SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

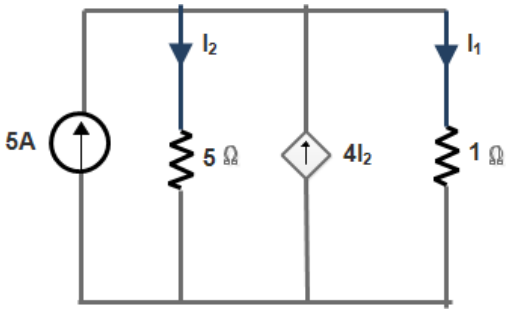
QUESTION BANK (DESCRIPTIVE)

Subject with Code : Network Analysis (23EE0205) **Course & Branch**: B.Tech - ECE

Year & Sem: I-B.Tech & II-Sem **Regulation:** R23

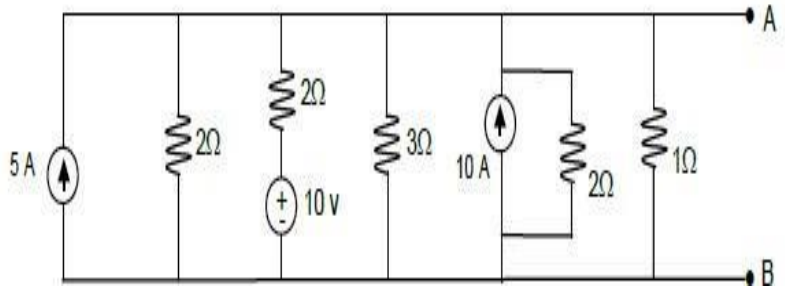
UNIT –I

1. a. Find I_1 and I_2 for given circuit. [L2][CO1] [5M]

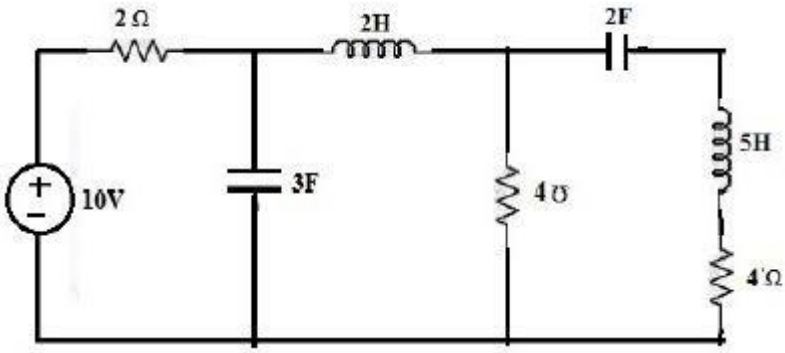


b. Define independent source and dependent source, what are the types of dependent sources. [L2][CO1] [5M]

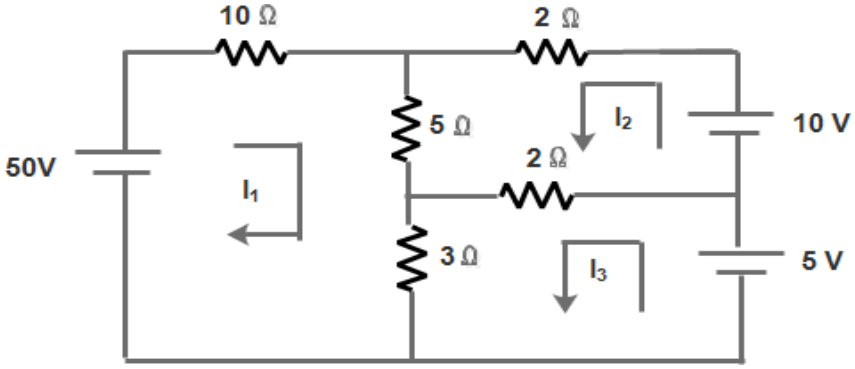
2. a. By using source transformation, convert the circuit shown in figure below into a single voltage source and single resistance. [L3][CO1][5M]



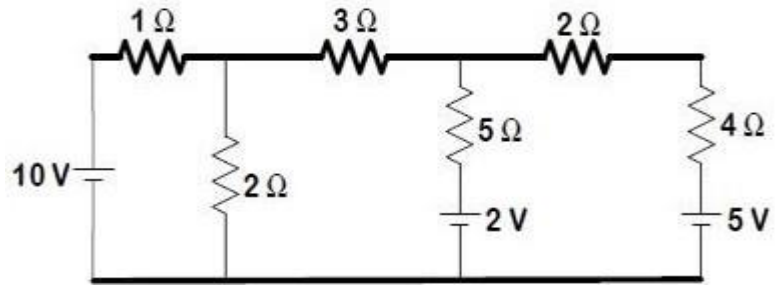
b. Draw the dual circuit for given circuit below. [L1][CO1][5M]



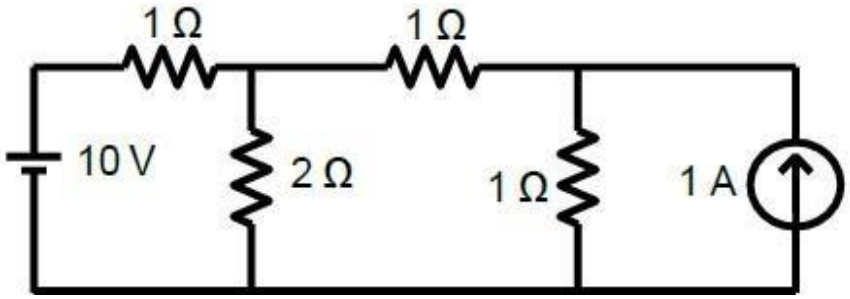
3. Determine the Mesh currents for the following network. [L3][CO1][10M]



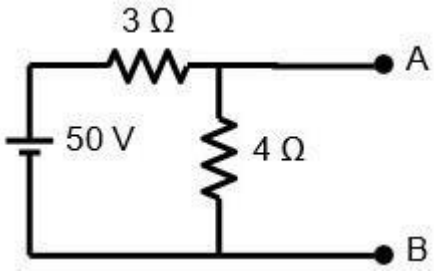
4. Calculate the current through 5 Ω resistor using Nodal analysis. [L3][CO1][10M]



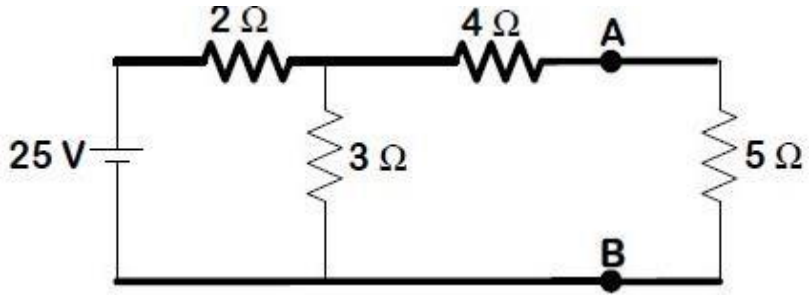
5. Calculate the current in 2Ω resistor in the given circuit using Super position theorem. [L3][CO1][10M]



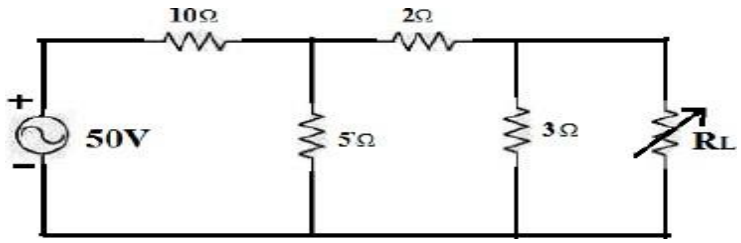
6. a. Find the Thevenin's equivalent circuit across AB for the given circuit. [L3][CO1][5M]



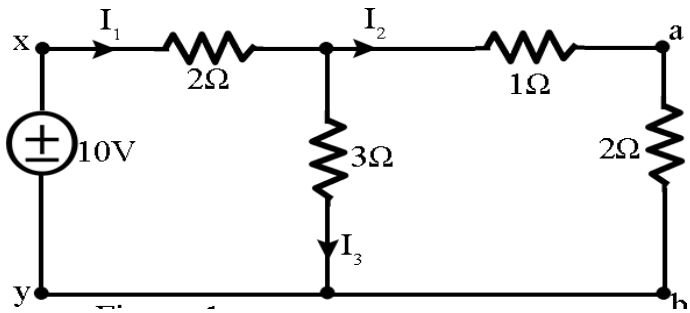
b. Find the Norton's equivalent across AB for the given circuit. [L3][CO1][5M]



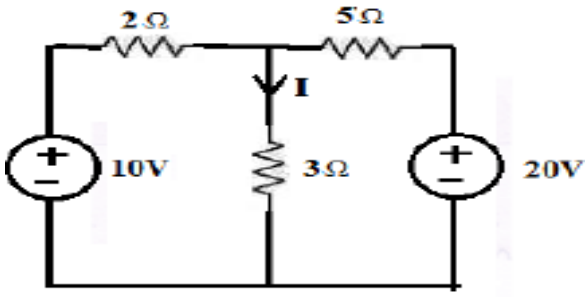
7. a. Determine the Maximum power delivered to the load resistance RL [L3][CO1][5M]



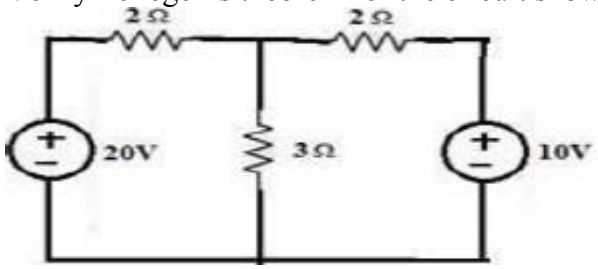
b. Verify Reciprocity theorem for the network shown in below figure. [L3][CO1][5M]



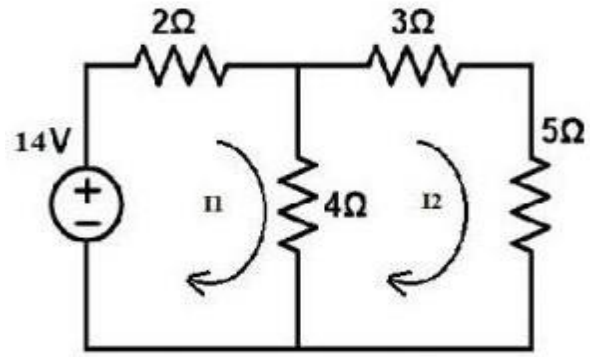
8. a. Calculate the current 'I' by using Milliman's theorem. [L3][CO1][5M]



b. Verify Tellegen's theorem for the circuit shown in below figure. [L3][CO1][5M]



9. Calculate the voltage & current within all the resistors by using Substitution theorem. [L3][CO1][10M]



10. a. Define statement of Thevenin's theorem. [L1][CO1][2M]

b. Define statement of Reciprocity theorem. [L1][CO1][2M]

c. Define statement of Tellegen's theorem. [L1][CO1][2M]

d. Define statement of Milliman's theorem. [L1][CO1][2M]

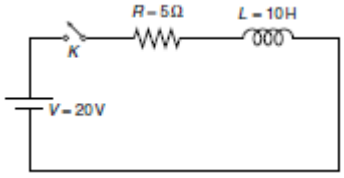
e. Define statement of Substitution theorem. [L1][CO1][2M]

UNIT –II

1. Derive the transient response of R-L series circuit having DC excitation? [L2][CO2] [10M]

2. Derive the expression for current in R-C series circuit having DC excitation? [L2][CO2][10M]

3. a. A DC voltage of 20 V is applied in an R–L circuit where R = 5Ω and L = 10 H. Calculate (a) the current i; (b) voltage across resistor and voltage across the inductor; and (c) the time constant. [L3][CO2][5M]



b. The constant voltage of 100 V is applied at t = 0 to a series R–C circuit having R = 5MΩ, C = 20μF. By assuming no initial charge to the capacitor, find current i and the voltage across R and C. [L3][CO2][5M]

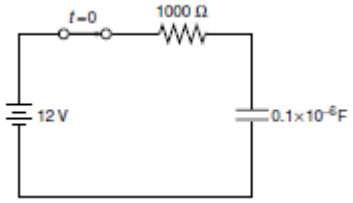
4. a. A coil having a resistance of 100Ω and an inductance of 20 H is connected to a 200 V DC source. Suddenly, the coil is disconnected from the battery and short-circuited. Calculate the following: [L3][CO2][5M]

1. The current in the coil at t = 0
2. Rate of change of current at t = 0
3. Time constant

b. A circuit has resistance of 1000Ω and a series capacitance of 0.1μF. At t = 0, it is connected to a 12 V battery. [L3][CO2][5M]

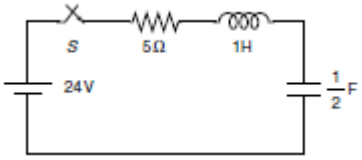
Find the following:

1. The current at t = 0
2. Rate of change of current at t = 0
3. Rate of change of capacitor voltage at t = 0



5. Derive the expression for current in case of critically damped series R-L-C circuit with DC excitation. [L2][CO2][10M]

6. For the circuit shown in Figure, find the transient current when switch S is closed. [L3][CO2][10M]



7. a. Find the final value of f (t) = 8 (2 − e^{-4t}) using the final value theorem. [L3][CO2][5M]

b. Find the initial value of a function whose Laplace transform is given as follows: [L3][CO2][5M]

$$\frac{(s+1)(s+2)}{s(s+3)(s+4)}$$

8. Evaluate the given function using partial fractions expansion. [L3][CO2][10M]

$$L^{-1}\left[\frac{1}{(s-1)(s^2+1)}\right]$$

9. a. Find the Laplace transform of sin ωt [L3][CO2][5M]

b. Find the Inverse Laplace transform of given F(s) using Heaviside's expansion theorem. [L3][CO2][5M]

$$F(s) = \frac{(S+2)}{S(s+3)(s+4)}$$

10. a. Define time constant. [L1][CO2][2M]

b. What is the significance of initial conditions. [L1][CO2][2M]

c. Define Laplace transform of a function *f(t).* [L1][CO2][2M]

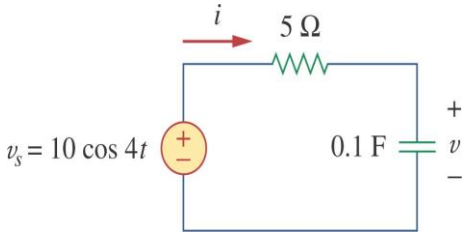
d. State Initial value theorem. [L1][CO2][2M]

e. State Final value theorem. [L1][CO2][2M]

UNIT –III

1 a) Explain the phasor relation for R, L, C elements. [L1][CO3] [6M]

b) Find $v(t) and$ i(t) in the circuit shown in figure below [L3][CO3] [4M]

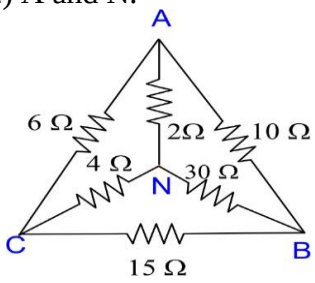


2 a) Explain phasor representation of series R L circuit. [L2][CO3] [5M]

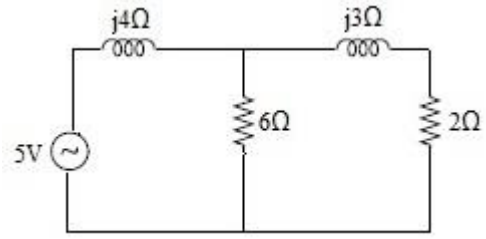
b) A voltage of 120 V at 50 Hz is applied to a resistance, R in series with a capacitance, C. The current drawn is 2 A, and the power loss in the resistance is 100 W. Calculate the resistance and the capacitance. [L3][CO3] [5M]

3 Derive the necessary relations for performing star to delta and delta to startransformations. [L1][CO3] [10M]

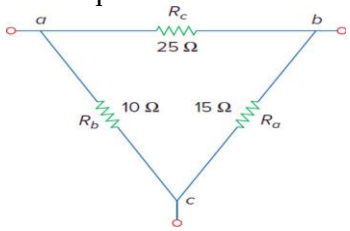
4	For the circuit shown in Figure below determine the equivalent resistance between (1)A and B and (2) A and N.	[L3][CO3]	[10M]



5	a) Define active power and reactive power.	[L1][CO3]	[4M]
	b) A series circuit having pure resistance of 40Ω, pure inductance of 50.07mH and a capacitor is connected across 400V,50Hz ac supply. This circuit draws a current of 10A. calculate (i) capacitor value (ii) power factor of the circuit.	[L3][CO3]	[6M]
6	a) Explain phasor representation of series R- L- C circuit.	[L2][CO3]	[5M]
	b) A series RLC circuit containing a resistance of 12Ω, an inductance of 0.15H and a capacitor of 100uF are connected in series across a 100V, 50Hz supply. Calculate the total circuit impedance, the circuit current, power factor and draw the voltage phasor diagram.	[L3][CO3]	[5M]
7	The impedance of a parallel circuit are Z1 = (6+j8) Ω and Z2 = (8-j6) Ω. If the applied voltage is 120V, find (i) Current and power factor of each branch (ii)Total current and over all power factor(iii) power consumed by each impedance.	[L3][CO3]	[10M]
8	a) Explain phasor representation of series R - C circuit.	[L2][CO3]	[5M]
	b) A non inductive resistor of 10Ω is in series with a capacitor of 100μF across a 250V, 50Hz ac supply. Determine the current taken by the capacitor and power factor of the circuit	[L3][CO3]	[5M]
9	Determine the mesh currents for the circuit shown in figure.	[L3][CO3]	[10M]



10.a	What is the phase of a sine wave?	[L1][CO3]	[2M]
b.	Explain j operator.	[L1][CO3]	[2M]
c.	Draw equivalent circuit of a pure inductor connected to a sinusoidal supply infrequency domain.	[L2][CO3]	[2M]
d.	Draw the impedance triangle of series R-L circuit with sinusoidal supply.	[L2][CO3]	[2M]
e.	Convert the Δ network to an equivalent Y network.	[L3][CO3]	[2M]



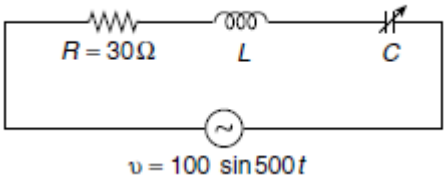
UNIT –IV

1. a. Derive an equation for the resonance frequency of a series resonant circuit in terms of L and C. [L2][CO4] [7M]

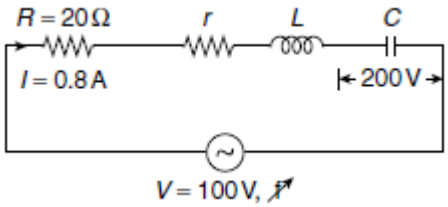
b. A resistance of 10Ω, a capacitor of 470pF and inductor of 0.5mH are connected in series across a variable frequency voltage source. Calculate the value of frequency at which the circuit will attain the resonance condition. [L2][CO4] [3M]

2. a. Derive an equation for the Q-factor of a series resonant circuit in terms of R, L and C. [L2][CO4] [5M]

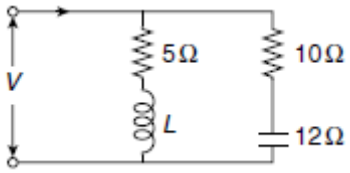
b. In the R–L–C series circuit shown in Figure, resonance occurs when the value of C is 20μF. The supply voltage is v = 20 sin 500 t. Find the values of L and Q-factor. [L2][CO4] [5M]



3. A resistor, an inductor and a capacitor are connected in series across at a 100 V variable frequency supply source, as shown in Figure. At a frequency of 250 Hz, the circuit resonates and the current is 0.8 A. At resonance, the voltage across the capacitor is measured as 200 V. Determine the values of r, L and C. [L2][CO4] [10M]

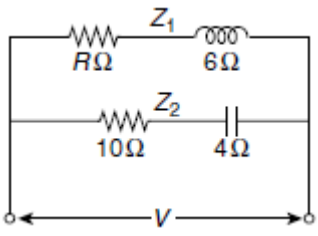


4. Calculate the value of the inductance L for which the parallel circuit shown in Figure will be in resonance at a frequency of 2000 rad/s. [L2][CO4] [10M]



5. Derive the relationship between Q-factor and Band Width of a resonant circuit. [L2][CO4] [10M]

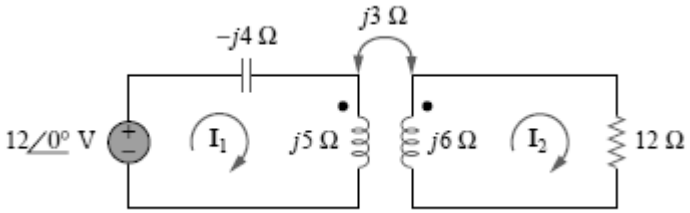
6. a. A parallel circuit is shown in Figure. Calculate the value of R in the circuit for which the circuit will resonate. [L2][CO4] [5M]



b. A parallel resonant circuit is driven by ac mains supply 230V, 50Hz. Find value of C required to be varied to achieve antiresonance in the circuit if it is shunted with a coil of 1mH inductance and 10Ω resistance. [L2][CO4] [5M]

7. Derive the relationship between the self inductance L_1, L_2 and mutual inductance M of two coupled coils. [L2][CO4] [10M]

8. Calculate the phasor currents I_1 and I_2 in the circuit shown in Figure.



9. If a coil of 800μH is magnetically coupled to another coil of 200μH. The coefficient of coupling between two coils is 0.05. Calculate inductance if two coils are connected in, (i) Series aiding (ii) series opposing (iii) Parallel aiding (iv) parallel opposing. [L2][CO4] [10M]

10. a. Define Resonance. [L1][CO4] [2M]

b. Define Bandwidth. [L1][CO4] [2M]

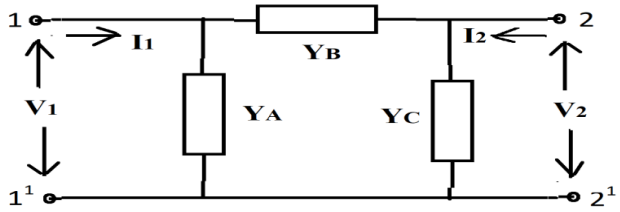
c. Define Q- Factor. [L1][CO4] [2M]

d. Define Self-inductance. [L1][CO4] [2M]

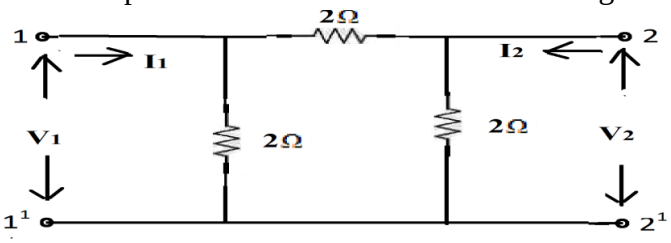
e. Define Mutual inductance. [L1][CO4] [2M]

UNIT –V

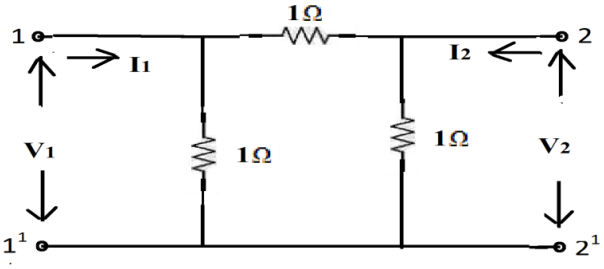
1. a. Find the Short-circuit parameters for the circuit shown in figure. [L4][CO5] [5M]



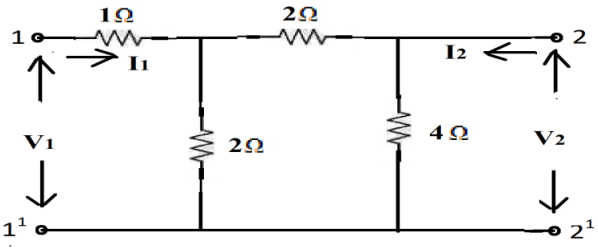
b. Find the transmission parameters for the circuit shown in figure. [L4][CO5] [5M]



2. a. Find the Z-parameters of the network shown in below figure. [L4][CO5] [5M]



b. Find the h-parameters of the network shown in figure. [L4][CO5] [5M]

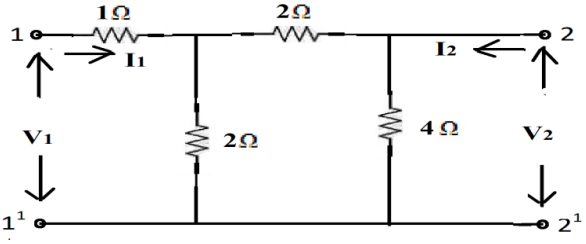


3. Obtain the ABCD parameters in terms of Z parameters and find ABCD parameters for the given Z-parameters of a two-port network, Z_{11}= 10Ω, Z_{22}= 15Ω, Z_{12}= 5Ω and Z_{21}= 5Ω [L4][CO5] [10M]

4. The hybrid parameters of a two-port network are, h_{11}= 1K Ω, h_{12}=0.003, h_{21}= 100 and h_{22}= 50μ℧.Find Z-parameters of the network [L4][CO5] [10M]

5. a. Derive the expressions for Y-parameters in terms of ABCD parameters. [L2][CO5] [5M]

b. Determine the y-parameters of the following network. [L4][CO5] [5M]



6.	a.	Derive the expressions for Z-parameters in terms of ABCD-parameters.	[L2][CO5] [5M]
	b.	Derive the expressions for Admittance and hybrid parameters	[L2][CO5] [5M]
7.		Explain in detail about Z-parameters and ABCD parameters	[L2][CO5] [10M]
8.		Show that for a series connected two-port networks the overall Z- parameters is equal to the addition of individual Z-parameters of the two networks	[L4][CO5] [10M]
9.		Explain what is the effect overall Transmission parameters when two or more two- port networks are connected in cascade	[L2][CO5] [10M]
10.	a.	Define Two-port network.	[L1][CO5] [2M]
	b.	Draw the equivalent circuit of Z-parameters.	[L1][CO5] [2M]
	c.	What is the condition for Symmetry in Z and Y parameters?	[L1][CO5] [2M]
	d.	What is the condition for Reciprocity in Z and Y parameters?	[L1][CO5] [2M]
	e.	Write the equations for Z-parameters in terms of Y-parameters.	[L1][CO5] [2M]