THA INSTITUTE OF SCIENCE AND TECHNOLOGY :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : Electrical Circuits - I (19EE0201) **Course & Branch:** B. Tech. - EEE
Year & Semester : I - B. Tech. & II - Semester **Regulation :** R19

UNIT-I

1.	**a)**	Define the Resistance and Conductance	**L1, 3M**
	b)	State Ohm's Law? Also write its limitations.	**L1, 3M**
	c)	State Kirchhoff's Laws?	**L1, 2M**
	d)	Derive the equivalent resistances when two resistances are connected in parallel.	**L1, 2M**
	e)	Derive the equivalent resistances when two resistances are connected in series.	**L1, 2M**
2.		Explain various types of energy sources with suitable diagrams.	**L1, 12M**
3.		Derive the expression for Delta connected resistances in terms of Star connected resistances.	**L2, 12M**
4.		Find the current in 5Ω resistor for the network shown in Fig. 1.1.	**L3, 12M**

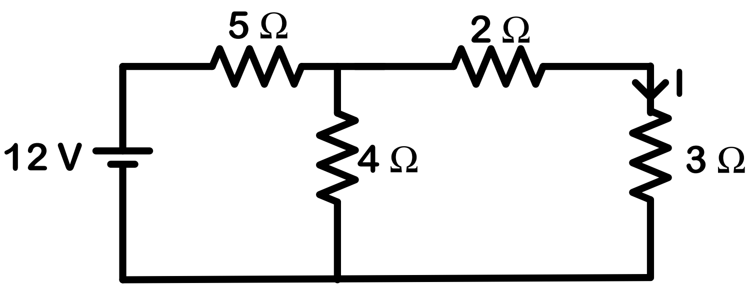

Fig. 1.1

5.		Find the equivalent resistance across the terminals A and B of the network shown in Fig. 1.2 using Star-delta transformation	**L3, 12M**

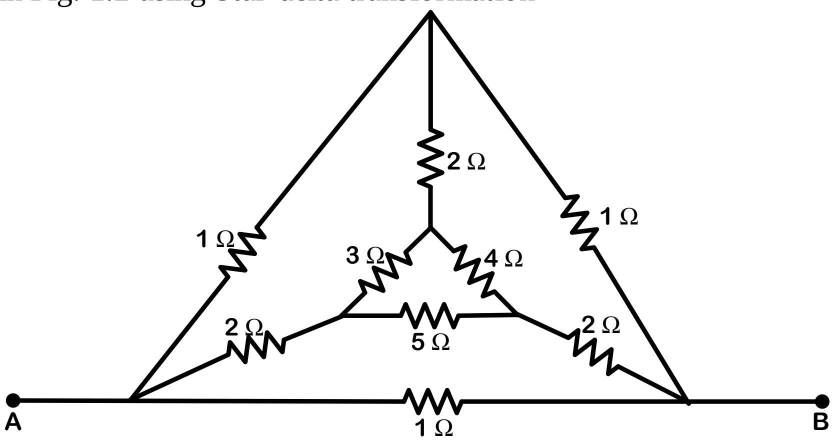

Fig. 1.2

6. Find the current passing through each resistor for the circuit below in Fig. 1.3. **L4, 12M**

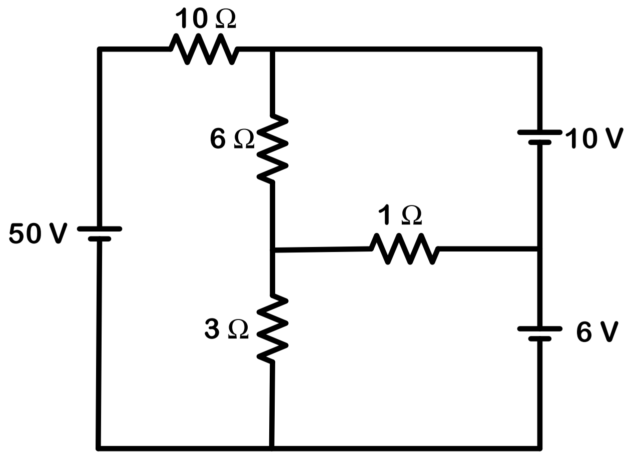

Fig. 1.3

7. Determine the current in the 5Ω resistor in the network given in Fig. 1.4. **L3, 12M**

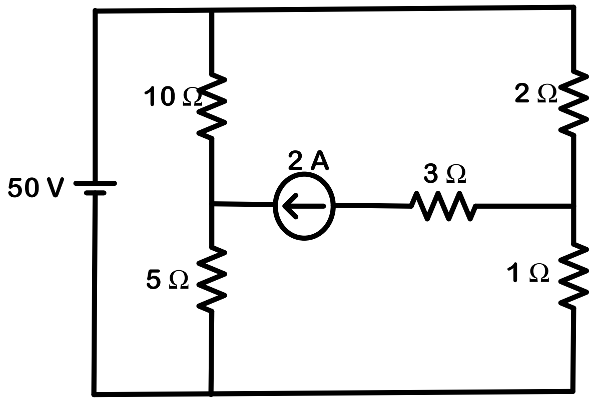

Fig. 1.4

8. Determine the voltages at each node for the circuit shown in Fig. 1.5. **L3, 12M**

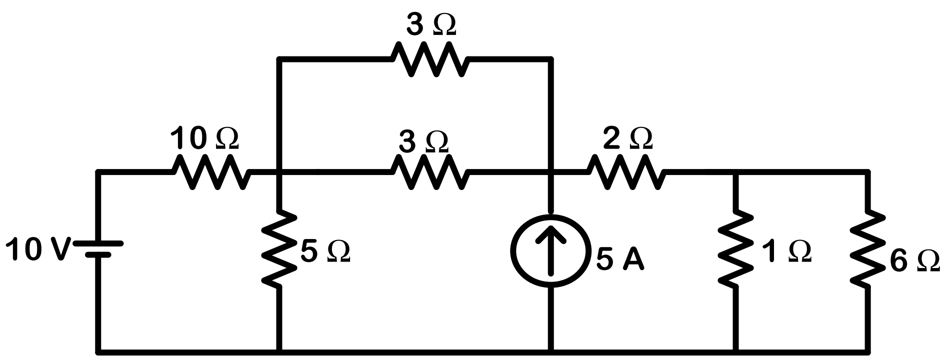

Fig. 1.5

9. Determine the current in the 5Ω resistor in the network given in Fig. 1.6 **L3, 12M**

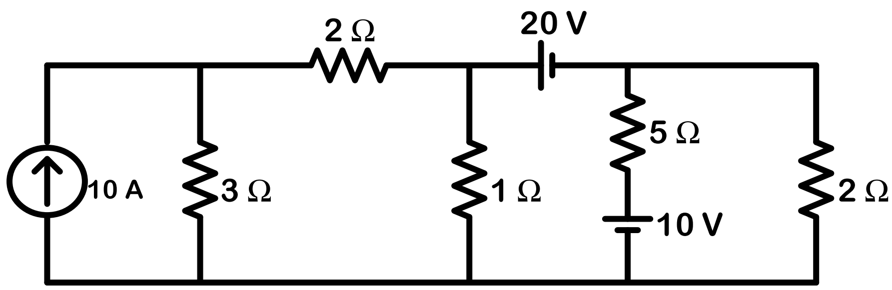

Fig. 1.6

10. Write the node equations for the circuit shown below in Fig. 1.7. **L4, 12M**

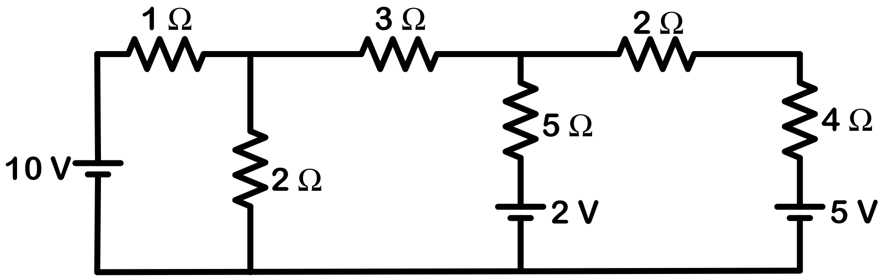

Fig. 1.7

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UNIT-II

1.	**a)**	Explain Faradays laws of electromagnetic induction	**L1, 3 M**
	b)	Define Relative permeability and coupling coefficient	**L1, 3 M**
	c)	What are self-inductance and mutual inductance?	**L1, 2 M**
	d)	State the transformer working principle.	**L1, 2 M**
	e)	Draw voltage current and power waveforms for pure inductive circuit	**L1, 2 M**
2.		Two coupled coils with L_1=0.02H, L_2=0.01H and k=0.5 are connected in four different ways such as series aiding, series opposing, parallel aiding and parallel opposing. Determine the equivalent inductances in all the four cases.	**L3, 12 M**
3.		State and explain Faraday's Laws of Electro Magnetic Induction.	**L1, 12 M**
4.		Derive the expression for equivalent inductance when the coupled inductors are connected in series aiding and series opposition.	**L2, 12 M**
5.		Explain Self Inductance, Mutual Inductance and Co-efficient of coupling in detail. Give the relation between L_1, L_2, k and M.	**L5, 12 M**
6.		Write the Comparison of Electric and Magnetic circuits? Also explain the analogy between the Electric and Magnetic circuits.	**L6, 12 M**
7.		Derive the expression for equivalent inductance when the coupled inductors are connected in parallel aiding and parallel opposition.	**L4, 12 M**
8.		Discuss about Ideal transformer.	**L1, 12 M**
9.		When two identical coupled coils are connected in series, the inductance of the combination is found to be 80 mH. When the connections to one of the coils are reversed, a similar measurement indicates 20 mH. Find the coupling coefficient between the coils.	**L3, 12 M**
10.		Derive an expression for energy stored in an inductor	**L2, 12 M**

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UNIT-III

1.	**a)**	Define Peak factor and Form factor.	**L1, 3 M**
	b)	Explain the concept of power factor, real and reactive power.	**L1, 3 M**
	c)	Draw phasor diagram for simple RC series circuit	**L1, 2 M**
	d)	Draw voltage current and power waveforms for pure capacitive circuit.	**L1, 2 M**
	e)	Define Root Mean Square value.	**L1, 2 M**
2.		Find the form factor of the half wave rectified sine wave shown in Fig. 2.1.	**L2, 12 M**

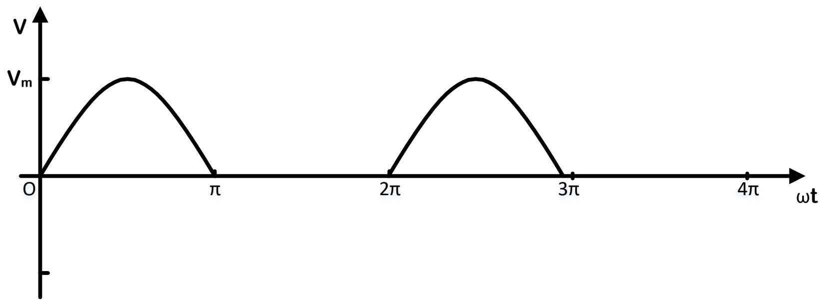

Fig 2.1

3.		Find the form factor for the following waveform shown in Fig. 2.2.	**L2, 12 M**

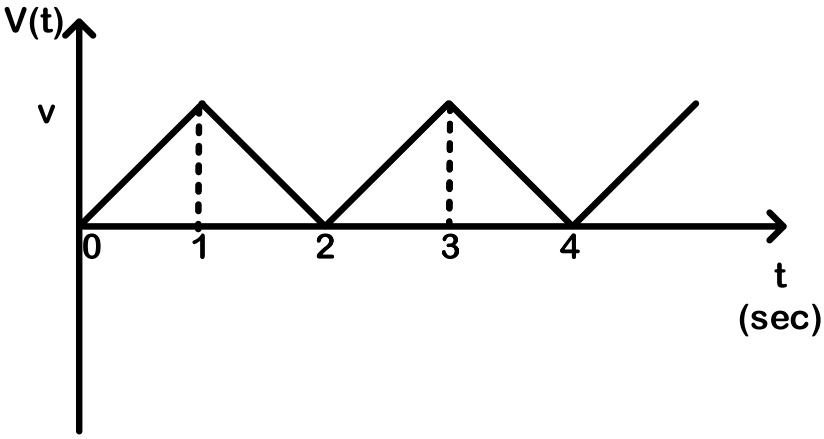

Fig. 2.2

4.		Find the form factor for the following waveform shown in Fig. 2.3.	**L2, 12 M**

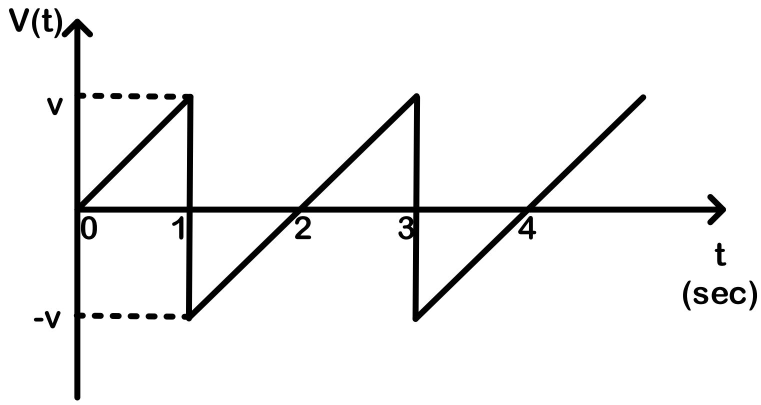

Fig. 2.3

5. The full wave rectified sine wave shown in Fig. 2.4 has a delay angle of 60^o. Calculate the average value and RMS value. **L5, 12 M**

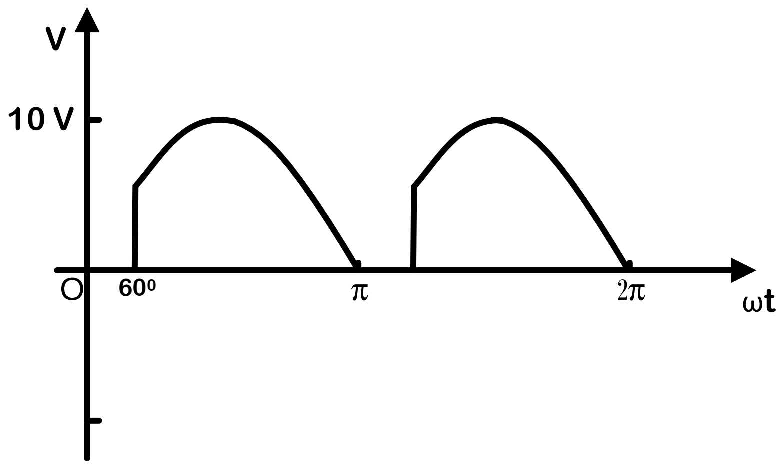

Fig. 2.4

6. A 1kΩ resistor is connected in series with an inductance of 50mH across a 230V, 50Hz AC Supply. Find, **L3, 12 M**

(a) Inductive reactance
(b) Impedance
(c) Current
(d) Phase angle
(e) Voltage drop across resistance
(f) Voltage drop across Inductance

7. A 50Ω resistor is connected in series with a 25μF Capacitor across a 230V, 50HZ AC Supply. Find **L3, 12 M**

(a) Capacitive reactance
(b) Impedance
(c) Current (d) Phase angle
(e) Voltage drop across resistance
(f) Voltage drop across Capacitance
(g) Power Factor.

8. A resistance of 50Ω, inductance of 29.8mH, Capacitance of 3.4μF Capacitor are connected in series across a 200V, 250HZ AC Supply. Find **L3, 12 M**

(a) Impedance of circuit

(b) Current
(c) Power consumed in the circuit
(d) Power factor
(e) Voltage drop across resistance
(f) Voltage drop across Inductance
(g) Voltage drop across Capacitance.
Also draw the phasor diagram for the circuit.

9. A Capacitor of 1μF is connected across an AC Voltage of V=170 sin (400t). Determine, **L4, 12 M**
(a) Capacitive Reactance
(b) Sinusoidal expression for current
(c) Maximum current.

10. A Pure Inductive coil allows a current of 10A to flow from a 230V, 50Hz AC Supply. Find, **L3, 12 M**
(a) Inductive Reactance
(b) Inductance of the coil
(c) Power Absorbed
(d) Sinusoidal equations for Voltage and Current.

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UNIT-IV

1.	**a)**	State Norton's theorem.	**L1, 3 M**
	b)	State Milliman's.	**L1, 3 M**
	c)	State Tellegen's theorem.	**L1, 2 M**
	d)	State maximum power transfer theorem.	**L1, 2 M**
	e)	State Compensation theorem.	**L1, 2 M**
2.		Find the current passing through 3Ω Resistor for the circuit shown below in Fig. 5.1 by using Superposition theorem.	**L3, 12 M**

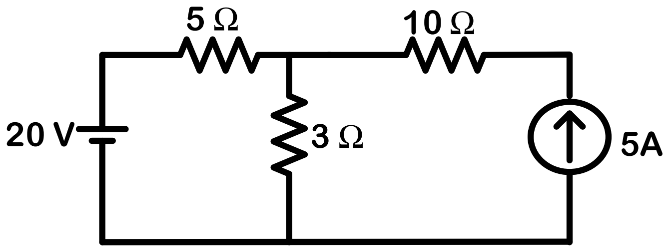

Fig. 5.1

3.		Determine the Norton's equivalent circuit for the circuit shown in Fig. 5.2.	**L3, 12 M**

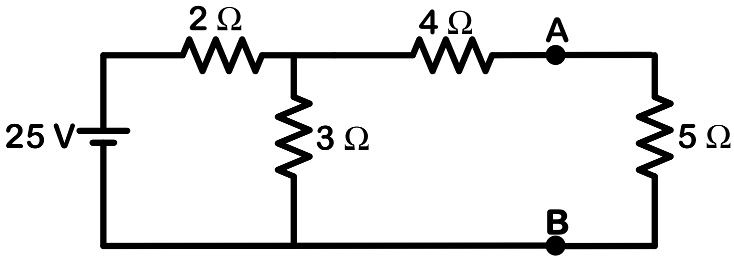

Fig. 5.2

4.		Using Millmann's theorem, find the current in the 10Ω Resistor for the circuit shown in Fig. 5.3.	**L4, 12 M**

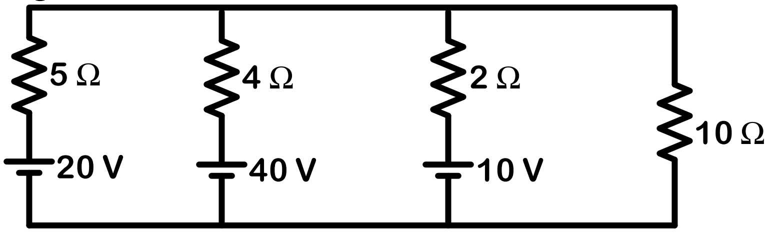

Fig. 5.3

5. Verify Reciprocity Theorem for the network shown in Fig. 5.4. **L5, 12 M**

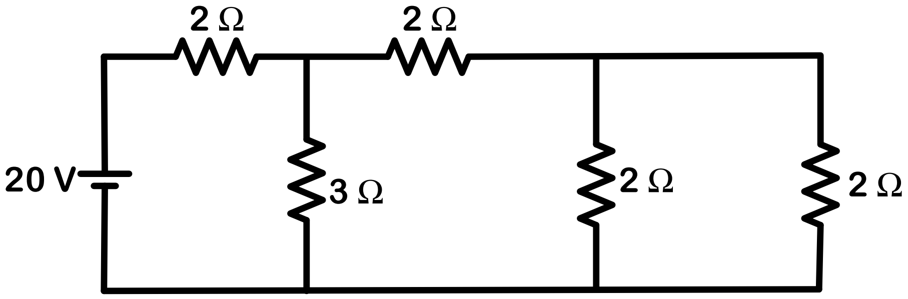

Fig. 5.4

6. Determine the Norton's equivalent circuit for the circuit shown in Fig. 5.5. **L3, 12 M**

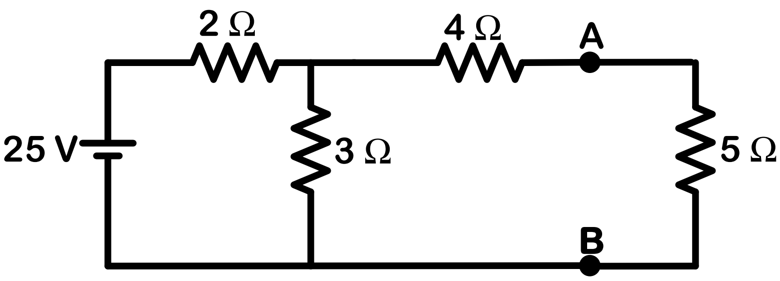

Fig. 5.5

7. Determine the voltage across (2+j5) Ω impedance as shown in Fig. 5.6 by using Superposition theorem **L4, 12 M**

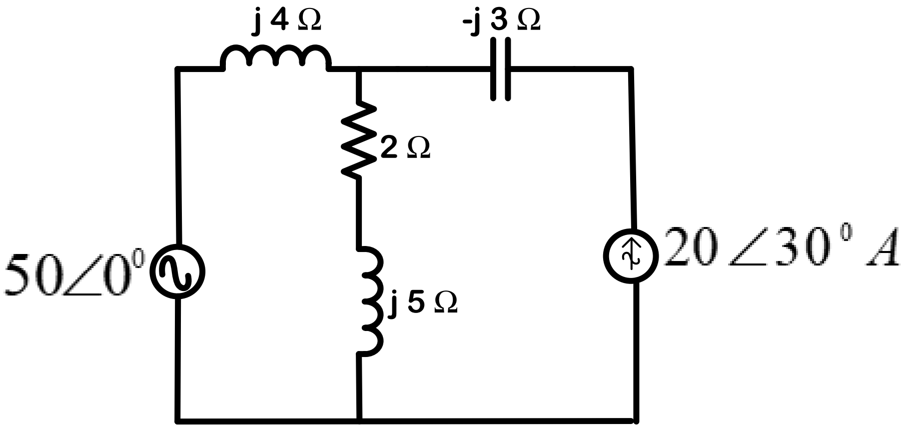

Fig. 5.6

8. Determine the Thevenin's equivalent circuit for the circuit shown in Fig. 5.7. **L2, 12 M**

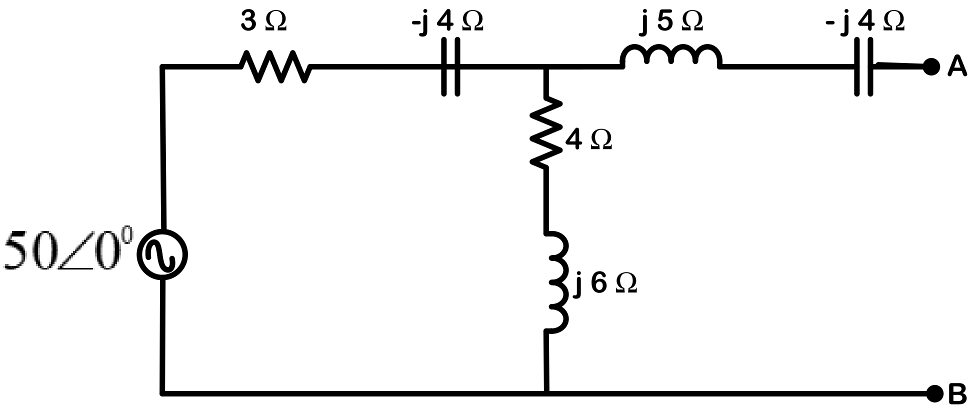

Fig. 5.7

9. Determine the Norton's equivalent circuit for the circuit shown in Fig. 5.8. **L2, 12 M**

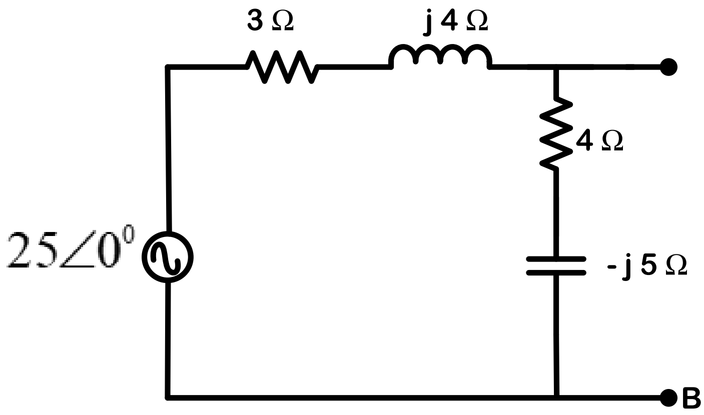

Fig. 5.8

10. For the circuit shown in Fig 5.9, find the value of load impedance for which the source delivers maximum power. Also calculate the value of maximum power. **L2, 12 M**

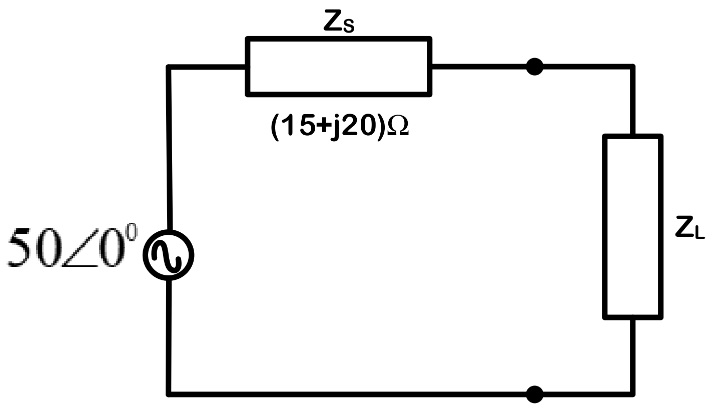

Fig. 5.9

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UNIT-IV

1.	**a)**	Define resonance and Q-Factor.	**L1, 3 M**
	b)	A resonating series circuit has 10 Ω resistances. If the supply is 10 V, obtain the power at half power frequency.	**L1, 3 M**
	c)	Define Q factor of parallel resonating circuit	**L1, 2 M**
	d)	Define bandwidth in resonance circuit.	**L1, 2 M**
	e)	Draw locus diagram for series RL circuit with 'L" as the variable parameters.	**L1, 2 M**
2.		A series RLC circuit has R=10Ω, L=0.5H and C=40μF. The applied voltage is 100V. Find, (a) Resonant frequency & Quality factor of a coil (b) Bandwidth (c) Upper and lower Half power frequencies (d) Current at resonance & current at half power points (e) Voltage across inductance & voltage across capacitance at resonance	**L3, 12 M**
3.	**a)**	In a parallel resonance circuit (Tank circuit) R=2Ω, L=1mH and C=10μ. Find the Resonant frequency, Dynamic impedance and Bandwidth.	**L5, 6 M**
	b)	Obtain the expression for resonant frequency for parallel RL-RC circuit.	**L2, 6 M**
4.		Obtain the expression for resonant frequency, bandwidth and Q-factor for parallel R-L-C circuit.	**L2, 12 M**
5.		Obtain the expression for resonant frequency, bandwidth and Q-factor for Series R-L-C circuit.	**L2, 12 M**
6.		Two coils one of R_1=0.51Ω, L_1=32mH and other coil of R_2=1.3Ω, L_2=15mH are in series and are connected in series with a capacitor of C_1=25μF, C_2=62μF and a resistor of R_3=0.24Ω. Determine, (a) Resonant frequency (b) Quality factor of the circuit (c) Bandwidth (d) Power dissipated in the circuit at resonance frequency if the supply is 230V AC Supply.	**L3, 12 M**
7.		Write the comparison between series resonance and parallel resonance.	**L5, 12 M**
8.		Derive and draw the Locus diagram of a Series RL Circuit.	**L3, 12 M**
9.		Draw the Locus diagram of a Series RC Circuit.	**L4, 12 M**
10.		In a parallel Resonant circuit shown in Fig. 4.1, find the Resonant frequency,	**L4, 12 M**

Dynamic impedance, Bandwidth, Q-factor and Current at resonance.

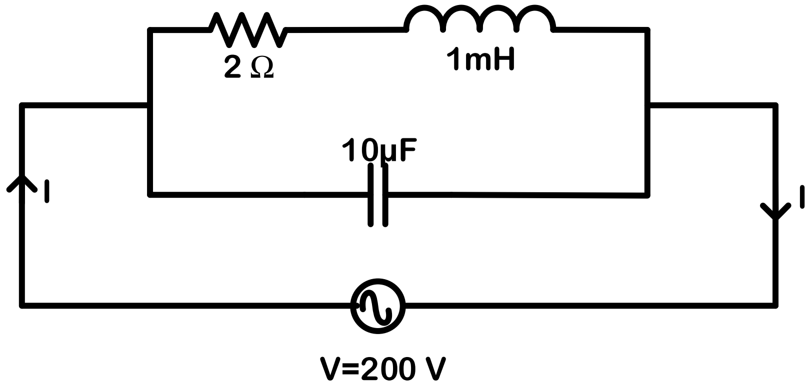

Fig. 4.1

Prepared by: **Dr. ARUN S L**