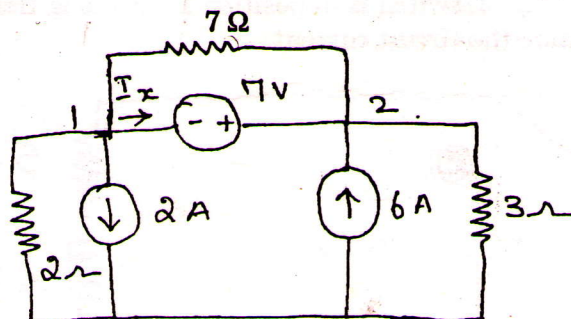


Fig. 1

Or

(8 marks)
Turn over

(c) Define inductance of a coil. Derive an expression for the inductance of a toroids.

(8 marks)

(d) Calculate the inductance of a toroid having 25 cm. mean diameter and 6.25 cm^2 circular cross-section wound uniformly with 100 turns of wire. Hence calculate the e.m.f. induced when current in it increases at the rate of 100 A/sec.

(7 marks)

III. (a) An iron rod of 1.8 cm. diameter is bent to form a ring of mean diameter 25 cm. and wound with 250 turns of wire. A gap of 1 mm. exists in between the end faces. Calculate the current required to produce a flux of 0.6 mwb. Take relative permeability of iron of 1200.

(7 marks)

(b) A parallel plate capacitor has three similar plates, the outside two being joined together. If the inner plate is movable so that it can be used as a variable capacitor. If C_1 = Capacitance when the inner plate is exactly mid way between the outers and C_2 = capacitance when the inner plate is three times as near one plate as the other. Evaluate (C_1/C_2) .

(8 marks)

Or

(c) State and explain Thevenin's theorem.

(8 marks)

(d) Use Thevenin's theorem to find the current in a resistance load connected between the terminals A and B of the network shown in Fig.2. (a) If the load is (i) 2Ω .
(ii) 1Ω .

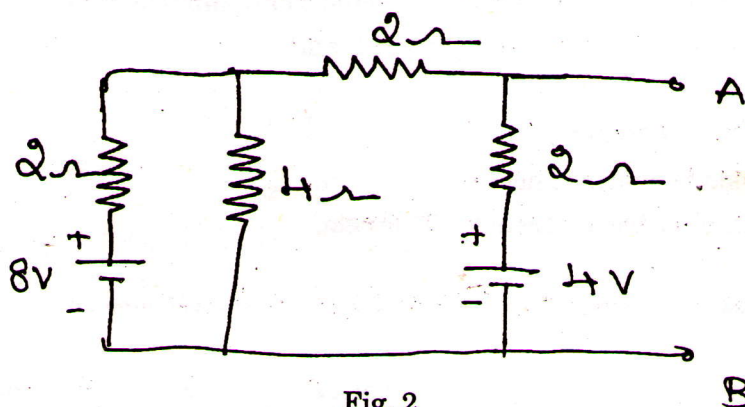


Fig. 2

(7 marks)

IV. (a) In the circuit shown in Fig. 3. switch is in position 1 for a long time and brought to position 2 at time $t = 0$. Determine the circuit current.

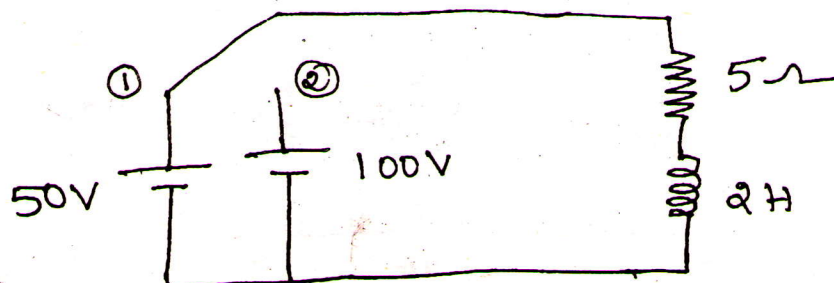


Fig. 3

(8 marks)