Roll No.

B.E./B.Tech.(Full Time) DEGREE END SEMESTER EXAMINATION , Nov/Dec 2011

Electronics and Communication Engineering

Second Semester

EC182 Circuit Analysis

(Regulation - 2004)

Time: Three hours Maximum ; 100 Marks

Answer all questions

**Part- A (10x2=20 marks)**

1. Let a node has 5 branches. In this, two branches passes 2A current towards the node, other two branches extracts 1A, 5A currents each, then, calculate the current in the remaining branch. Also mention its direction.
2. Calculate the current derived from a 5V source while five 1kΩ resistors are connected across it in parallel.
3. In a linear network, a voltage source of 5V induces 2A current through a resistor. If the source is replaced by a 20V source, what would be the current through the resistor?
4. Draw the Thevenin's and Norton's equivalent circuits and relate the elements of the networks.
5. A series RLC circuit has 50Ω resistor, 2H inductor and 1mF capacitor. Then calculate the impedance offered by the circuit at 10 Hz.
6. A voltage source 20sin(100πt) excites an impedance (20+j50)Ω. Then, calculate the power factor introduced by the impedance.
7. A series RC circuit has 100Ω resistor and 2F capacitor. Calculate the time constant of the network.
8. A parallel RLC circuit has 100Ω resistor, 1H inductor and 10mF capacitor. Then calculate the Q-factor of the circuit.
9. What is an ideal transformer? Write the relationship between current, voltage and power in the primary and secondary.
10. If a network has 10 nodes, how many branches will be present in its tree?

**Part-B (5x16=80)**

11. Consider the circuit shown in Q11.
    (i) Find the current through the resistor $R_1$, by identifying its Thevenin's equivalent network (8)
    (ii) Verify the same with Norton's equivalent network (6)
    (iii) Also calculate the power absorbed by $R_1$. (2)

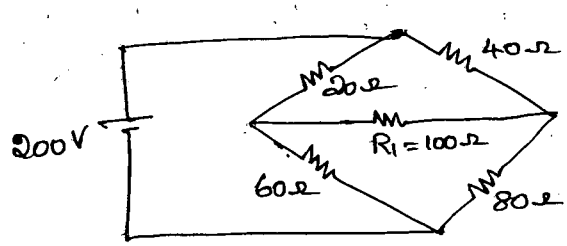


Figure Q11

12. a) Consider the network shown Q12.a. Find the current derived from source by,

(i) reducing the networking to have single equivalent resistor across the source (10)

(ii) verify the same with mesh analysis (6)

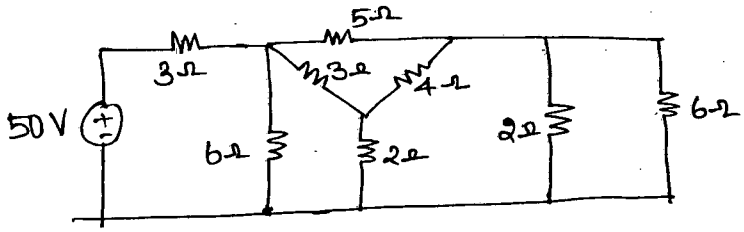


Figure Q12.a

OR

b) (i) Find the equivalent resistance across terminals 'A' & 'B' in the network shown in figure Q12.b. (8)

(ii) If 5V source is connected across terminals 'A' & 'B', calculate the current through 5Ω resistor by applying nodal analysis

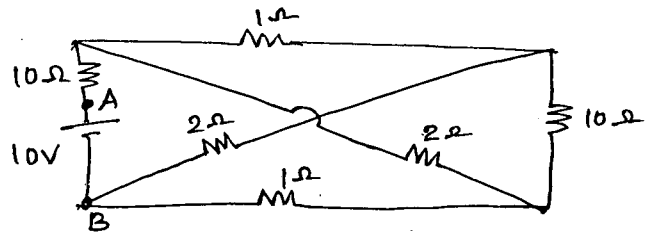


Figure Q12.b

13. a) Consider the circuit shown in Q13.a.

(i) Find the current in each branch and total current. (8)

(ii) Determine the voltage across each element (6)

(iii) Draw the voltage phasor diagram (2)

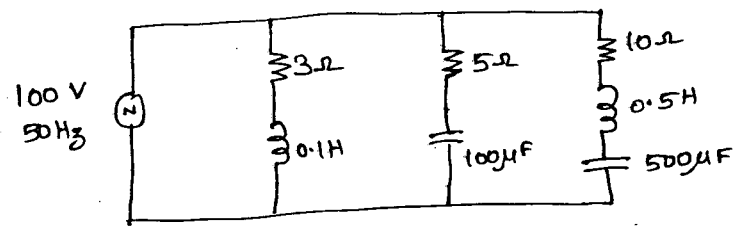


Figure Q13.a

OR

b) In the circuit shown in figure Q13.b, find the power dissipated by each element

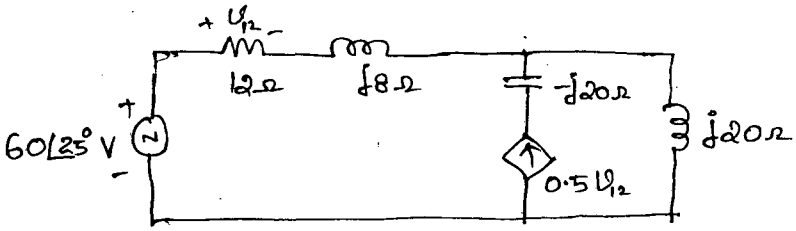


Figure Q13.b

14. a) In the network shown in Q14.a, the capacitor is charged to a voltage of 50V, the switch is closed at t=0. [C1]

(i) Determine the current expression $i_1$ and $i_2$ (12)

(ii) Find the value of $i_1$ and $i_2$ at t=0 and t=∞ (4)

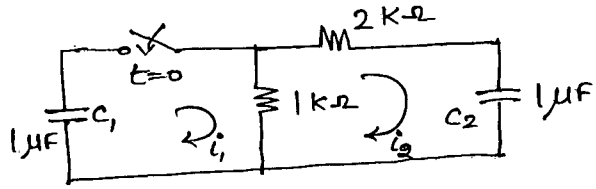


Figure Q14.a

OR

b) In the network shown in Q14.b, the switched is moved from position 1 to position 2 at t=0. The switch is in position 1 for along time.

(i) Find the initial current in the inductor and initial voltage in the capacitor (4)

(ii) Determine the current expression i(t) for al values of t. (12)

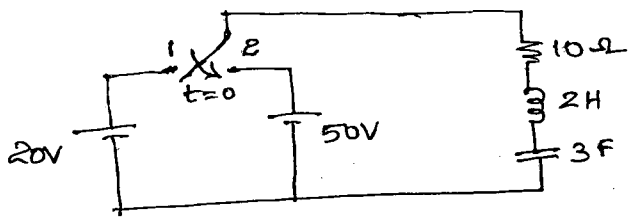


Figure Q14.b

15. a) Consider the network shown in Q15.a.

(i) Find its dual network (8)

(ii) Draw the graph, tree and Co-tree of the network (8)

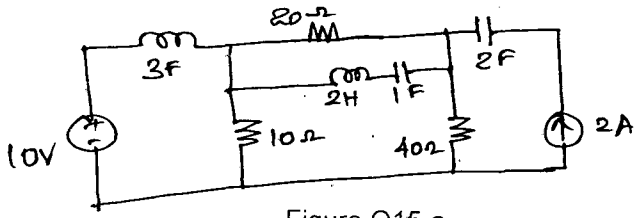


Figure Q15.a

OR

b) Consider the network shown in figure Q15.b.

(i) Write the mesh equaltions for the network (8)

(ii) calculate the current through the capacitor (8)

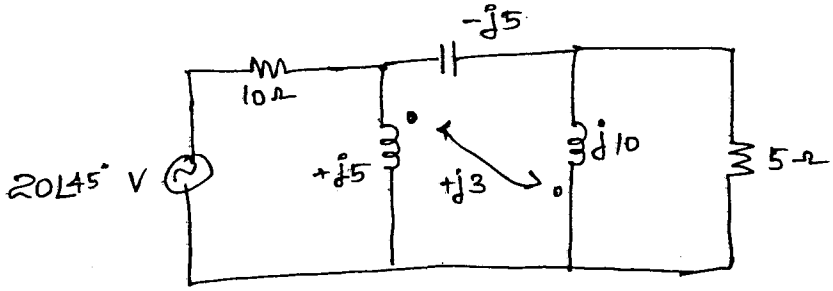


Figure Q15.b