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B.E./B.Tech.(Full Time) DEGREE END SEMESTER EXAMINATION , APRIL/MAY 2011

Electronics and Communication Engineering

Second Semester

EC182 Circuit Analysis

(Regulation - 2004)

Time: Three hours | Maximum ; 100 Marks

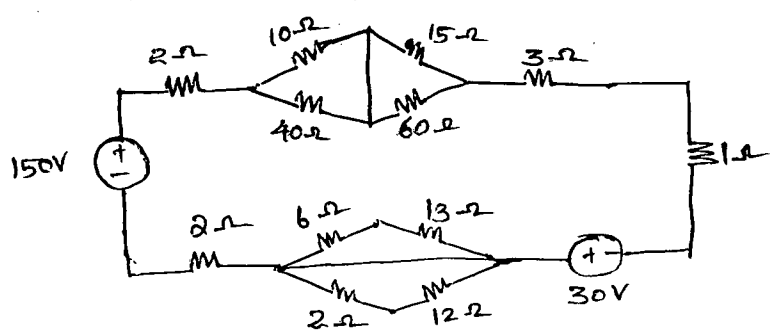
Answer all questions

Part- A (10x2=20 marks)

1. A resistive load consumes 20W power while 200V source is connected across its terminals. Then, find the resistance and current flow through the load.
2. State: Kirchoff's current law.
3. If a source has internal impedance 2+j3 Ohms. Then, find the value of the load which can derive the maximum power from the source.
4. Write the superposition principle.
5. Write the phase relationship between current and voltage while a voltage source is connected to a inductor
6. Relate instaneous power and average power.
7. Write the formula for resonance frequency and Q-factor of a series RLC circuit.
8. What is time constant of RC circuit? How is it measured?
9. What is branch and node in a tree?
10. What is mutual inductance?

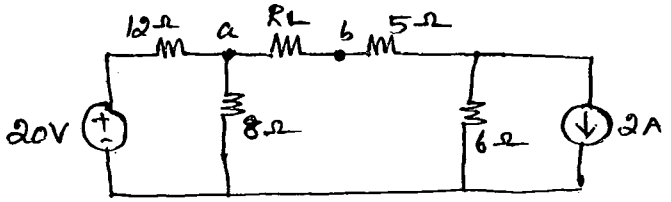
Part-B (5x16=80)

11. a) Use both resistance and source combinations, as well as current division in the circuit Q11.a, to find
    (i) Current through each element in the circuit (5)
    (ii) Voltage across each element in the circuit (5)
    (iii) the power absorbed by the 1Ω, 10Ω and 13Ω resistors **(6)**



Q11.a

12. a) (i) Find the Thevenin's equivalent circuit for the circuit shown in Q12.a across the terminals *a* and *b*. (12)

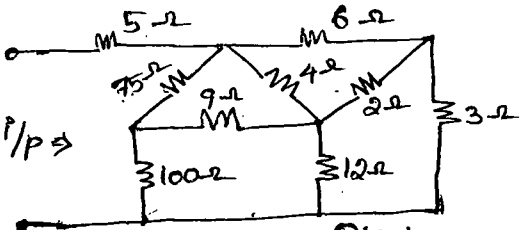


Q12.a

(ii) Find the value of R_L in the above circuit for which the R_L will receive maximum power. (4)

OR

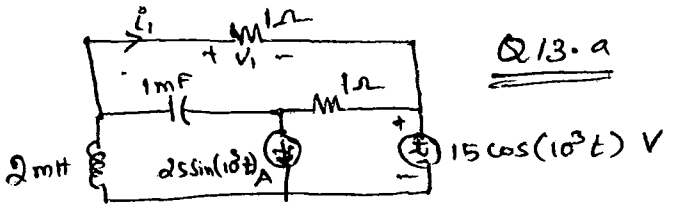
b) (i) Apply Δ-Y and Y-Δ to find the input resistance of the network shown in Q12.b (12)



Q12.b

(ii) Find the power delivered by a 1V source, connected at the input of the above circuit. (4)

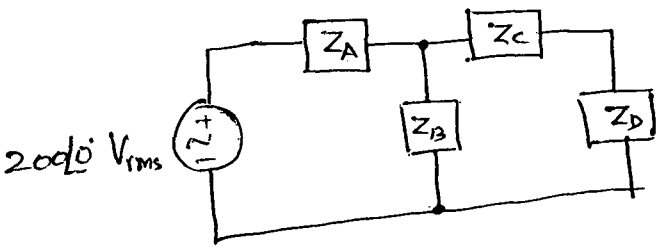
13.a) Apply steady state analysis and superposition principle in the circuit shown in Q13.a to find $v_1(t)$ due to (i) Voltage source acting alone, (ii) current source acting alone, (iii) both the source are acting together



Q13.a

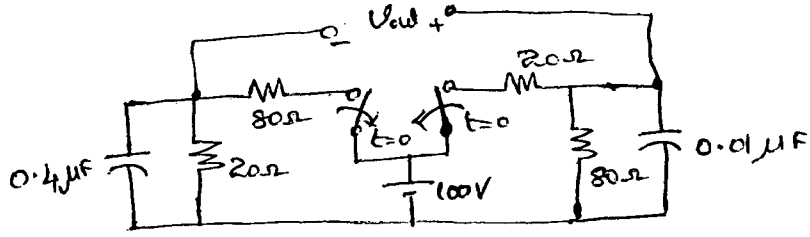
OR

b)Consider the circuit shown in Q13.b and let Z_A=5+j2 Ω, Z_B=20-j10 Ω, Z_C=10∠30° Ω and Z_D=10∠-60° Ω. Find the apparent power and average power delivered to each load and by the source.



Q13.b

14. a) (i) A long time after the circuit Q14.a was assembled, both switches are opened simultaneously at t=0 as indicated. (i) obtain the expression for v_{out} for t>0 (ii) Obtain the values for v_{out} at time $t=0^+$, 1 μs, 5 μs.



Q14.a

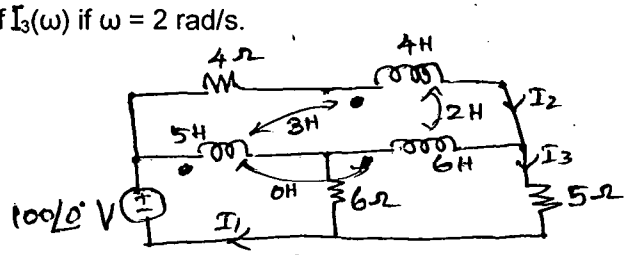
OR

b) (i) Consider a parallel RLC circuit. Derive the formula for resonant frequency and quality factor of the circuit.

(ii) In a parallel RLC circuit, R=50 Ω, L=2mH, C=1μF. Find the resonant frequency and quality factor of the circuit.

15.a) Consider a circuit shown in Q15.a. (i) Write the value of $I_1(\omega)$, $I_2(\omega)$ and $I_3(\omega)$ interms of ω. (12)

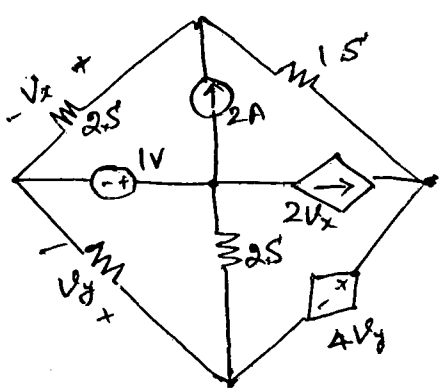
(ii) Find the value of $I_3(\omega)$ if ω = 2 rad/s. (4)



Q15.a

OR

b) Consider the circuit shown in Q15.b, draw the graph of the network and find the value of V_x and V_y by using the graph.



Q15.b