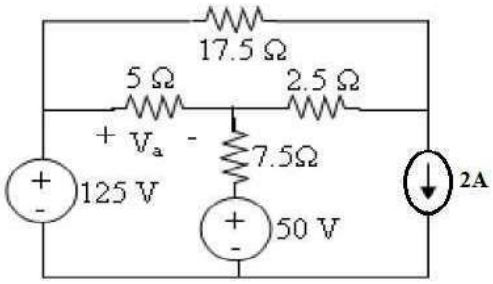
Question Bank ECA

Unit-1

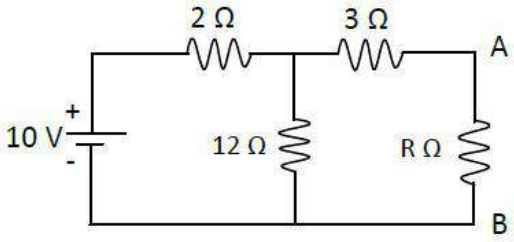
1. a) What do you mean by an electric network and an electric circuit?

   b) Find the value of V_a for the following circuit using KVL.



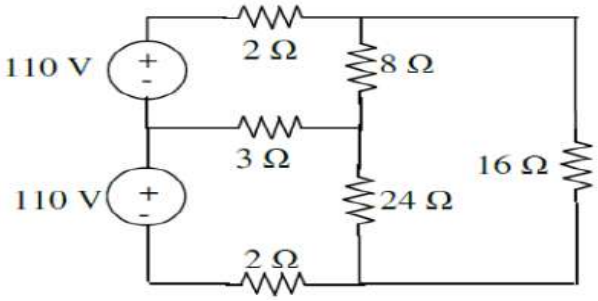
2. a) Explain the concept of source transformation?

b)Find the maximum power delivered to the load by using maximum power transfer theorem for the following circuit.



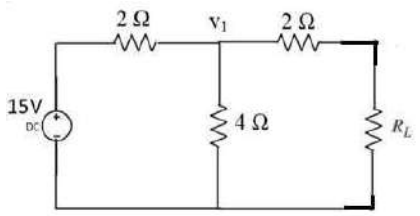
3. (a) State and explain Kirchhoff's laws?

   (b) Using nodal analysis find all branch currents for the following circuit



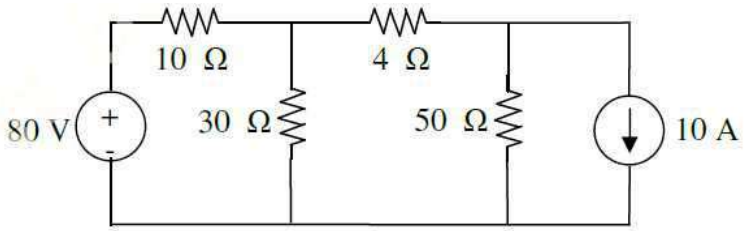
4. a) What is the condition for maximum power transfer to the load?

b) Find Thevenin's equivalent for the following circuit.



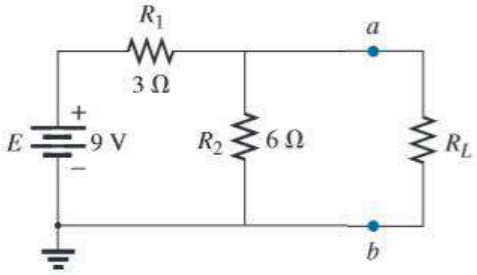
5. a) State and explain Superposition theorem?

b) Verify Superposition theorem for 4Ω resistor for the following circuit.



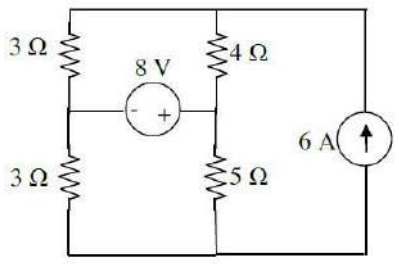
6. a) State and explain milliman's theorem.

b) Find Norton's equivalent for the following circuit.



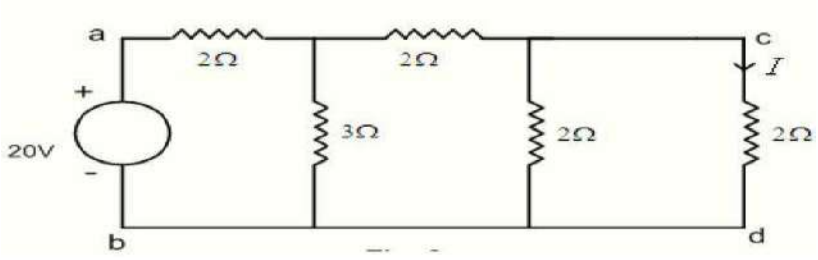
7. (a) State Kirchhoff's voltage law?

(b) Find branch currents for the following circuit.



8. a)State and explain Norton's theorem?

b) Verify the reciprocity theorem for the network shown in fig .



Unit -2

10. a) What is time constant? What are the time constants of series RL and RC circuits?

b) Deduce the transient response and source free response for seriesRC circuit .

11. (a) Explain about properties of Exponential Response of RLC circuits.

(b) Deduce the transient response source free series RL cicuit

12. (a) Explain about Source free RL and RC Circuits.

(b) Explain the complete response of source free series RLC Circuits.

13. Explain the complete response of source free parallel RLC Circuits.

14. The impedances of parallel circuit are Z1= (6+j8) ohms and Z2 = (8-j6) ohms. If the applied voltage is 120V, find (i) current and power factor of each branch (ii) overall current(iii) power consumed by each impedance. Draw the phasor diagram

15. Explain the phasor relation for R,L,C elements.

16. A resistor of 50Ω, inductance of 100mH and a capacitance of 100μF are connected in series across 200V, 50Hz supply. Determine the following

i) Impedence ii) current flowing through the circuit iii)Power Factor

iv)voltage across R,L and C v) Power in Watts.

17. (a)Explain the phasor relation for series RL and RC circuit

(b) A 120V AC circuit contain 10 Ω resistance and 30 Ω inductive reactance in series. What is average power of this circuit.

18. (a) Define power factor, apparent power, active power and reactive power.

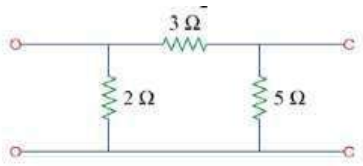
(b)The impedances of parallel circuit are Z1= (4+j6) ohms and Z2 = (12-j8) ohms. If the applied voltage is 220V, find (i) current and power factor of each branch (ii) overall current (iii) power consumed by each impedance. Draw the phasor diagram.

19.(a) Explain the phasor relation for parallel RL and RC elements.

(b) A 120V AC circuit contains 10 Ω resistance and 30 Ω inductive reactance in series. What is average power of this circuit.

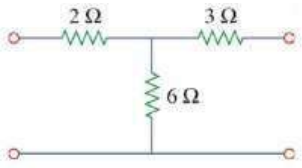
Unit 3

1. a) Find the Z- parameters for the following circuit.



b) Express ABCD parameters in terms of h parameters.

2. a) Find the Y- parameters for the following circuit.

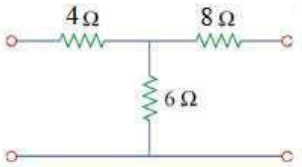


b) Express h parameters in terms of ABCD parameters.

3. a) Find the ABCD parameters for the following circuit.

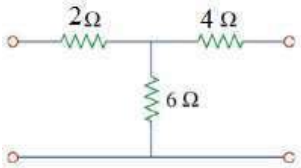
b) Express Y parameters in terms of h parameters.

4. a) Find the h- parameters for the following circuit.

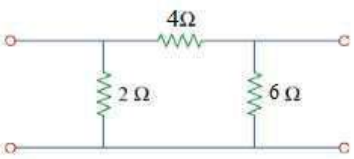


b) Find the relationship between Z and h parameters.

5. Find the Z and Y parameters for the following circuit.

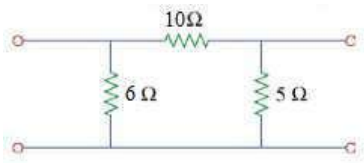


6. a)Find the Y- parameters for the following circuit.



b) Express Z parameters in terms of ABCD parameters.

7. Find the ABCD and h - parameters for the following circuit.



Unit-4

1. a) Explain Neper and Decibel.

   b) What is a constant K low pass filter, derive its characteristics impedance.

2. a) What is a filter? Explain about various types of filters.

   b) Explain the classification of pass band and stop band in detail.

3. Derive the expression for characteristic impedance in a pass band filter.

4. Explain the design procedure for a constant K low pass filter and its characteristics.

5. Design a constant K high pass filter and explain its design procedure in detail.

6. What is high pass filter. Explain the general configuration and parameters of a contant-Khigh pass filter

7. What is an m-derived filter? Explain the general configuration and parameters of m-derived low pass filter.

8. Derive necessary expressions for m-derived high pass filter.

9. Give the analysis for the design of constant-K band pass filter.

10. Design a band elimination filter and explain its design procedure in detail.

I. Basic Circuit Analysis

1. Kirchhoff's Current Law (KCL) states that:
   a) The sum of voltages around a closed loop is zero.
   b) The sum of currents entering a node is zero.
   c) The voltage across a resistor is proportional to the current through it.
   d) Power is equal to voltage times current.
2. Thevenin's theorem is used to:
   a) Simplify a complex circuit into a voltage source and series resistance.
   b) Calculate the maximum power transfer.
   c) Find the current through a specific element.
   d) Analyze transient responses.
3. In nodal analysis, the unknown variable is:
   a) Current.
   b) Voltage.
   c) Resistance.
   d) Power.
4. Source transformation is used to convert:
   a) Voltage sources to current sources and vice-versa.
   b) Resistors to capacitors.
   c) Inductors to capacitors.
   d) AC to DC.
5. Maximum power transfer occurs when the load resistance is:
   a) Equal to the source resistance.
   b) Twice the source resistance.
   c) Half the source resistance.
   d) Zero.
6. When using the superposition theorem, each independent source is considered:

a) Simultaneously.

b) One at a time, with others turned off.

c) Only the largest source.

d) Only the smallest source.

7. In a series circuit, the current is:

a) Different across each element.

b) The same across each element.

c) Proportional to the resistance.

d) Inversely proportional to the resistance.

8. In a parallel circuit, the voltage is

a) Different across each element.

b) The same across each element.

c) Proportional to the resistance.

d) Inversely proportional to the resistance.

9. The reciprocal of resistance is:

a) Inductance.

b) Capacitance.

c) Conductance.

d) Reactance.

10. A dependent voltage source's value is determined by

a) A constant voltage.

b) A current or voltage elsewhere in the circuit.

c) The source resistance.

d) The load resistance.

II. Transient Analysis

11. The time constant of an RC circuit is given by:

a) R/C

b) RC

c) 1/RC

d) C/R

12. In an underdamped RLC circuit, the response is:

a) Overdamped.

b) Critically damped.

c) Oscillatory with decreasing amplitude.

d) Constant.

13. The initial condition for a capacitor is determined by:

a) The voltage across it at t=0-.

b) The current through it at t=0-.

c) The resistance in the circuit.

d) The inductance in the circuit.

14. .The steady-state response of an RL circuit to a DC source is:

a) Exponentially decaying.

b) Linearly increasing.

c) Constant.

d) Oscillatory.

15. The resonance frequency of a series RLC circuit is given by:

a) 1/(LC)

b) √(LC)

c) 1/√(LC)

d) L/C.

16. The response of an RC circuit to a step input is:

a) Linear.

b) Exponential.

c) Sinusoidal.

d) Parabolic.

17. In an RL circuit, the inductor opposes:

a) Change in voltage.

b) Change in current.

c) Constant current.

d) Constant voltage.

18 Critically damped RLC circuit response has:

a) Oscillations.

b) No oscillations and fastest return to steady state.

c) Slow return to steady state.

d) Increasing oscillations.

19. The final value of the current through an inductor in a DC circuit is:

a) Zero.

b) Infinite.

c) Determined by the steady-state conditions.

d) Dependent on initial charge.

20. The initial voltage across a capacitor in a DC circuit before a change is:

a) Always zero.

b) The voltage from the previous steady state.

c) Infinite.

d) Related to the current.

III. Two-Port Networks

21. The Z-parameters of a two-port network relate:

a) Voltages to currents.

b) Currents to voltages.

c) Input voltage to output voltage.

d) Input current to output current.

22. The ABCD parameters are also known as:

a) Impedance parameters.

b) Admittance parameters.

c) Transmission parameters.

d) Hybrid parameters.

23 For a reciprocal two-port network:

a) Z12 = Z21.

b) Y12 = Y21.

c) AD - BC = 1.

d) All of the above.

24. The h-parameters relate:

a) Voltages to currents.

b) A mix of voltages and currents.

c) Only voltages.

d) Only currents.

25. When two two-port networks are connected in cascade, the overall parameters are obtained by:

a) Adding the individual parameters.

b) Multiplying the individual parameters.

c) Taking the reciprocal of the individual parameters.

d) Subtracting the individual parameters.

26.The 'Y' parameters of a two-port network are also known as:

a) Impedance parameters.

b) Admittance parameters.

c) Hybrid parameters.

d) Transmission parameters.

27.For a symmetrical two-port network:

a) Z11 = Z22.

b) Y11 = Y22.

c) AD = BC.

d) All of the above.

28. The 'h' parameters are useful for analyzing:

a) Transmission lines.

b) Amplifiers.

c) Filters.

d) Resonant circuits.

29.The 'g' parameters are the inverse of:

a) 'z' parameters.

b) 'y' parameters.

c) 'h' parameters.

d) 'abcd' parameters.

30. The condition AD-BC=1 applies to:

a) Z-parameters.

b) Y-parameters.

c) h-parameters.

d) ABCD-parameters.

IV. Network Functions and Synthesis

31. A driving-point impedance function is:

a) The ratio of output voltage to input current.

b) The ratio of input voltage to input current.

c) The ratio of output current to input voltage.

d) The ratio of output voltage to input voltage.

32. Poles of a network function are:

a) Values of 's' that make the function zero.

b) Values of 's' that make the function infinite.

c) Values of 's' that make the function equal to 1.

d) Values of 's' that make the function equal to -1.

33. A positive real function is:

a) Real and positive for all real values of 's'.

b) Real and positive for all real values of 's' >= 0.

c) Real and positive for all Re(s) > 0.

d) Real and positive for all Im(s) > 0.

34. Cauer and Foster forms are used for:

a) Analyzing transient responses.

b) Synthesizing one-port networks.

c) Designing amplifiers.

d) Analyzing two-port networks.

35.. A low-pass filter is designed to:

a) Pass high frequencies and attenuate low frequencies.

b) Pass low frequencies and attenuate high frequencies.

c) Pass a specific band of frequencies.

d) Block a specific band of frequencies.

36. Zeros of a network function are:

a) Frequencies at which the function becomes infinite.

b) Frequencies at which the function becomes zero.

c) Frequencies at which the function becomes 1.

d) Frequencies at which the function becomes -1.

37. A reactance function must have:

a) Poles and zeros on the right half of the s-plane.

b) Poles and zeros on the left half of the s-plane.

c) Poles and zeros on the jω-axis.

d) Poles and zeros at the origin.

38. Foster forms of synthesis use:

a) Series elements only.

b) Parallel elements only.

c) Series and parallel combinations of elements.

d) Only resistors.

39. A band-pass filter is designed to:

a) Pass all frequencies.

b) Block all frequencies.

c) Pass a specific range of frequencies.

d) Block a specific range of frequencies.

40. A high-pass filter is designed to:

a) Pass low frequencies and block high frequencies.

b) Pass high frequencies and block low frequencies.

c) Pass a band of frequencies.

d) Block a band of frequencies.