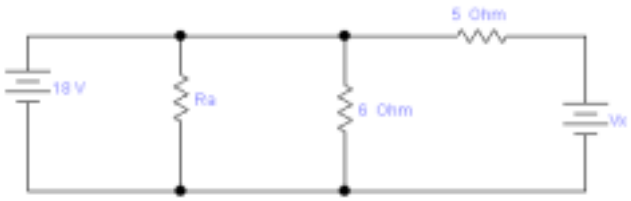
EC3251 CIRCUIT ANALYSIS

IMPORTANT QUESTIONS AND QUESTION BANK

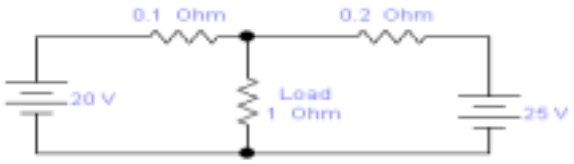
UNIT-I DC CIRCUIT ANALYSIS

2-Marks

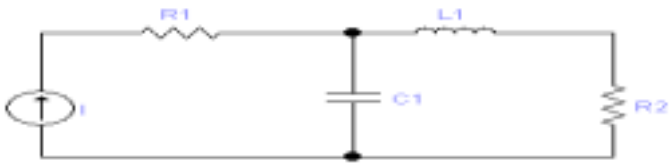
1. State Ohm's law.?
2. What is Kirchoff's Current law?
3. What is Kirchoff's Voltage law?
4. Calculate the number of branches and nodes in the given figure



5. Examine the current drawn by a lamp rated at 250V,40W connected to a supply of 230V?
6. Analyze the given figure and find the voltage at load



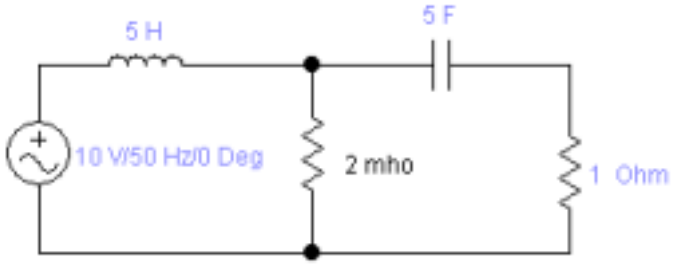
7. Estimate the power delivered and the current I, if a 25Ω resistance has a voltage of 150V?
8. Design Dual circuit for the given figure



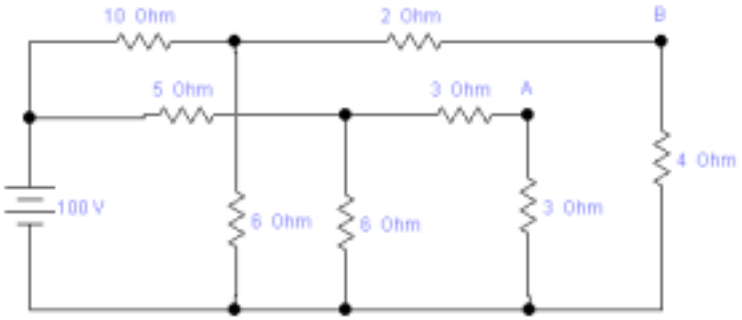
9. Define nodal analysis/
10. Define mesh analysis?

Part-B

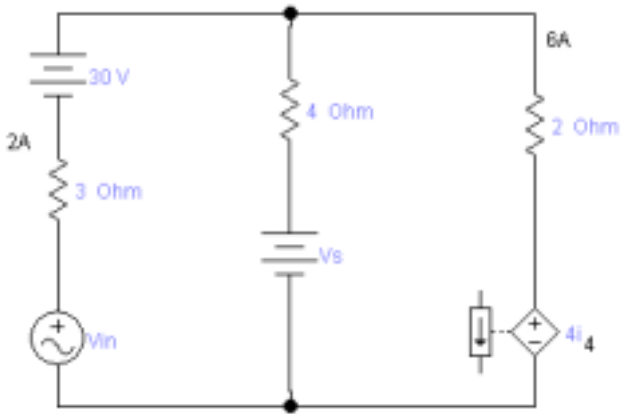
1. Schematize the dual network of the given circuit and explain its procedure



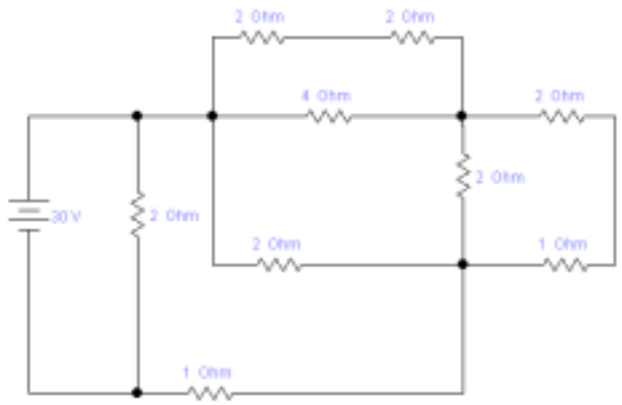
2. Predict the voltage VAB in the circuit shown below.



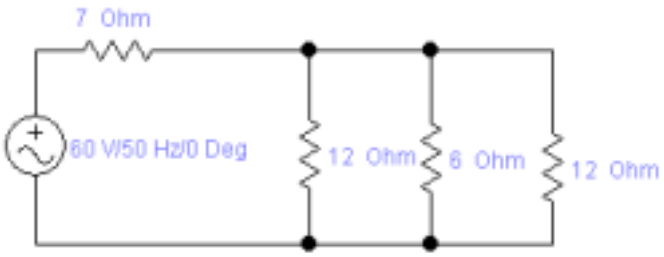
3. Using Ohm's law and Kirchoff's law on the circuit given below, identify Vin, Vs and the Power provided by the dependent sources



4. Assess the current delivered by the source in the circuit shown below

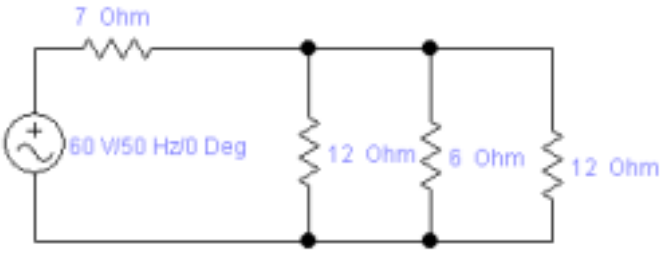


5. Explain the procedure involved in Mesh current method?
6. Calculate the Current supplied by 60V source in the given network using mesh

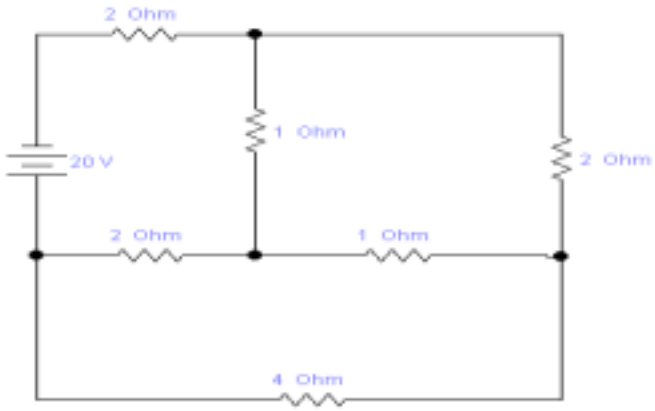


current method?

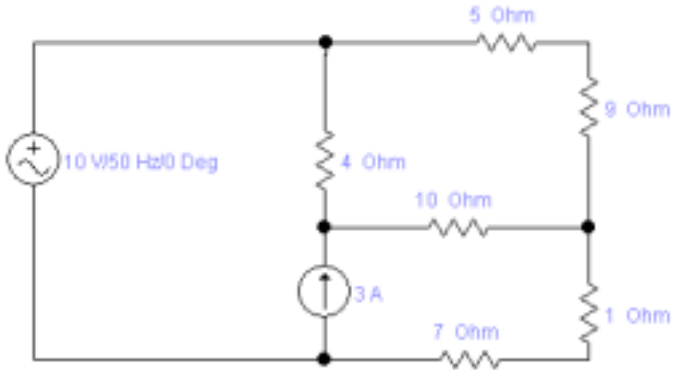
7. List the procedure involved in Node voltage method?
8. Examine the given network using node voltage method and find the Current supplied



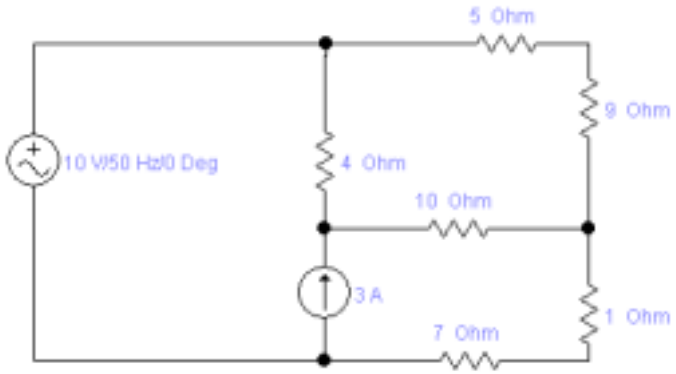
by 60V source?



9. Solve the given circuit by ohms law?
10. Estimate the current in various branches in given figure using mesh analysis?

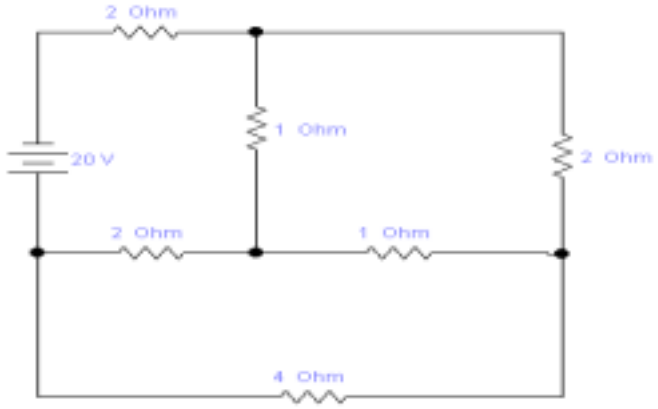


11. Estimate the current in various branches in given figure using nodal analysis



12. Explain the basics of electrical components and explain their methods?

13. Using Nodal analysis analyze the given circuit and estimate current in all branches?



14. Explain the Kirchoff's Current law and Kirchoff's Voltage law?
15. Explain the basic functions of ohms law?

UNIT-II NETWORK THEOREM AND DUALITY

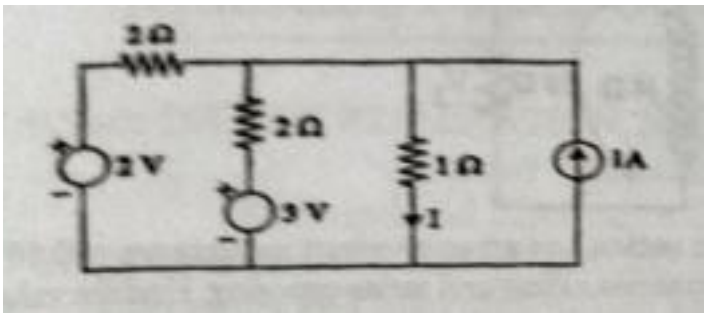
2-Marks

1. Define Superposition theorem?
2. Valuate Thevenin's theorem?
3. Discuss about the Norton's theorem?
4. What is Reciprocity theorem?
5. Estimate the current through 5Ω resistor by using Superposition theorem?
6. Show that how to find the Voc and Rth in thevenin's theorem??
7. Inspect the Millman's theorem?
8. List out the limitations of Reciprocity theorem?
9. List out the limitations of Reciprocity theorem How will you convert the current source to voltage source?
10. How will you convert the current source to voltage source?

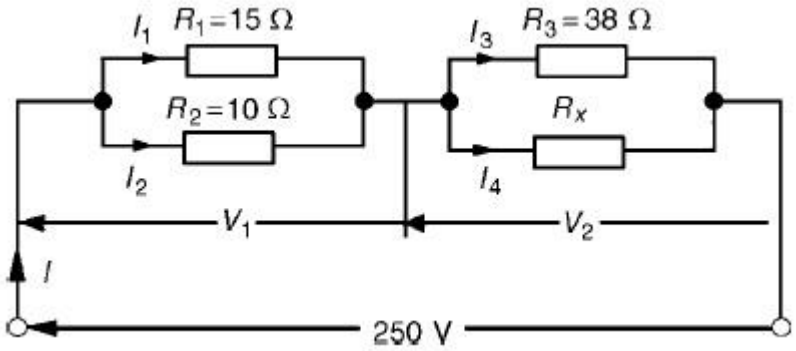
Part-B

1. For the circuit shown in figure, using Thevenin's theorem, find the current in the 10Ω resistor?

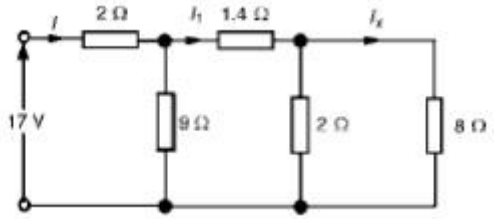
2. Determine the I flow through 1ohm resistor using Norton theorem



3. Determine the equivalent resistance to star – delta conversion?
4. Two resistors are connected in series across a 24V supply and a current of 3A flows in the circuit. If one of the resistors has resis and (b) the p.d. across the 2 Ω resistor. If the circuit is connected for 50 hours, how much energy is used?
5. For the circuit shown in Figure 5.23 calculate (a) the value of resistor Rx such that the total power dissipated in the circuit is 2.5kW, and (b) the current flowing in each of the four resistors?



6. For the arrangement shown in figure find the current Ix



7. Explain the details about the star delta conversation?
8. A star-connected load consists of three identical coils each of resistance 30 Ω and inductance 127.3 mH. If the line current is 5.08 A, calculate the line voltage if the supply frequency is 50 Hz. Inductive reactance XL =2πfL
9. A 415V, 3-phase, 4 wire, star-connected system supplies three resistive loads as shown in Figure Determine (a) the current in each line and (b) the current in the neutral conductor?
10. Explain and details about the circuit theory of the venins theorem?
11. Explain the study about the Norton's theorem states and explain in it?
12. Use Norton's theorem to determine the current I flowing in the 4 Ω resistance?

13. A Wheatstone bridge network Calculate the current flowing in the 32 Ω resistor, and its direction, using Théveni negligible resistance?
14. Power dissipated in 4Ω resistor P=I2R=(0.571)2 (4)=1.304W Use Thévenin's t to determine the current flowing in the 3 Ω resistance of the network ?

UNIT-III SINUSOIDAL STEADT STATE ANALYSIS

2-Marks

1. What is the phase of a sinusoidal function?
2. What is the phasor of a sinusoidal function?
3. What is the phase of an impedance? What are in-phase and quadrature?
4. How to solve the sinusoidal steady-state response by using phasor and impedance?
5. What is the reflected impedance of a circuit with transformer?
6. What are the Characteristics of sinusoidal response?
7. What are the Purpose steady-state analysis?
8. How to calculate steady-state solution by phasor?
9. Define algebraic equation?
10. What is the impedance?

Part-B

1. Use a phasor diagram to find the value of R that will cause iR to lag the source current is by 45° when ω = 5 krad/s?
2. Explain in detail about Polarity of the voltage and current ratios and their diagrams?
3. Discuss and solving the two mesh equations of a general linear transformer?
4. Explain the details about in Characteristics of ideal transformer?
5. Explain about the sinusoidal voltage source (dependent or independent)?
6. Explain the relationship between the phasor current and phasor voltage at the terminals of an inductor?
7. In a two element series circuit, the applied voltage and the resulting current are V(t) = 60 + 66 sin (1000t) V, i(t) = 2.3sin (1000t + 68.3) 3 A to find nature element?
8. Explain about the Classification of Coupling and their function are include? Explain coupling aide type?
9. Illustrate the ideas associate with circuit responses to sinusoidal sources?

10. Explain Passive Circuit Elements in Frequency Domain?
11. Discuss the details in Kirchhoff's Laws and Impedance Combinations?
12. Determine the Summary of the Phasor Approach to Circuit Analysis?
13. Useful Circuit Analysis Techniques – Phasor Domain? Consider that the voltage and current associated with the terminals of the network shown are given by v = 75 cos ω(ωt − 15◦) V i = 16 cos(ωt + 60◦) A Determine (i) the reactive power and the average power at the terminals of the network; (ii) whether the network inside the box is absorbing or delivering average power and (iii) whether the netwok inside the box is absorbing or delivering magnetizing vars. (iv) Determine the power factor and the reactive factor for the network inside the box?
14. Explain the Relationship between RMS Values and Average Power and complex power?
15. Explain about the filter and their types and applications?

UNIT-IV TRANSISTENTS AND RESONANCE IN RLC CIRCUITS

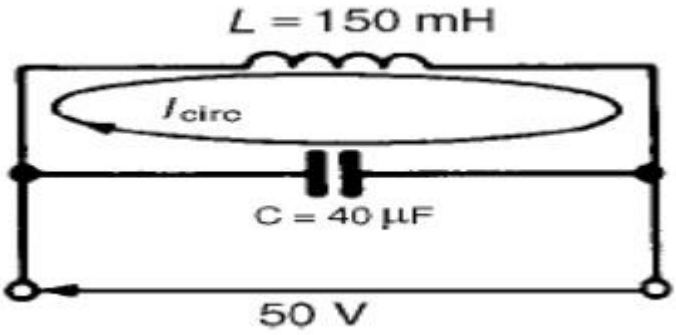
2-Marks

1. Define RL circuits?
2. Draw the single phase RL circuit diagram?
3. Define quality factor?
4. Determine the function of quality factor?
5. Define RLC circuits?
6. Determine the frequency response?
7. Define parallel response?
8. Explain series response?
9. Write down the application of RLC circuits?
10. Write down the unit step function?

Part-B

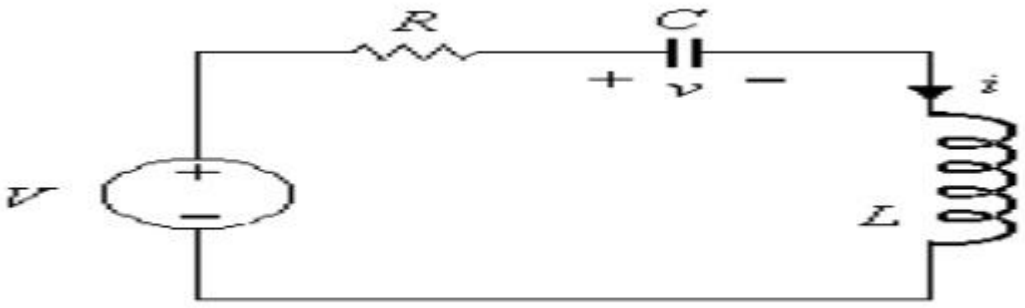
1. A pure inductance of 150 mH is connected in parallel with a 40 μF capacitor across a 50 V, variable frequency supply. Determine (a) the resonant frequency

of the circuit and (b) the current circulating in the capacitor and inductance at



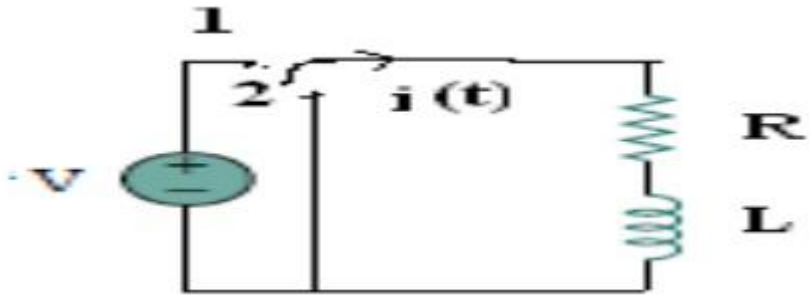
resonance?

2. 1- A series L–R–C circuit has a sinusoidal input voltage of maximum value 12 V. If inductance, L = 20 mH, resistance, R = 80 Ω, and capacitance, C = 400 nF, determine (a) the resonant frequency, (b) the value of the p.d. across the capacitor at the resonant frequency, (c) the frequency at which the p.d. across the capacitor is a maximum, and (d) the value of the maximum voltage across the capacitor?
3. A coil of inductance 5 mH and resistance 10 Ω is connected in parallel with a 250 nF capacitor across a 50 V variable-frequency supply. Determine (a) the resonant frequency, (b) the dynamic resistance, (c) the current at resonance, and (d) the circuit Q-factor at resonance?
4. Explain about the Summary of the properties of RLC resonant circuits?
5. Details about the step response of series RLC circuit



6. Define Q-factor Derive the expressions for Q-factor of inductor and capacitor (or) Write a note on figure of merit?
7. Explain about the linear transformer and their functions?
8. Discuss the details about in transient response of RL circuits?
9. To find the current expression (response) for the circuit and write the KVL equation around the circuit?
10. Write a short note on (i) Actual time (t) (ii) Growth of current in inductor?

11. Explain Current decay in source free series RL circuit?



12. Discuss the details about **Response of a series R-L-C circuit?**
13. Draw the circuit in which R, L, and C are connected in series with each other across ac supply?
14. Determine the steps included to draw phasor diagram?
15. Write a note phasor diagram depends on the condition of magnitude of VL and Vc which ultimately depends on values of XL and Xc and explain the different cases?

UNIT-V COUPLED CIRCUITS AND TOPOLOGY

2-Marks

1. Define magnetically coupled circuits?
2. Define mutual inductance?
3. Write short note in linear transformer?
4. Define network Topology?
5. Define nodal analysis?
6. Determine the trees analysis?
7. Define link analysis?
8. Define loop analysis?
9. Determine the functions of ideal transformer?
10. Explain the function of coupled circuits?

Part-B

1. What is coupled circuits and what are the applications of coupled circuits?
2. Determine to consider a single inductor, a coil with N turns. When current i flows through the coil used derive to Faraday's law?
3. Determine the energy in a coupled circuits and determine the Determine the coupling coefficient. Calculate the energy stored in the coupled inductors at time t = 1 s if v = 60 cos (4t + 30◦) V?
4. Explain about the linear transformer and their function of liner transformer and their applications?

5. Write and explain about the details in network topology and their functions?
6. Explain about the introductions of network topology and write advantages and disadvantages?
7. Write a short notes on (i) link analysis (ii) loop analysis (iii) trees and general nodal analysis?
8. Explain classification of coupling and coupling of aiding method?
9. Explain mutually coupled inductors in parallel? Write details of Elimination of mutual inductance?
10. Energy in mutually coupled inductors? Analysis of circuits with magnetically coupled inductors?
11. Explain the details about Nodal analysis and mesh analysis?
12. Find the equivalent inductance of the given circuit. Also find coefficient of coupling and leakage factor?
13. Two coils connected in series-aiding fashion have a total inductance of 250 mH. When connected in a series-opposing configuration, the coils have a total inductance of 150 mH. If the inductance of one coil (L1) is three times the other, find L1, L2, and M. What is the coupling coefficient?
14. Two coils are mutually coupled, with L1 = 25 mH, L2 = 60 mH, and k = 0.5. Calculate the maximum possible equivalent inductance if: (a) the two coils are connected in series (b) the coils are connected in parallel?
15. (a) Find the input impedance of the circuit in Fig. 13.99 using the concept of reflected impedance? (b) Obtain the input impedance by replacing the linear transformer by its T equivalent?