14EC306

Hall Ticket Number:

II/IV B.Tech (Regular) DEGREE EXAMINATION

MODEL PAPER

(First Semester)

CIRCUIT THEORY

(ECE BRANCH)

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Discuss the following (12X1=12 Marks)

1. a) Give the KCL in word form?
   b) State Reciprocity theorem.
   c) What are Passive and Active elements?
   d) What is the difference between Mesh & Loop?
   e) Define Form factor.
   f) What are the differences between Admittance and Susceptance?
   g) Define Bandwidth.
   h) Give the formula for selectivity.
   i) What is Initial value theorem?
   j) Define Reactance power.
   k) Draw the phasor diagram of RL circuit.
   l) Define Resonance in Parallel RLC Circuit?

UNIT-I

2. a) Determine the node voltages using nodal analysis in the circuit of Fig.1
   b) Write the mesh equations for the circuit shown in Fig. 2. Next determine the values of i_1, i_2, i_3.

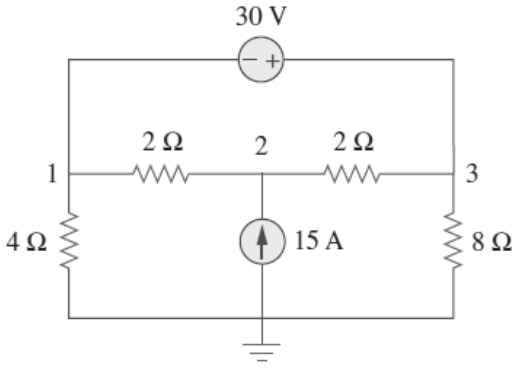


Fig.1

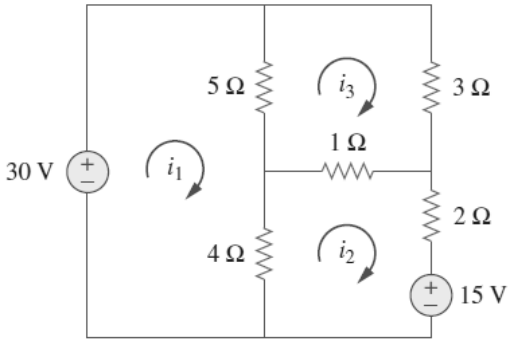


Fig.2

(OR)

3. a) Calculate v_o and I_o in the circuit of fig. 3.

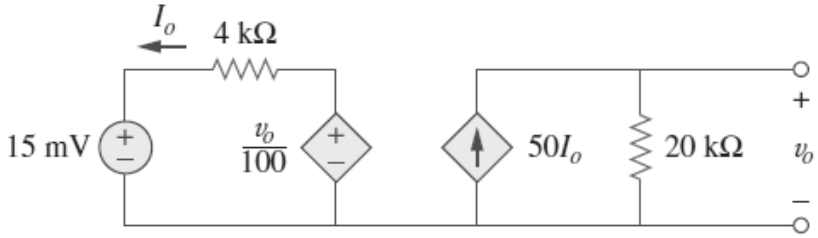


Fig. 3

b) For the network shown in Fig. 4 develop a oriented graph and construct the cut set matrix.

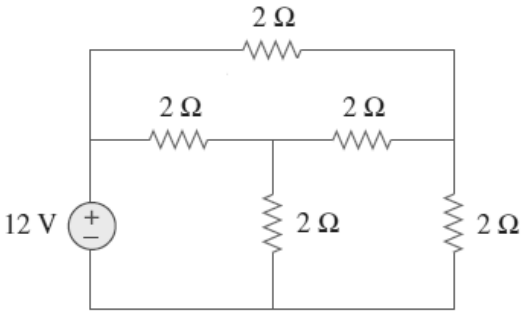


Fig. 4

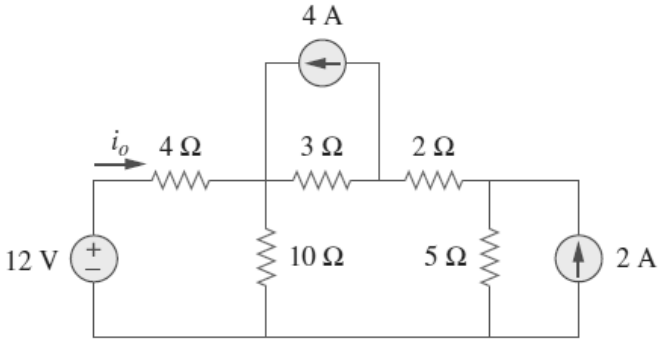


Fig. 5

UNIT-II

4. a) Use superposition theorem to obtain i_o for the circuit in Fig. 5
   b) State and prove Millman's theorem.

OR

5. a) State and prove maximum power transfer theorem and Illustrate with an example.
   b) Apply thevenin's theorem to find V_o in the circuit in Fig. 6

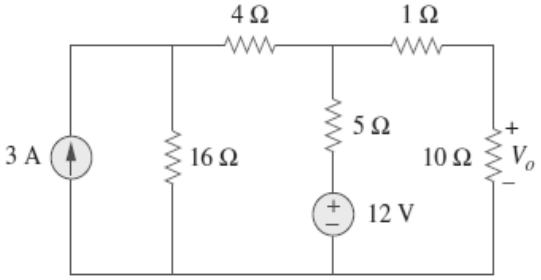


Fig. 6

UNIT-III

6.a) A series RLC circuit with R=5 ohms, L=1 henries and C=0.5 farads has a constant voltage of 5 Volts applied at time t=0. Determine the transient current i(t). Assume zero initial conditions.

b) A series RC circuit with R = 100 ohms and C = 25 F and a sinusoidal voltage of 150sin (500 *t*) Volts are applied. Find the expression for total current.

OR

7. a) Find the average power absorbed by the 10 ohm resistor for the circuit in Fig. 7

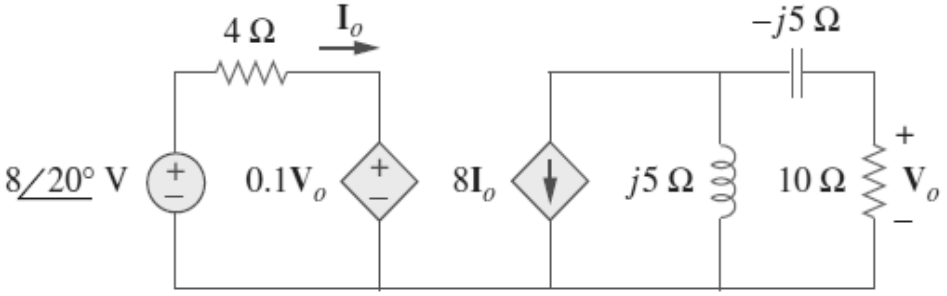
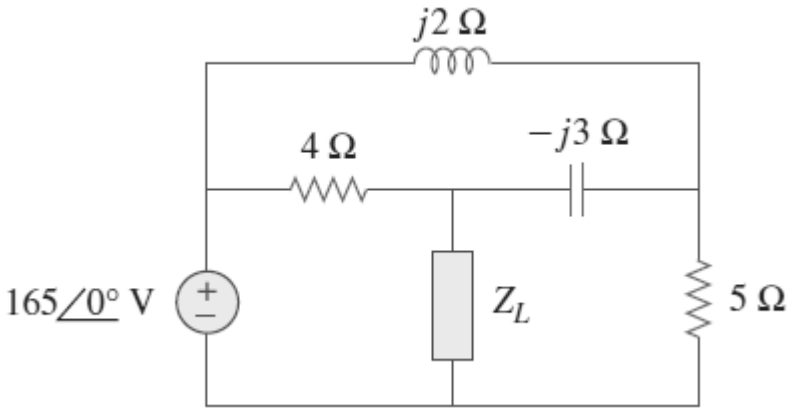


Fig. 7

b) Find the value of Z_L which will absorb maximum average power and also maximum value of the power for the circuit shown



UNIT-IV

8. a) For a parallel RLC circuit, find the under damped response for R = 10.5 ohms, L =7 Henries and C = 1/42 Farads.

b) The voltage v_s = 100 cos wt mV is applied to a series resonant circuit composed of a 10 ohms resistance, a 200ηF capacitance, and a 2mH inductance. Use both exact and appropriate methods to calculate the current amplitude if w = 48krad/s

OR

9. a) Find the inverse Laplace transform of 2/ (s^3+12s^2+36s)

b) State and prove initial and final value theorems.