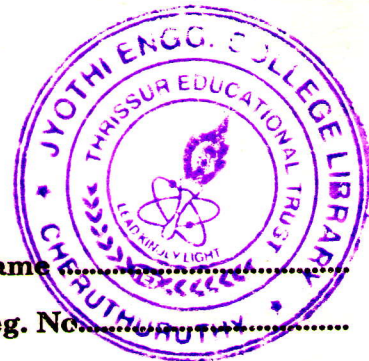


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(Pages : 3)

Name

Reg. No.



**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, JANUARY 2003**

IT/CS2K. 306. ELECTRIC CIRCUITS AND SYSTEMS

(New Scheme)

Time : Three Hours

Maximum : 100 Marks

Answer all the questions.

1. (a) Find R in the circuit of Fig. 1 :

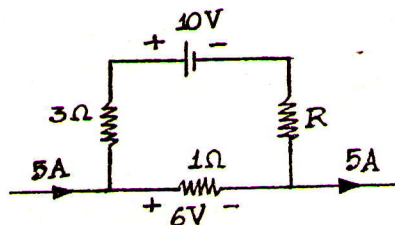


FIG. 1.

- (b) Find $x(t)$ by solving $x'' + 5x' + 6x = 10$ with $x' = x = 0$ at $t = 0$, using Laplace transforms.
(c) Find R_{AB} in the circuit shown in Fig. 2 :

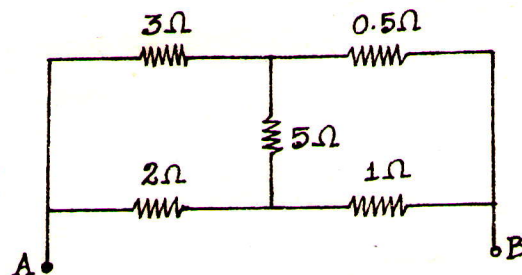


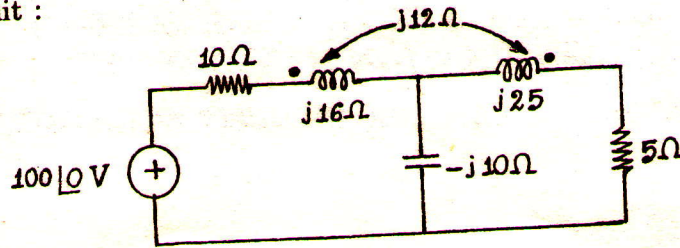
FIG. 2.

- (d) When 2 V direct voltage is applied to a initially relaxed network, the current is e^{-3t} for $t > 0$. Find the elements of the circuit.
(e) Write Maxwell's bridge. Explain for what it is used for and how.
(f) Define h -parameters. Find these parameter for a T-network of resistances of 1Ω each.
(g) Discuss what you understand by dynamic, steady state and frequency response of a control system.
(h) What is root locus ? How does it give the information about stability of control system ?

(8 × 5 = 40 marks)

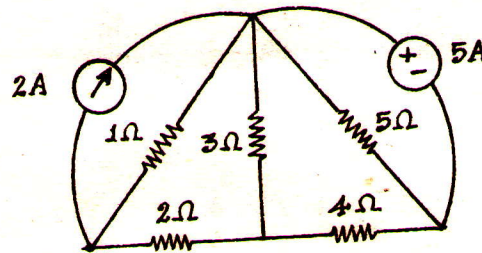
Turn over

2. (a) For the circuit shown in Fig. 3, find the power given by source and the power dissipated in the circuit :

FIG. 3.

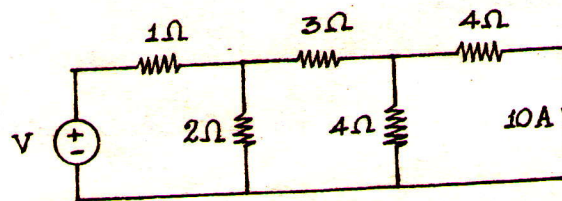
Or

- (b) For the circuit shown in Fig. 4, write equilibrium equations, using branch voltage of the tree with branches 1 and 3. Solve for the branch voltages and currents. Resistances indicates branch numbers also.

FIG. 4.

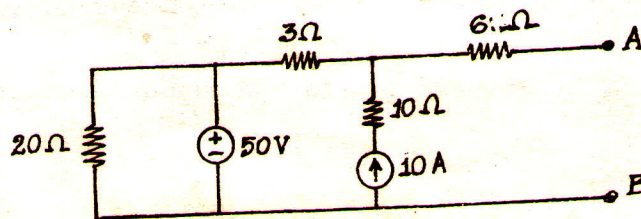
(15 marks)

3. (a) (i) Apply reciprocity theorem and verify for the circuit shown in Fig. 5 :

FIG. 5.

(10 marks)

- (ii) Find the Thevenin's equivalent across AB in the Fig. 6 :

FIG. 6.

(5 marks)

Or

- (b) Following three loads form a delta across 3-phase 400 V system of sequence RYB :—

Phase RY 30 kVA 0.8 p.f. lag.

Phase YB 20 kW, 0.6 p.f. lag.

Phase BR 20 kW u.p.f.

Find the line currents taking E_{RY} as ref. Calculate the total power consumed.

(15 marks)

4. (a) (i) Explain the principle of Maxwell's bridge and its use. Write equations for balance. (8 marks)

(ii) Write the balancing equations and the phasor diagram of Anderson Bridge.

(7 marks)

Or

- (b) Find z and y parameters of the two networks given in Figs. 7 and 8. Connect these two networks such that their h -parameters add. Find the h -parameters of the interconnected network.

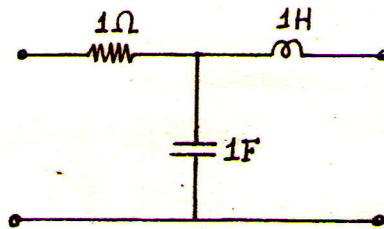


FIG. 7.

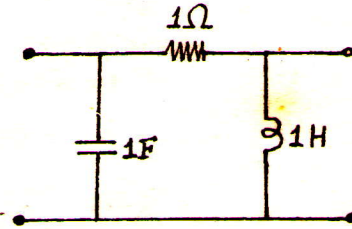


FIG. 8.

(15 marks)

5. (a) The open-loop poles of a control system are $s = 0$, $s = -2$, $s = -3 \pm j 4$. Sketch the root loci of closed loop system with $H(s) = 1$ and discuss the stability, if the open-loop gain is K .

Or

- (b) Define transient response specifications. Obtain these for a secondary system. Calculate these if, $\xi = 0.6$, $W_n = 5$ rad/sec. when subjected to unit step input.

(15 marks)

[4 × 15 = 60 marks]