D 30340

(Pages : 4)

Name.....

Reg. No.....

THIRD SEMESTER B.TECH. DEGREE EXAMINATION, DECEMBER 2003

IT/CS 2K 306/PTCS2K 305. ELECTRIC CIRCUIT SYSTEM

Time : Three Hours

Maximum : 100 Marks

1. (a) Use initial value theorem and final value theorem to find $f(0)$ and $f(\infty)$ if $F(s) = (s+2)/s(s+3)(s+4)$.

(b) Two coupled coils are connected in parallel as shown in the Fig. 1. Derive an expression for equivalent inductance.

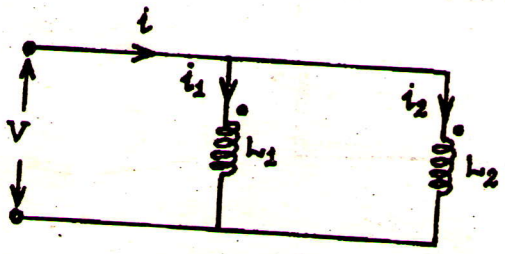

Fig. 1.

(c) State, explain and illustrate compensation theorem.

(d) Find image parameters for the network shown in the Fig. 2.

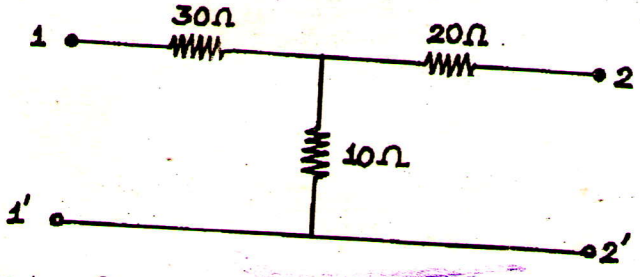

Fig. 2.

(e) Find the transform admittance of the network shown in the Fig. 3.

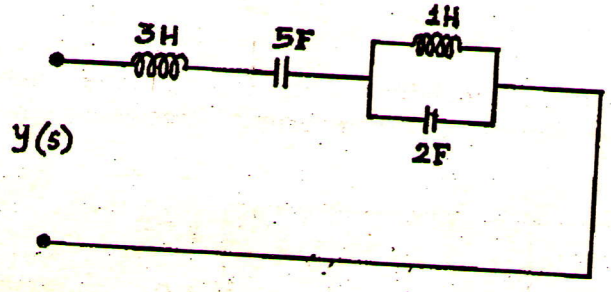

Fig. 3.

(f) Define gain margin and phase margin.

(g) What is Nichol's chart ? What are the advantages of Nichol's chart over the M and N circles ?

Turn over

(h) The unity feedback system has a open-loop transfer function of

$G(s) = 25(s+4)/s(s+0.5)(s+2)$.

Find the steady state error for unit ramp input and for parabolic input.

(8 × 5 = 40 marks)

2. (a) Solve for the current I_1 shown in the network of the Fig. 4.

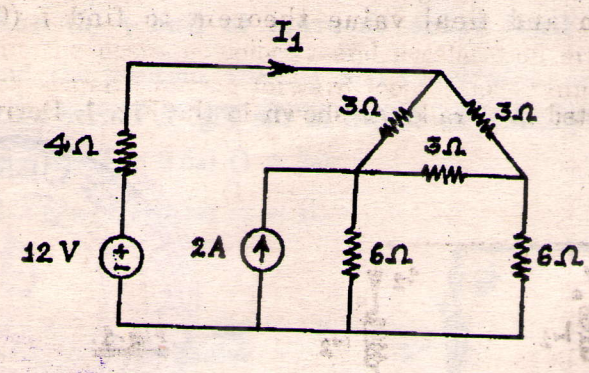

FIG.4.

Or

(b) Obtain the dotted equivalent circuit for the coupled circuit shown in the Fig. 5 and use it to find the voltage V across the 10 Ω capacitive reactance.

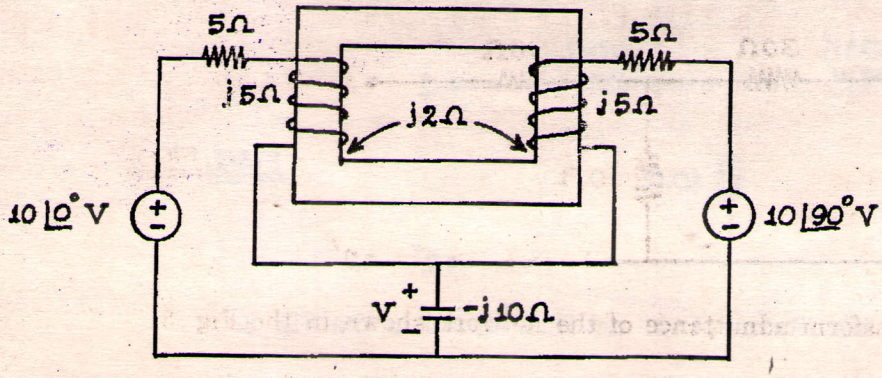

FIG.5.

(15 marks)

3. (a) (i) In the single source network shown in the Fig. 6 the voltage source cause a current of I_x in the 4 Ω branch. Find I_x and then verify the reciprocity theorem.

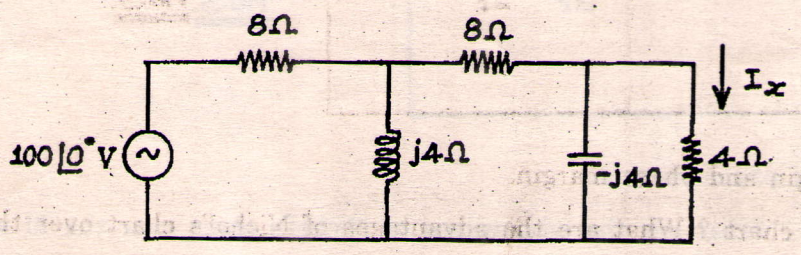

FIG.6.

(7 marks)

(ii) In the network shown in the Fig. 7 the impedance Z connected across AB is variable in both resistance and reactance. What load impedance Z will receive maximum power ? What is the value of the maximum power ?

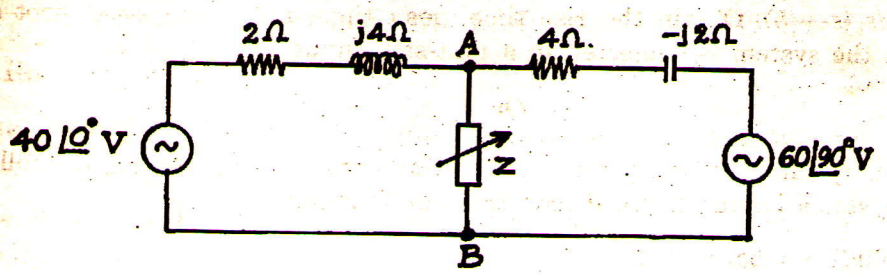

FIG.7.

(8 marks)

Or

(b) In the circuit of Fig. 8 find the initial and final values of I_1 and I_2 (using initial and final value theorems), when switch is closed.

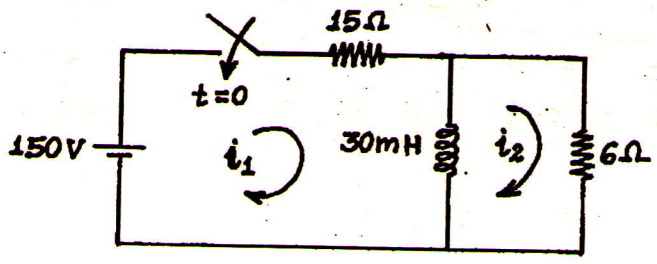

FIG.8.

(15 marks)

4. (a) Refer to the two port network shown in the Fig. 9 and find

(i) *h* parameters.

(ii) *z* parameters.

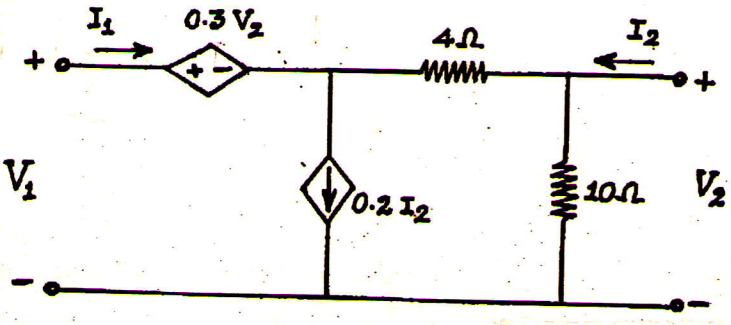

FIG.9.

Or

(b) Explain the principle and the method of using Anderson's bridge in bridge circuits.

(15 marks)

5. (a) Consider the unity feedback closed loop system where the forward transfer function is $G(s) = 25/s(s + 5)$. Obtain the rise time, peak time, maximum over shoot and settling time when the system is subjected to a unit-step input.

Or

(b) Find out the position, velocity and acceleration error coefficients for the following unity feedback systems having forward loop transfer function $G(s)$ as :

(i) $100/(1 + 0.5s)(1 + 2s)$.

(ii) $K/s(1 + 0.1s)(1 + s)$.

(15 marks)

[4 × 15 = 60 marks]