upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

T 8140

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Second Semester

Electronics and Communication Engineering

EC 1151 — CIRCUIT ANALYSIS

(Common to B.E. (Part–Time) Second Semester Regulation 2005)

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define voltage and power.

2. What is an ideal voltage source and an ideal current source?

3. What is a linear network?

4. State Maximum power transfer theorem.

5. What is a phasor?

6. Define average or real power.

7. What are transient and steady state responses?

8. What are half-power frequencies?

9. What is a linear transformer?

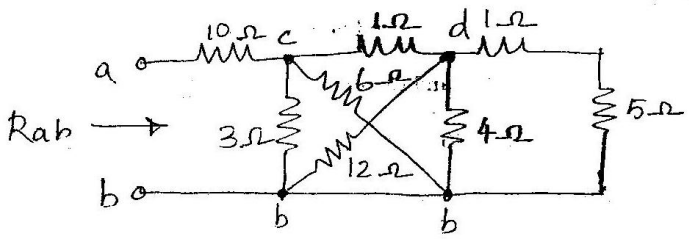
10. When will you say that the two circuits are dual?

upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

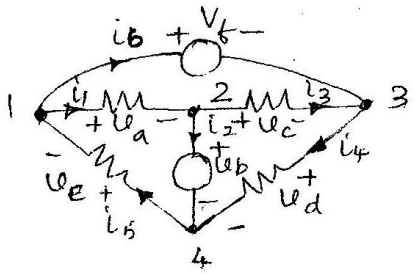
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

PART B — (5 × 16 = 80 marks)

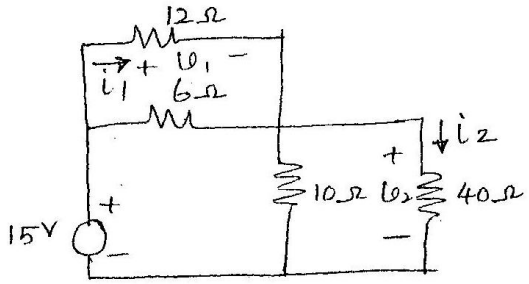
11. (a) (i) Calculate the ~~equivalent~~ resistance R_{ab} in the circuit shown below : (4)



(ii) Write all the independent KCL and KVL equations for the following network. (6)



(iii) Find v_1 and v_2. Also calculate i_1 and i_2. (6)

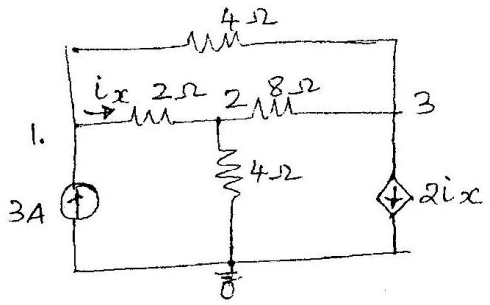


Or

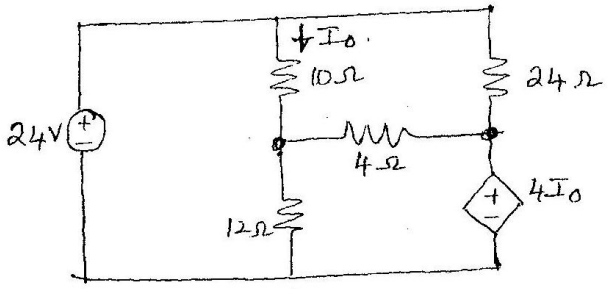
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

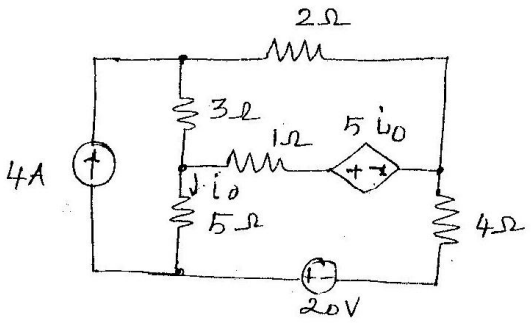
(b) (i) Determine the voltages at the nodes in the following circuit : (8)



(ii) Use mesh analysis to find the current I_0 in the following circuit : (8)



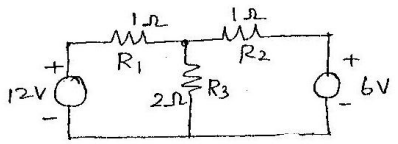
12. (a) (i) Find i_0 in the following circuit using superposition. (10)



upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

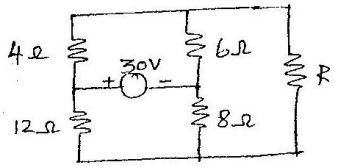
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

(ii) Determine the current through the 2 Ω resistor in the following network using Thevenin's theorem. (6)

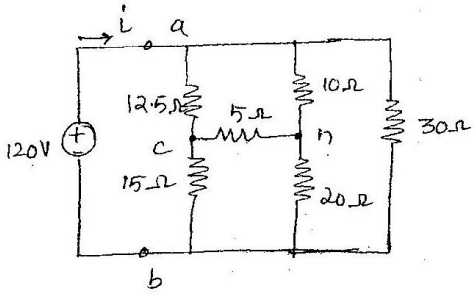


Or

(b) (i) In the following circuit find out for what value of R is the power dissipated in R maximum? Calculate that power. (8)

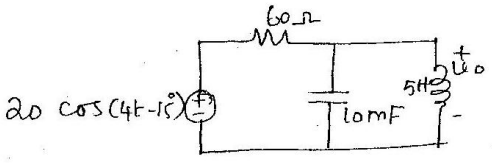


(ii) Obtain the equivalent resistance R_{ab} in the following circuit and use it to find out current i. (8)



13. (a) (i) Find the amplitude, phase, period and frequency of the sinusoid $u(t) = 12\cos(50t + 10°)$. (4)

(ii) Determine $u_0(t)$ in the following circuit. (6)



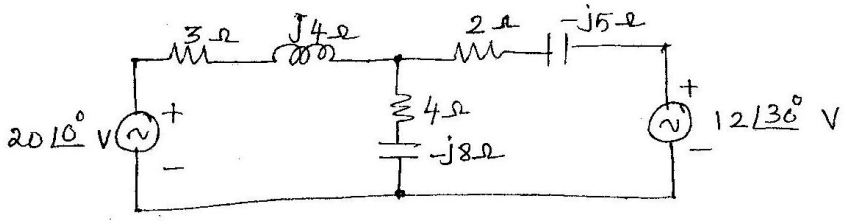
(iii) Derive the phasor diagram for a series RL circuit. Also obtain the voltage triangle and impedance triangle. (6)

Or

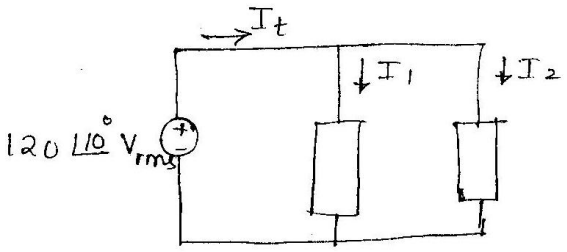
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

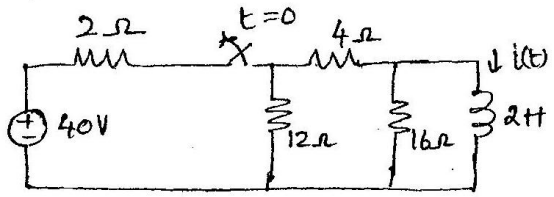
(b) (i) In the network shown in the following figure, determine the branch currents using mesh analysis. (8)



(ii) In the circuit shown in the following figure, $z_1 = 60\angle -30^\circ\ \Omega$, $z_2 = 40\angle 45^\circ\ \Omega$. Calculate the total apparent power, real power, reactive power and pf. (8)



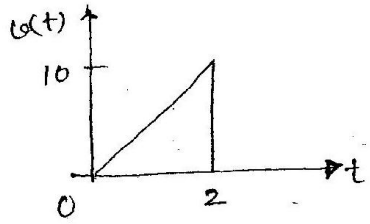
14. (a) (i) The switch in the following circuit has been closed for a long time. At $t = 0$, the switch is opened. Calculate $i(t)$ for $t > 0$. (4)



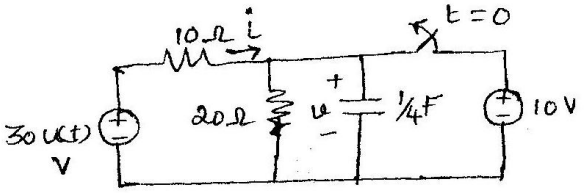
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

(ii) Express the saw tooth function shown in the following figure in terms of singularity functions. (6)



(iii) In the following figure, the switch has been closed for a long time and is opened at $t = 0$. Find i and v for all time. (6)



Or

(b) (i) Derive the following expressions for a series resonant circuit ;

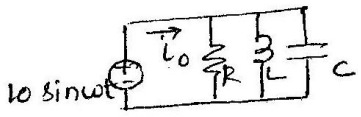
Resonant frequency,

Half–power frequencies,

Quality factor and

Band width. (8)

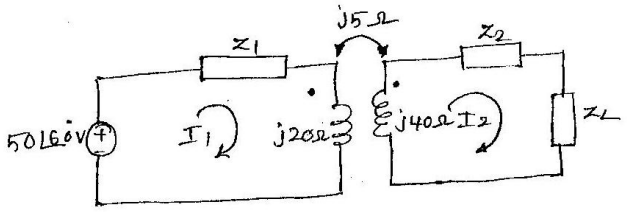
(ii) In the parallel RLC circuit shown in the following figure, let $R = 8\ k\ \Omega$, $L = 0.2$ mH and $C = 8\ \mu$F. Calculate w_0, Q and B. Also find w_1, w_2 and power dissipated at w_0, w_1 and w_2. (8)



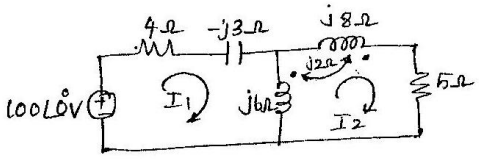
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

15. (a) (i) In the circuit shown in the following figure (A linear transformer), calculate input impedance and current I_1. Take $Z_1 = 60 - j100\ \Omega$, $z_2 = 30 + j40\ \Omega$, and $z_L = 80 + j60\ \Omega$. (6)

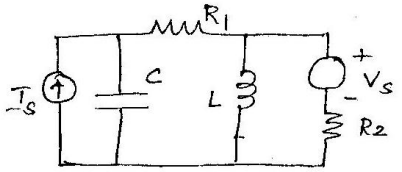


(ii) Calculate the mesh currents in the circuit shown below. (10)

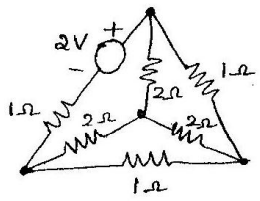


Or

(b) (i) Draw the graph of the network shown in the following figure. How many trees are possible for this graph? Draw the trees. (6)



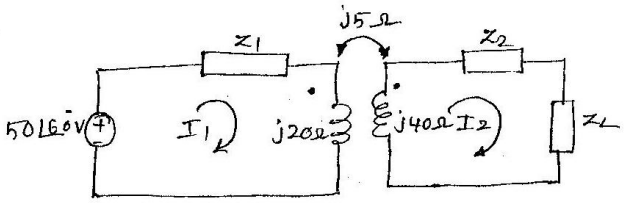
(ii) Write the matrix loop equation for the following network and determine the loop currents. (10)



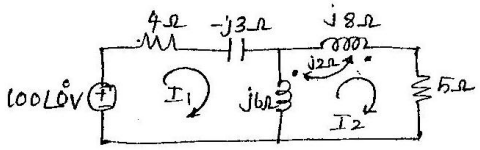
upload your college symposium/conference details,function photos,videos in www.technicalsymposium.com

upload your college symposium/conference
details,function photos,videos in
www.technicalsymposium.com

15. (a) (i) In the circuit shown in the following figure (A linear transformer), calculate input impedance and current I_1. Take $Z_1 = 60 - j100\ \Omega$, $z_2 = 30 + j40\ \Omega$, and $z_L = 80 + j60\ \Omega$. (6)

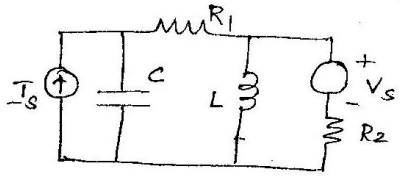


(ii) Calculate the mesh currents in the circuit shown below. (10)

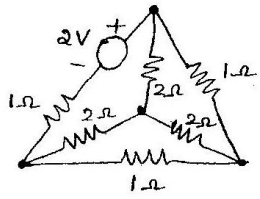


Or

(b) (i) Draw the graph of the network shown in the following figure. How many trees are possible for this graph? Draw the trees. (6)



(ii) Write the matrix loop equation for the following network and determine the loop currents. (10)



upload your college symposium/conference
details,function photos,videos in
www.technicalsymposium.com