Roll No. | | | | | | | | | | |

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

6

Electronics and Communication Engineering

Second Semester

EC9152 Circuit Analysis

(Regulation - 2008)

Time: Three hours Maximum ; 100 Marks

Answer all questions

Part- A (10x2=20 marks)

1. The filament of light bulb in a circuit operates with 120V and 0.8A current. What is the resistance in the filament?
2. A 8V voltage source is connected with three resistors connected in series. In this voltage drops are measured across two of those resistors are 5V and 2.5V. Then calculate the voltage drop across the third resistor.
3. Superposition is theorem cannot be applied for non-linear circuits. State true or false and justify your answer.
4. A 10V source has 5Ω internal resistance. Apply source transformation and calculate the maximum that can be derived from the source.
5. Define power factor. What is the value of power factor at resonance?
6. Draw the phasor diagram for voltage in a series RLC circuit.
7. Write the time constants of series RL and RC circuits.
8. A parallel RLC circuit has 10Ω resistor, 5H inductor and 1mF capacitor. Then calculate the Q-factor of the circuit.
9. What is the power efficiency of an ideal transformer? Relate the voltage and current at the primary and secondary coils of an ideal transformer.
10. If a network has N nodes, how many nodes and branches will be present in its tree?

Part-B (5x16=80)

11. Consider the circuit shown in Q11.
    (i) Find Thevenin's equivalent network across the load Z_L. (10)
    (ii) Find the value of Z_L to derive maximum power from the network and also calculate the average power dissipated by the load (6)

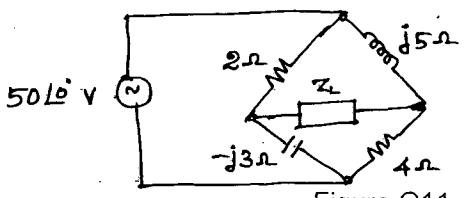

Figure Q11

12. a) Consider the network shown Q12.a. Calculate the current through 10Ω and 5Ω resistors

(i) Apply mesh analysis and calculate (8)

(ii) Verify the same with superposition principle (8)

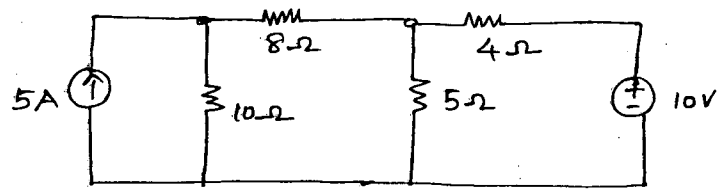

Figure Q12.a

OR

b) (i) Find the current through 10Ω resistor in the network shown in figure Q12.b. by applying source transformation (8)

(ii) Verify your result of (i) with nodal analysis (8)

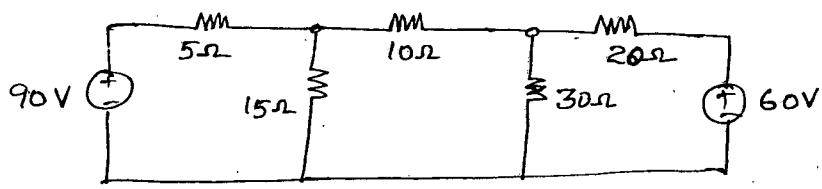

Figure Q12.b

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

(i) Find the current through 2Ω resistor using Thevenin's equivalent circuit (8)

(ii) Verify your result with Norton's equivalent circuit (6)

(iii) Find the value of a resistor which replaces 2Ω resistor to derive maximum power from the network (2)

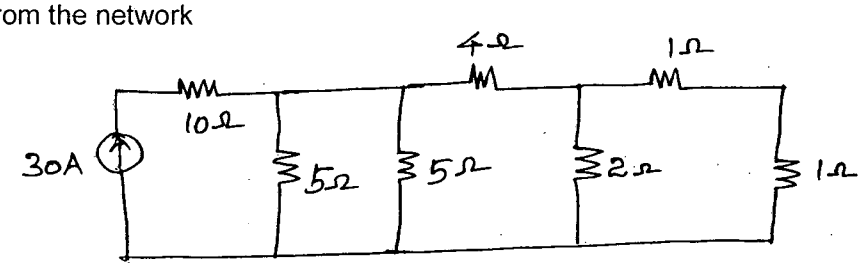

Figure Q13.a

OR

b) (i) Find the dual network for the circuit shown in figure Q13.b(i)

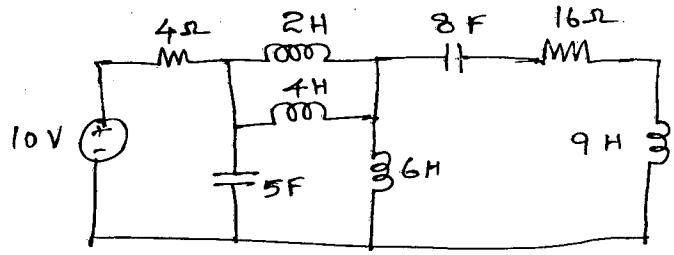

Figure Q13.b(i)

(i) Find the equivalent resistance across the terminals A,B in the circuit shown in figure Q13.b(ii)

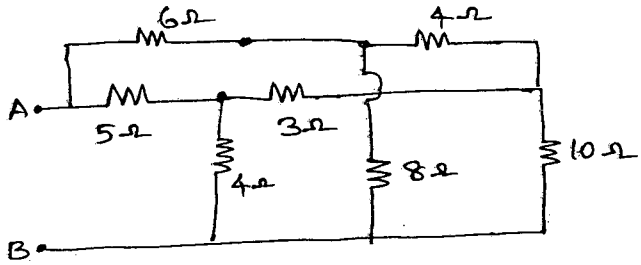

Figure Q13.b(ii)

14. a) In the network shown in Q14.a, the switch S is opened at time t=0.

(i) Determine the current expression i(t) for t<0 (4)

(ii) Find the i(t) for t>0 (8)

(iii) Find the value of i(t) at t=0 and t=∞ (4)

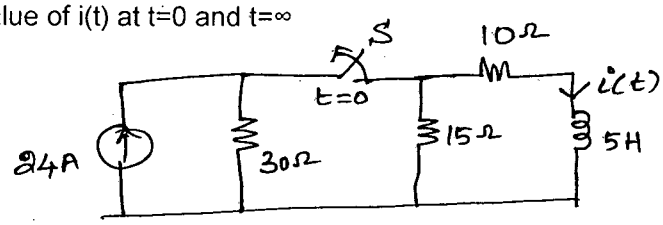

Figure Q14.a

OR

b) In the network shown in Q14.b, the switch S is opened at time t=0.

(i) Determine the voltage across inductor v(t) for t<0 (4)

(ii) Find the v(t) for t>0 (8)

(iii) Find the value of v(t) at t=0 and t=∞ (4)

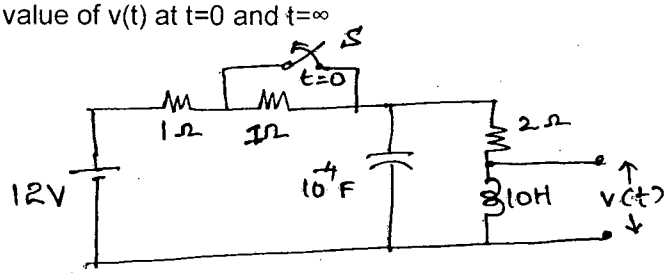

Figure Q14.b

15. a) Consider the network shown in Q15.a, the voltage across 100Ω resistor is 50V.

(i) Determine the source voltage V1 (8)

(ii) Find the current through the elements in the network (8)

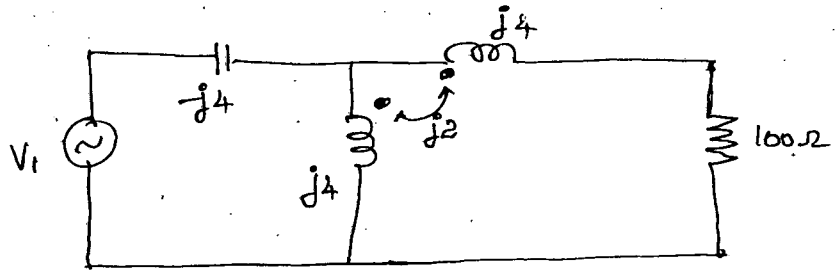

Figure Q15.a

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)

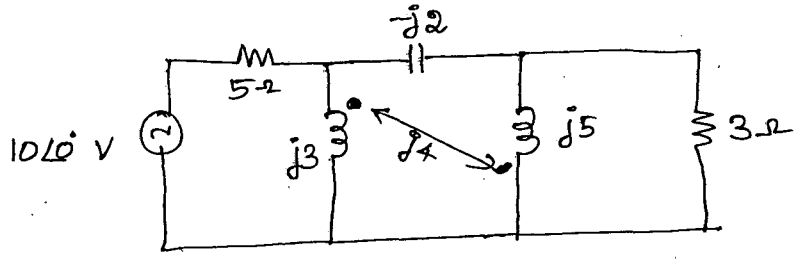

Figure Q15.b