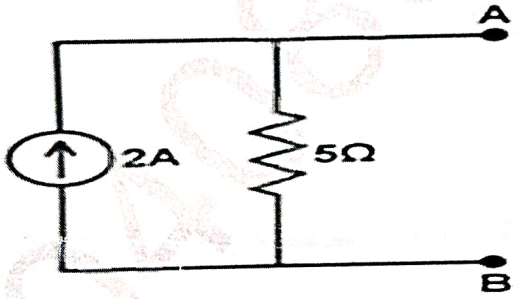
3RD SEM ./ELECTRICAL/EEE / 2020(W) OLD
EET-301 Circuit and Network Theory

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

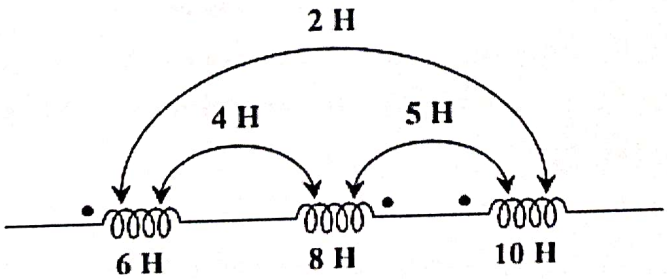
a. State KCL and KVL?
b. Define active and passive elements?
c. What is reluctance?
d. Define quality (Q) factor in series circuit?
e. Define co-efficient of coupling?
f. State Thevenin's theorem?
g. What is filter in electrical circuit?
h. Define mutual inductance?
i. Write the units of resistance, inductance, capacitance and impedance?
j.



Convert the current source into voltage source?

2. Answer **Any Six** Questions 6 x 5

a. Explain B-H curve in magnetic circuit?
b. State and Explain maximum power transfer theorem?
c. What is power factor? Draw power triangle.
d. Give a classification of filters?
e. 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, circuit current?
f.

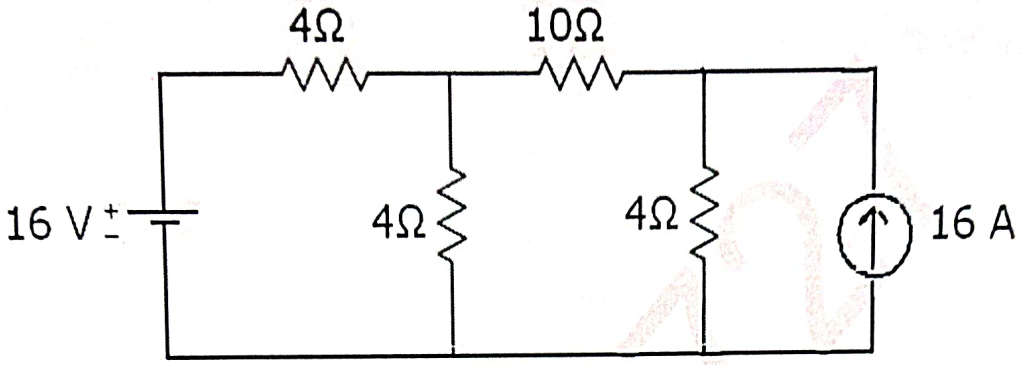


For the three coupled coil, calculate the total inductance?

g Derive the relation between line and phase quantity in star connection?

3 Design a K-type band-pass filter having a design impedance of 500ohm and cut-off frequencies 1 KHZ and 10KHZ? 10

4 10

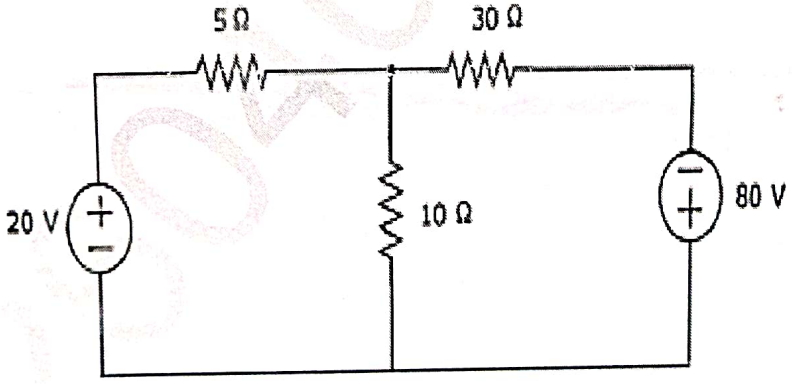


Using Super-position principle find the current in 10 ohm resistor?

5 (a)What is resonance condition? Derive the expression for resonant frequency in RLC series circuit? 5

(b)State and explain Milliman's Theorem? 5

6 (a)Using mesh analysis find the current in 10 ohm resistor? 10



(b)Find the analogy between Electric and magnetic circuit?

7 Write short note on any two 5*2=10

(a)Open circuit (Z) parameter

(b)Steady state and Transient response

(c)resonant frequency for a tank circuit

3RD SEM./ELECT/E&M/EEE/EE(I&C)/ELECT[PT]/2020(W)NEW
TH2-CIRCUIT AND NETWORK THEORY

Full Marks: 80 Time: 3 Hours

Answer any Five Questions including Q No. 1& 2

Figures in the right hand margin indicates marks

1. **Answer all the questions** 10x2

a) What is reactive power? State its SI unit

b) What do you mean by nodal analysis of AC networks?.

c) State the superposition theorem.

d) Define (i) Bandwidth (ii) Q factor in series circuit

e) What is power factor and power triangle?

f) Give an example of (i) Active Element (ii) Linear Element

g) What do you mean by coefficient of coupling in coupled circuits?

h) Define (i) Reluctance (ii) Permeance

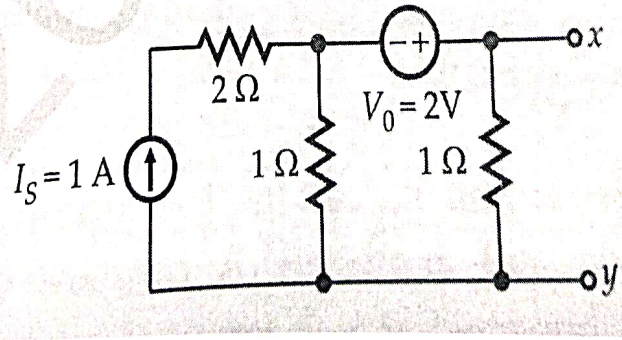
i) Classify the filters on the basis of frequency characteristics.

j) What are short-circuit admittance parameters?

2. **Answer any six questions** 6x5

a) Write down the analogies between electric and magnetic circuits.

b) Find the Thevenin's equivalent to the left of terminals x-y in the below network.



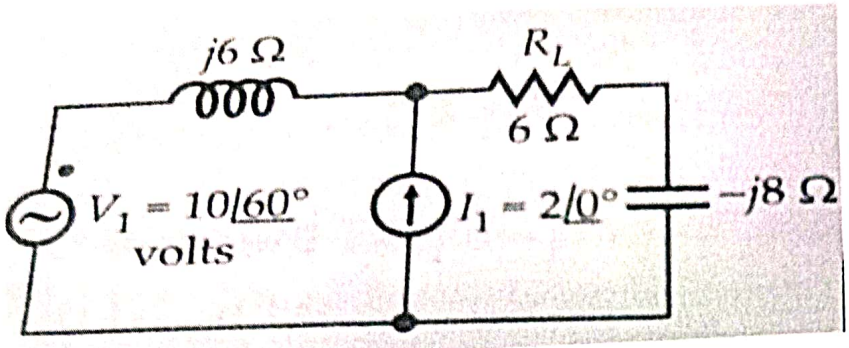
c) How the 3 phase power is measured by two wattmeter method?

d) Write a short note on hybrid (h) parameters.

e) Explain the sinusoidal response of parallel R-C circuit

f) Describe briefly about π section of a circuit network

g) Find the current in the resistor (R_L) using the principle of superposition theorem in below network.



3. Derive the relation between phase and line quantities in star connection. 10
4. Describe about the resonant frequency of series resonance and parallel resonance circuit. 10
5. Explain the transient response of series R-L circuit having DC Excitation. 10
6. Write short notes on (i) Constant K low pass filter (ii)Constant K Band pass filter. 10
7. Write short notes on (i) Hysteresis Loop (ii) Source Transformation technique. 10

****

3RD SEM./ELE & MECH./ EEE/ ELE./ EE(I & C)/ 2023(W)NEW

Th-2 Circuit & Network Theory

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What are bilateral and unilateral elements and give some examples.

b. State KCL and KVL.

c. State Thevenin's theorem.

d. State different powers and draw the power triangle.

e. State the condition for maximum power to be transferred in the circuit. Write down the expression of maximum power.

f. Define quality factor.

g. Define coefficient of coupling.

h. Write down the condition for series resonance and the expression of frequency.

i. State the open circuit parameters of a two port network.

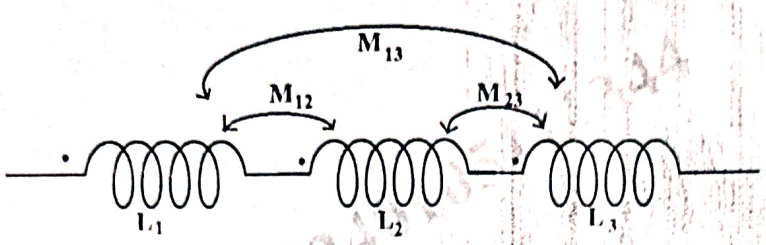
j. Define filter. Write down the types of filters

2. Answer **Any Six** Questions 6 x 5

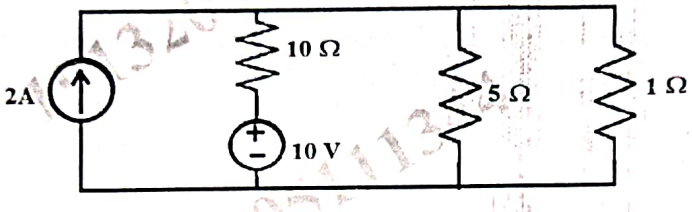
a. Explain B-H curve briefly with a neat diagram.

b. Give a comparison between magnetic circuit and Electric circuit.

c. Find the total inductance of the three series connected coupled coils as shown in the figure. Given: $L_1 = 1\ H, L_2 = 2\ H, L_3 = 5\ H, M_{12} = 0.5\ H, M_{23} = 1\ H, M_{13} = 1\ H.$



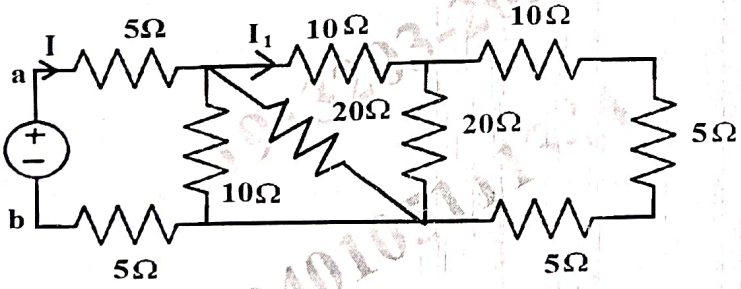
d. Find the power loss in 1 ohm resistor by Thevenin's theorem.



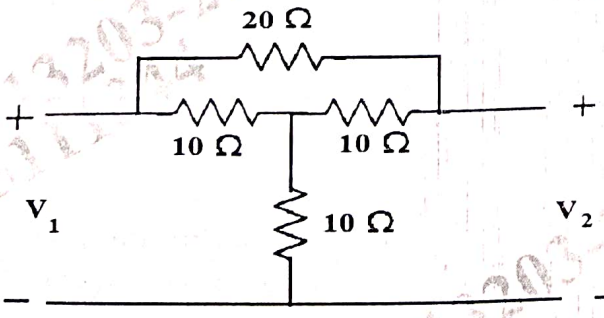
e. What are the properties of resonance?

f. A coil having resistance of 10 ohm and inductance of 1H is switched on to a direct voltage of 100 volt. Calculate the rate of change of the current (a) at the instant of closing the switch (b) when $t = L/R$.

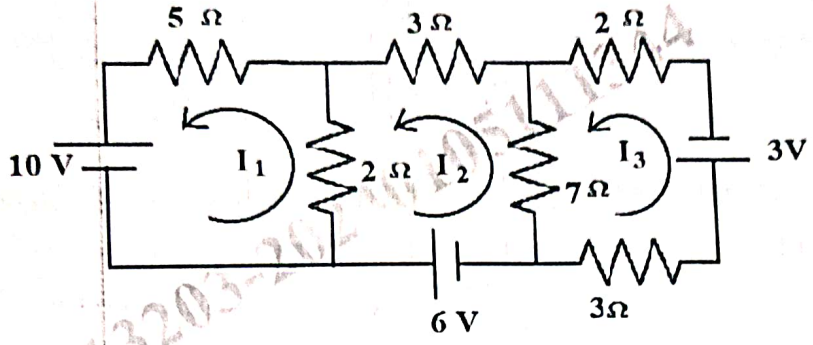
g Find the value of I_1



3 Find the Z-parameters of the circuit as shown in the figure. 10

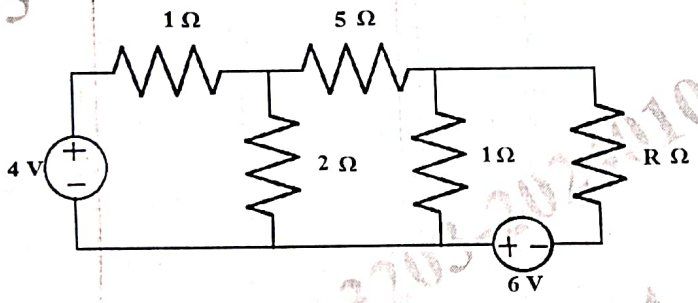


4 Find I_1, I_2 *and* I_3 by using Mesh analysis. 10



5 Derive the relation between phase and line quantities in star and Delta Connection of a 3-phase circuit. 10

6 Find the value of 'R' in the circuit of figure as shown below such that maximum power transfer takes place. What is the amount of this power? 10



7 Design a constant k-low pass filter(both Π and T) having $f_c = 2KHz$ and design impedance $R_0 = 600\Omega$ .Obtain the value of attenuation at 4 kHz. 10

3RD SEM./ELE. & MECH./EEE./ELE./EE(INST. & CONT.)/ 2024(W)

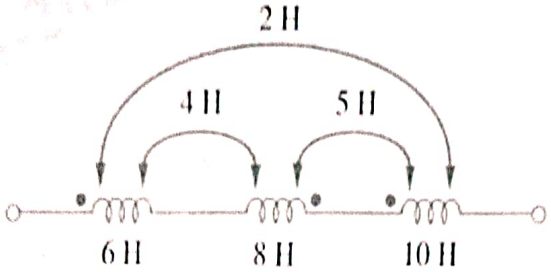
TH2 Circuit & Network Theory

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a.



Find the total inductance of the three series connected coupled circuit.

b. A current of 15 A divides between two branches in parallel resistance of 8 ohm & 16 ohm respectively. Calculate the current in each branch.

c. What is passive element? Give two Examples.

d. What are self-inductance and mutual inductance?

e. What is the true power consumed in a 30V series RLC circuit if Z= 20 ohm and R= 10 ohm?

f. State Q-factor for series resonant circuit.

g. Write the analogy between the Electric and Magnetic circuits.

h. Define time-constant in R-C circuit.

i. What do you mean by Transmission parameters?

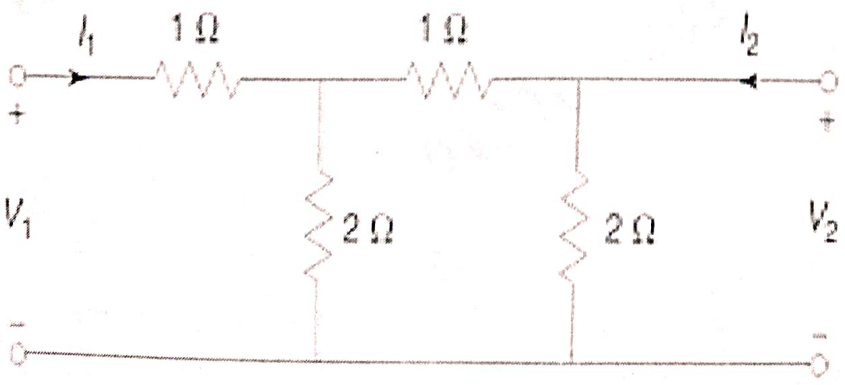
j. If the voltage in an ac circuit is represented by the equation, $v = 220\sqrt{2}\sin(314t - \phi)$ Volt . Calculate (i) peak value of the voltage (ii) rms value of the voltage

2. Answer **Any Six** Questions 5 x 6

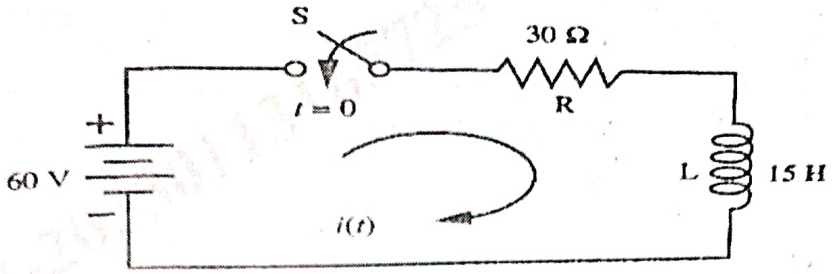
a. A series RLC circuit has R=10Ω, L=0.5H and C=40μF. The applied voltage is 100V. Find, (a) Resonant frequency (b) Quality factor of a coil (c) Bandwidth (d) Upper and lower Half power frequencies. 1+1+1 +2

b. Design K-Type Band Pass Filter having a design impedance Of 500 Ohm and Cut-Off Frequencies 1Khz and 10Khz.

c. Find Z parameter for the network given below



d. Derive the expression for the current in the below circuit when the switch, S is closed at t=0.



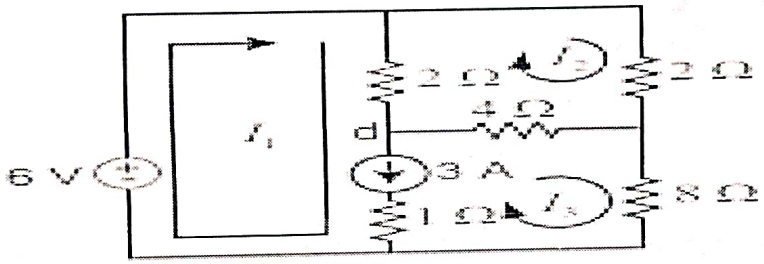
e. State Maximum Power Transfer theorem. Derive the condition of maximum power transfer.

f. Find the number of turns required to produce a flux density of 2T in a core of mean magnetic length of260cm when the coil carries a current of 5A. Assume the permeability of the core is 1000.

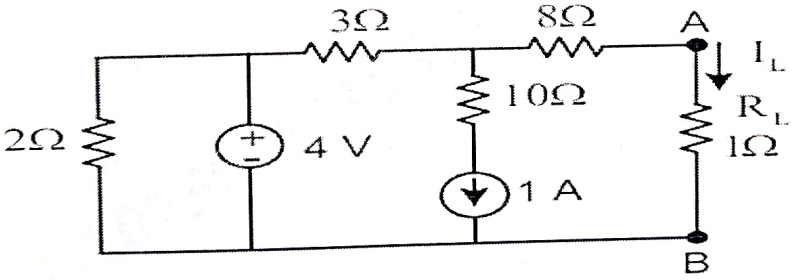
g Derive the expression for Delta connected resistances in terms of Star connected resistances.

Answer **Any Three** Questions

3. Use super mesh analysis method, determine all mesh currents. 10



4. 10



Determine the current through the load resistance 1 ohm using Norton's theorem.

5. Derive the expression of 3 -phase power and power factor by using 2-wattmeter method. 10

6. Explain hysteresis loop with diagram. 10

7. Two impedance $Z_1 = (8 + j6)$ and $Z_2 = (3 - j4)$ are in parallel. If the total current of the combination is 25A, find the current taken and power consumed by each impedance. 10