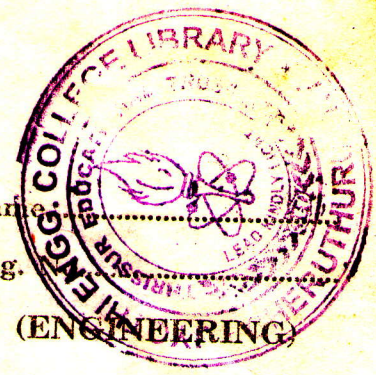


C 26951

(Pages : 2)

Name

Reg.



COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)  
DEGREE EXAMINATION, JUNE 2003

(New Scheme)

CS2K 109/IT2K 109. BASIC ELECTRICAL ENGINEERING

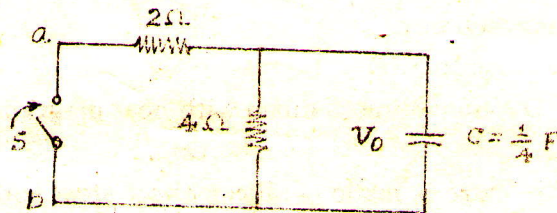
Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

- (a) A series RL circuit with  $R = 25$  ohms,  $L = 0.02$  H is connected to a 250 V, 50 cycles source. Calculate (i) the impedance ; (ii) current ; (iii) power ; and (iv) power factor.  
(b) State and explain Kirchoff's laws.  
(c) From the following circuit, determine the poles and zeros of impedance. If energy is stored in the circuit in the form of an initial voltage  $V_0$  on the capacitor, predict the current  $i$  that will flow when the switch S is closed.

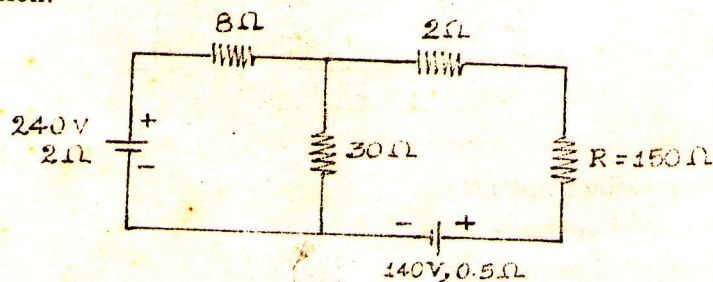


- (d) Derive the characteristics equation of a mechanical mass damper second order system.  
(e) Write a short note on hysteresis.  
(f) Explain the efficiency and regulation of a transformer.  
(g) Draw and explain the circuit model of an alternator.  
(h) Explain the SCR based thyristor speed control of a DC motor.

(8 × 5 = 40 marks)

Part B

- (a) Find the current in the 150 ohms load resistor and the power consumed in it by the principle of superposition.



Or

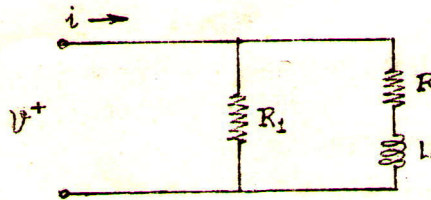
Turn over

- (b) A series circuit has  $R = 10 \Omega$ ,  $L = 50 \text{ mH}$  and  $C = 100 \mu\text{f}$  and is supplied with  $200 \text{ V } 50 \text{ c/s}$ . Find (i) the impedance ; (ii) the current ; (iii) the power ; (iv) the power factor ; and (v) the voltage drops across each element.

(15 marks)

3. (a) In the circuit,  $R_1 = 2 \Omega$ ,  $R = 4 \Omega$  and  $L = 2 \text{ H}$ .

- (i) Determine enough points to plot  $z(s)$ .  
 (ii) What is the impedance of this circuit to direct current ?  
 (iii) If a voltage  $v = V_0 e^{st}$  is acting where  $V_0 = 1 \text{ V}$ , what current  $i$  flows for  $s = -4$  ? For  $s = -3$  ? For  $s = -2$  ?  
 (iv) Assume current  $i = 2e^{-4t} \text{ A}$  is flowing and calculate the necessary voltage  $v(t)$ .



Or

(15 marks)

- (b) Explain the following terms :

(i) Series resonance.

(8 marks)

(ii) Parallel resonance.

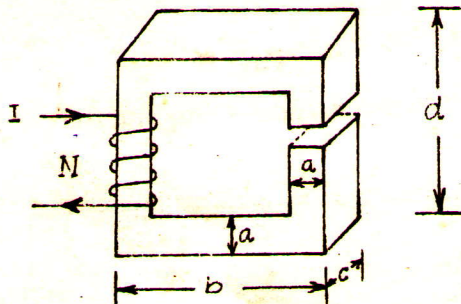
(7 marks)

4. (a) Explain the D'Arsonval mechanism with neat diagram.

Or

- (b) A core in the figure is made of silicon sheet steel with an air-gap  $2 \text{ mm}$  long ;  $a = 4 \text{ cm}$ ,  $c = 5 \text{ cm}$ . and  $b = d = 20 \text{ cm}$ . The  $300$  turn coil has a resistance of  $2 \Omega$ . Estimate the current for

- (i) A steady-state magnetic flux of  $2.5 \text{ mWb}$  across the air gap.  
 (ii) An applied voltage of  $120 \text{ V d.c.}$   
 (iii) An applied voltage of  $120 \text{ V}$  at  $60 \text{ Hz}$ .  
 (iv) An applied voltage of  $120 \text{ V}$  at  $40 \text{ Hz}$ .



(15 marks)

5. (a) Explain the working principle of :

(i) Self excited generators.

(7 marks)

(ii) Field excited generators.

(8 marks)

Or

- (b) Draw the construction and neatly explain the working principle of a synchronous motor.

(15 marks)

[4 × 15 = 60 marks]