Total No. of Questions :09] [Total No. of Pages : 02

II/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC-2017

First Semester

EC/EE

NETWORK THEORY

Time: Three Hours **Maximum marks:60**

Answer Question No.1 Compulsory **12X1=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. a) Define active and passive elements.
   b) What is the purpose of star-Delta transformation.
   c) Define the term link.
   d) Define the term oriented graph.
   e) State current division rule.
   f) Define the term phase.
   g) What is the power factor of a purely inductive load.
   h) How much of the reactive power absorbed by the inductor is supplied by the main voltage source in a series RLC circuit at resonance?
   i) What is the Laplace transform of u(t-T)
   j) State final value theorem.
   k) What is complex theorem.
   l) What is bandwidth.

UNIT-I

2. a) Explain the principles of duality? Write a graphical procedure to draw a dual network.
   b) Discuss in detail about the series and parallel connectious of two coupled coils.

(OR)

3. a) State and explain Star-Delta conversion in AC systems.
   b) Two identical coupled coils in series has an equivalent inductance values of 0.2 H and 0.03 H. Find the values of L1,L2, M and K.

UNIT-II

4. A RLC series circuit has R=10Ω, L=0.5 H and C=10μF connected across a 200V, 50 Hz supply. Find (i) Reactance (ii) Impedance (iii) Current (iv) phase angle (v) power factor (vi) voltage across R,L and C.

P.T.O

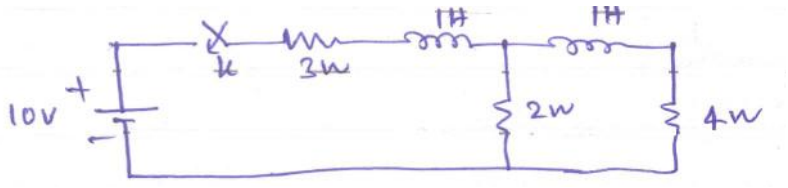
(OR)

5. a) Derive the expression for sinusoidal response of parallel RLC circuit.

   b) Derive the expression for complex impedance of an RLC series circuit.

UNIT-III

6. Using Laplace transformation technique, find current in each loop at $t=0^+$ following switching at t=0 of switch k is shown in fig. Assume the network previously deenerzized.



(OR)

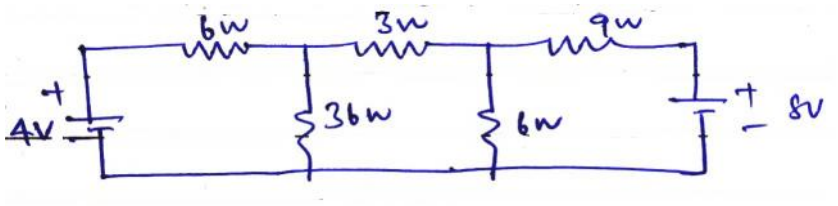
7. Find $f(0^+)$ and $f(\infty)$ for the following transforms

i) $f(s)=\dfrac{4e^{-2S}}{(S+50)S}$ ii) $\dfrac{S^2+6}{S^2+7}$ iii) $\dfrac{5S^2+10}{2S(S^2+3S+5)}$

UNIT-IV

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

   b) Find the current through 6Ω resistor connected between P and Q in the circuit shown in fig using thevenin's theorem.



(OR)

9. A RLC series circuit has a Resistance of 100Ω, Inductance 0.5H and the maximum current flows through it at a frequency of 40Hz. If the supply is 100V at 50Hz, find the current, powerfactor and voltage across each element.

Total No. of Questions : 09] [Total No.of Pages : 03

II/IV B. Tech. DEGREE EXAMINATIONS, JUNE / JULY 2017

First Semester

EC / EE

NETWORK THEORY

Time : **Three Hours** Maximum Marks : **60**

Answer Question No. 1 Compulsory. **12x1=12 M**

Answer ONE question from each Unit. **4x12=48 M**

1. a) State Ohm's law and list its limitations.

   b) Define an ideal voltage source.

   c) Define quality factor.

   d) Draw V I characteristics.

   e) What is meant by Unilateral and bi-lateral element ?

   f) Define source transformation.

   g) List the applications of Thevinins theorem.

   h) What are the classifications of Circuit elements ?

   i) Write some applications of Maximum power transfer theorem.

   j) What is a super node ?

   k) State reciprocity theorem.

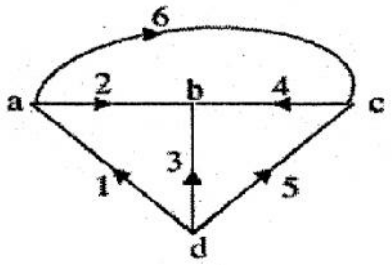
   l) Define self-inductance.

UNIT - I

2. a) Define the following terms :

      (i) Node (ii) Tree (iii) cut set matrix (iv) Basic tie set.

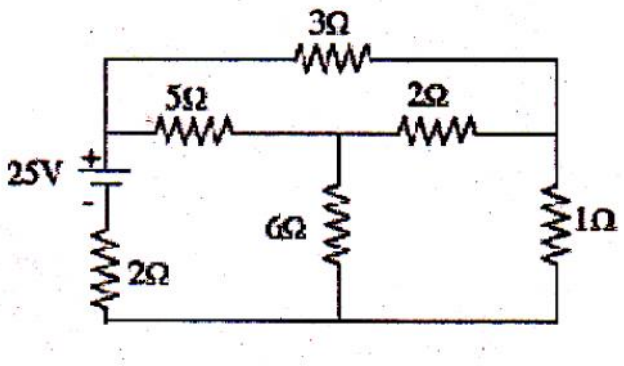
   b) Define incidence matrix. For the graph shown in, find the complete incidence matrix.



P.T.O.

(OR)

3. a) Find the branch currents shown in below figure by using the concept of the tie-set matrix.



b) Two similar coils connected in series gave a total inductance of 625 mH and when one of the coil is reversed, the total inductance is 350 mH. Determine the mutual inductance between the coils and coefficient of coupling.

UNIT - II

4. a) Explain the RMS value and average value of alternating quantity. Derive its necessary expressions.

b) Derive the expression of Voltage, Current & Power in a capacitor supplied with alternating sinusoidal voltage.

(OR)

5. a) Explain mathematical expression representation of sinusoidal Quantities.

b) A 60Hz voltage of 230V effective voltage is impressed on a capacitor of 20 micro farad find

(i) Write time equation.

(ii) Show voltage & current on time diagram.

(iii) find maximum energy stored in capacitor.

UNIT - III

6. a) Explain the pulse response of parallel RL circuit ?

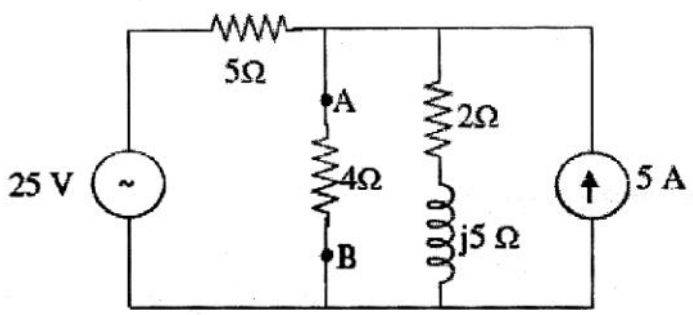
b) Explain in detail and derive the pulse response of series RC circuit ?

(OR)

7. For an RC series unit, a sinusoidal voltage Vmsinwt = V(t) is applied at t = 0. Find the expression for transient current using both differential equation approach and Laplace transform approach.

UNIT - IV

8. a) In the circuit shown in below figure, find the current through RL connected across A-B Terminals by utilizing Thevenin's theorem. Verify the results by Norton's theorem.



b) State and explain maximum power transfer theorem for variable pure resistive load.

(OR)

9. A series RLC circuit consists of R = 15 ohm, L = 0.2 H and C = 2 microfarad. Calculate frequency of resonance. A variable frequency sinusoidal voltage of constant RMS value of 15V is applied to the circuit. Find the frequency at which voltage across L and C is maximum. Also calculate voltage across L and C is maximum. Also calculate voltages across L and C at frequency of resonance. Find maximum current in the circuit.

Total No. of Questions : 09] [Total No.of Pages : 03

II/IV B. Tech. DEGREE EXAMINATIONS, JUNE / JULY 2017

First Semester

EC / EE

CIRCUIT THEORY

Time : **Three Hours** Maximum Marks : **70**

Answer Question No. 1 Compulsory. **14x1=14 M**

Answer ONE question from each Unit. **4x14=56 M**

1. a) Define unilateral networks.
   b) Define complex power.
   c) Define voltage magnification.
   d) Define periodic function's Laplace transform.
   e) Define phase relationship for a pure capacitor.
   f) Defin the constant of RL circuit.
   g) State tellegene's theorem.
   h) Define selectivity.
   i) State final value theorem ?
   j) Why laplace transforms are used for circuit analysis ?
   k) What is the current locus diagram ?
   l) Define twing; tree.
   m) What is supernode ?
   n) Plot the step response of RC circuit ?

UNIT - I

2. a) Explain Star to Delta transformation of unbalance network ?
   b) Determine I, I_L and Drop across R_L from the circuit shows in fig. (1).

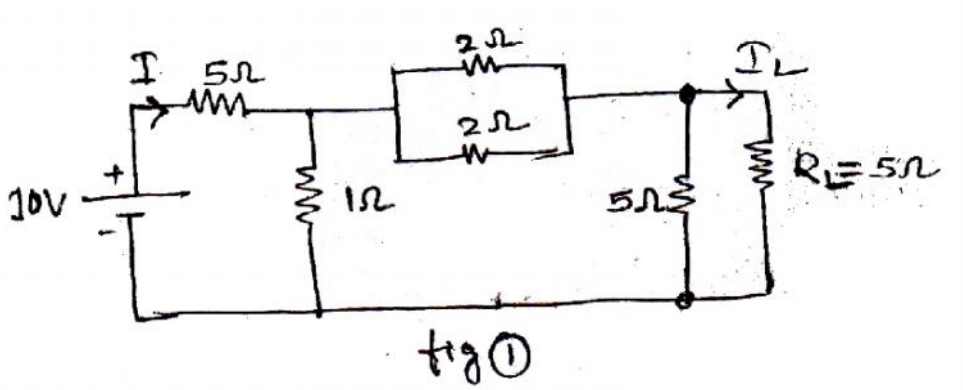


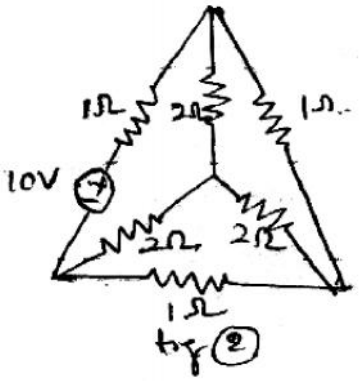
fig ①

P.T.O.

(OR)

3. a) What is fundamental cut-set matrix ? Explain the procedure to form cut-set matrix ?

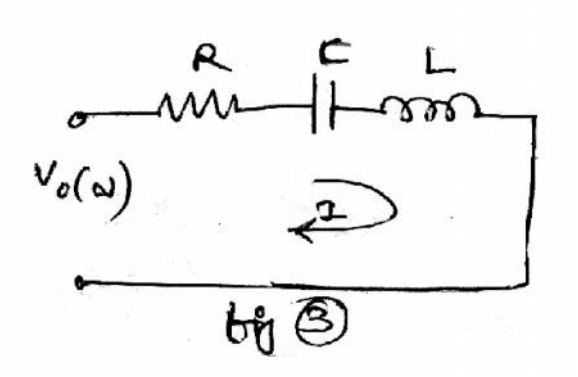
   b) Draw the graph and write down the tie-set matrix for the circuit shown i fig (2).



UNIT - II

4. a) Define R.M.S. value, form factor, peak factor and derive an expression for sinusoidal wave ?

   b) In the series RLC circuit in fig (3), R = 4.2Ω, L = 0.03H, C = 450 μF. If I = 10A, find the drop across each element, supply voltage and power factor angle. Also draw the vector diagram. Assume f = 50 Hz.



(OR)

5. a) Define power, complex power and power factor ? Also explain power transfer ?

   b) An impedance of (3+j5)Ω is connected across 10V, 50 Hz voltage sources. Find (i) Power factor (ii) real and reactive power (iii) current drawn by the impedance (r.ms value) ?

UNIT - III

6. a) State and prove Maximum power transfer theorem ? Also derive condition for maximum power transfer with impedance load ?

b) Find the power loss in 1Ω resistor (R_L) using Norton's theorem in fig (4).

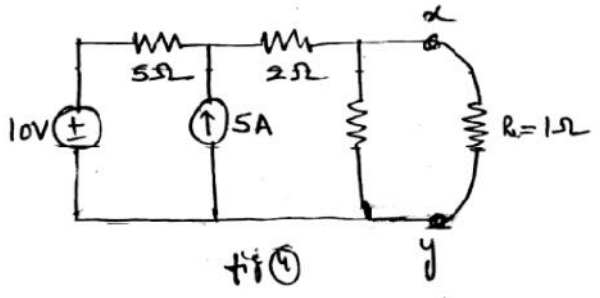


fig (4)

(OR)

7. a) Discuss briefly about parallel Resonance of RLC circuit with necessary expression for Resonant frequency, Bandwidth, Q-factor ?

b) A series RLC circuit has R = 1.5Ω, X_C = 5Ω, Z_L = (3+j1). Find the input impedance and the circuit current. Calculate the frequency of resonance, half power frequencies ? The supply is 100V, 50 Hz.

UNIT - IV

8. a) Derive an expression for Transient Response in RLC series circuit with DC excitation ?

b) Find the loop currents in Laplace domain in matrix form.

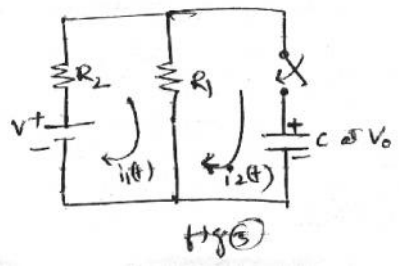


fig (5)

(OR)

9. a) Apply initial value theorem to the following :

(i) $H(S) = \dfrac{(S+2)}{(S+1)(S+4)}$ (ii) $H(S) = \dfrac{(S^2+1)}{(S^2+4)}$

b) Write PSPILE code for calculating different parameter for the circuit in fig (6).

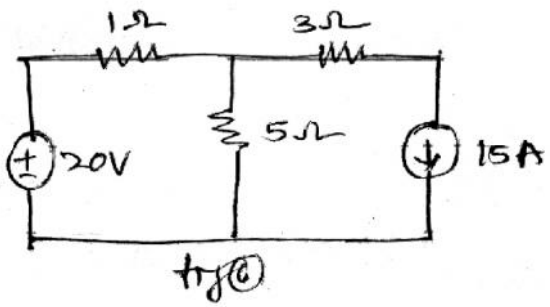


fig (6)

EC/EE 213 (CR)

Total No. of Questions :09] [Total No. of Pages : 04

II/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC-2017

First Semester

EE/EC

CIRCUIT THEORY

Time: Three Hours **Maximum marks:70**

Answer Question No.1 Compulsory **14X1=14 M**

Answer ONE Question from each Unit **4X14=56 M**

1. a) What is the type of energy stored inside an inductor?

   b) Define Crest factor.

   c) State initial value theorem.

   d) Obtain Laplace transform of f(t)= sint.

   e) Define time constant.

   f) Define the terms twig and link.

   g) What is the power absorbed by a 10 ohm resistor connected across a, v(t), 50- sint, voltage source?

   h) Define Q-factor

   i) What is the phase difference between voltage and current waveforms in a series R-L circuit.

   j) Draw the current waveform w.r.t time for a series R-L circuit with no source, with $I_L(0)= I_0$. I_L is the initial current in the R-L circuit.

   k) Obtain the Laplace transform of a step signal.

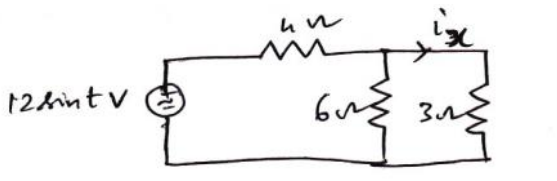
   l) What is magnification.

   m) State Tellegan's theorem.

   n) Define loop matrix.

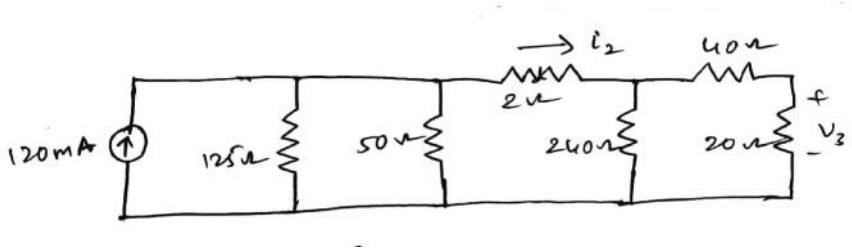
UNIT-I

2. a) Find i_x in the circuit shown below.



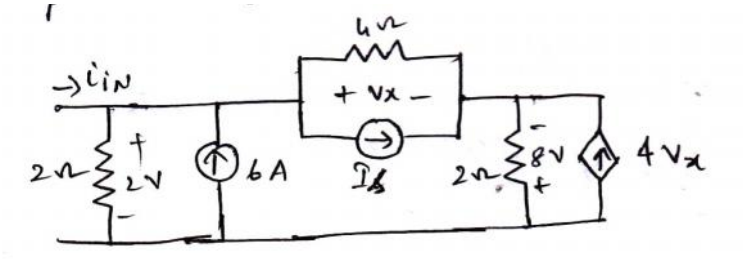
P.T.O

b) Find i_2 in the following circuit.



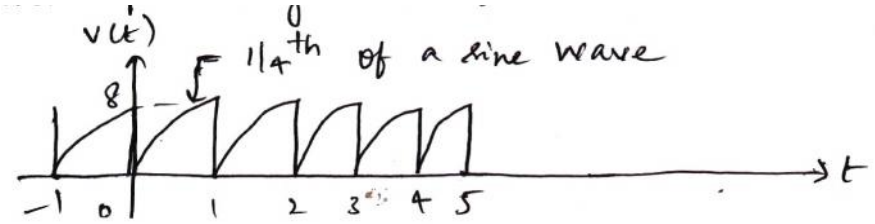
(OR)

3. Use Ohm's and Kirchoff's laws on the circuit shown below to find (a) V_x ; (b) i_{in}; (c) I_C; (d) the power produced by the dependent source



UNIT-II

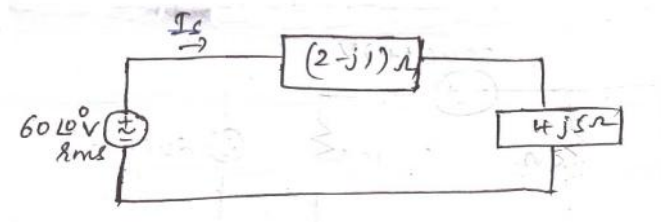
4. a) Find (i) RMS value (ii) frequency (iii) Average value of the following wave form



b) Define power factor and explain the different power factors and give in which type of circuits we can find these power factors.

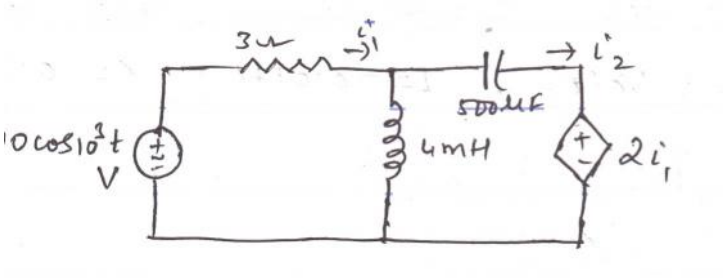
(OR)

5. a) Calculate the values of the average power delivered to each of the two loads shown, the apparent power supplied by the source and the power factor of the combined loads



P.T.O

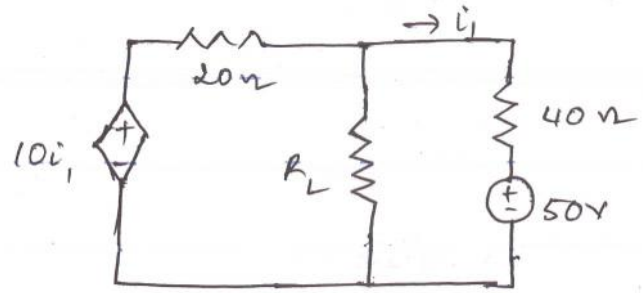
b) Find the values of I_1 and I_2 in the circuit.



UNIT-III

6. a) State and explain Reciprocity theorem.

b) In the circuit shown below determine the value of R_L to which a maximum power can be delivered and find the value of the maximum power.



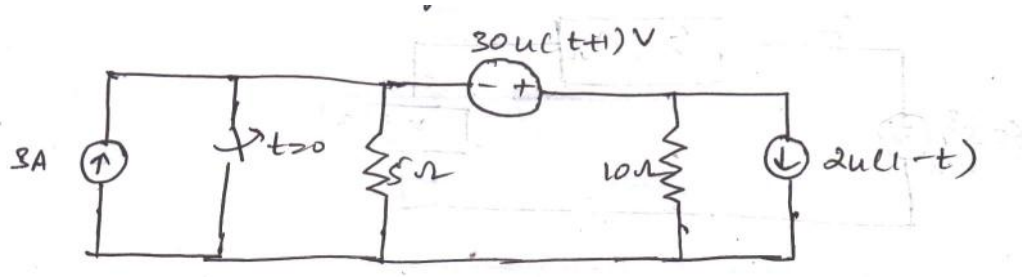
(OR)

7. a) Derive the expression for Q-factor in a series RLC circuit.

b) A coil of resistance 100Ω and inductance 100μH is connected in series with a 100pF capacitor. The circuit is connected to a 20 V variable frequency supply. Calculate (i) the resonant frequency (ii) current at resonance, (iii) Q-factor of the circuit, (iv) voltage across L and C at resonance.

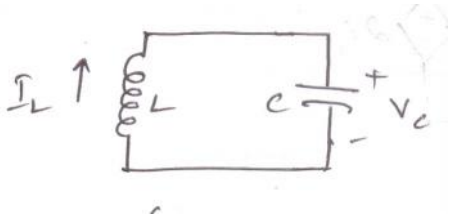
UNIT-IV

8. a) For the circuit of figure below find i_1 at t=-2 seconds, t=+2 seconds and for t > 1 seconds.



P.T.O

b) In the circuit given below $V_C(0)=0$ V and $I_L(0)=2$A. Find the equation for $I_L(t)$ and $V_C(t)$, L=0.01H, C=0.01 F.



(OR)

9. a) Use Laplace transform methods to find i(t) if

i) $$\frac{2di(t)}{dt}+8i(t)=6e^{-2t}u(t), i(0^-)=1A$$

ii) $$\frac{d^2i}{dt^2}+3\frac{di}{dt}+2i=4u(t), \frac{di(0^-)}{dt}=5A/s, i(0^-)=0A$$

b) Derive Laplace transform of $f(t)=e^{-at}\sin bt$

Total No. of Questions : 09] [Total No.of Pages : 04

II/IV B. Tech. DEGREE EXAMINATIONS, JUNE / JULY 2017

First Semester

EC / EE/ EI

CIRCUIT THEORY

Time : **Three Hours** Maximum Marks : **70**

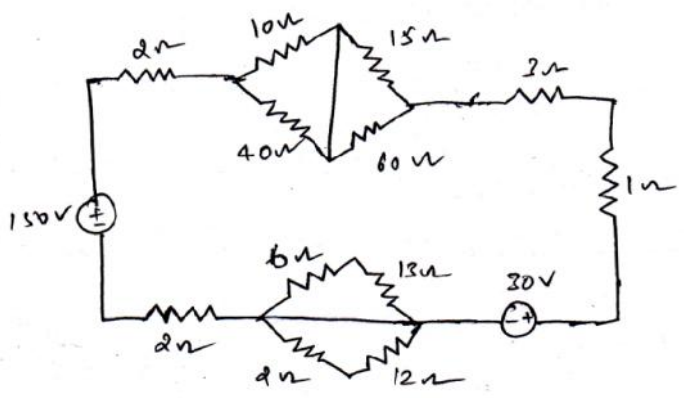
Answer Question No. 1 Compulsory. 14x1=14 M

Answer ONE question from each Unit. 4x14=56 M

1. a) State Superposition theorem.
   b) What is the type of energy stored in a capacitor ?
   c) What is a dual network ?
   d) Obtain form factor for a sine wave.
   e) What type of power factor is associated usually with capacitative loads ?
   f) Explain about the linearity of a system.
   g) Why are Laplace transforms used for circuit analysis ?
   h) What happens to the current flowing in a series RLC circuit at resonance ?
   i) What is the relationship between line voltages and phase voltages in a star connected 3 - phase system ?
   j) Define power factor.
   k) Define resonance.
   l) State Norton's theorem.
   m) Define charge and current.
   n) Define cut set and loop matrices.

UNIT - I

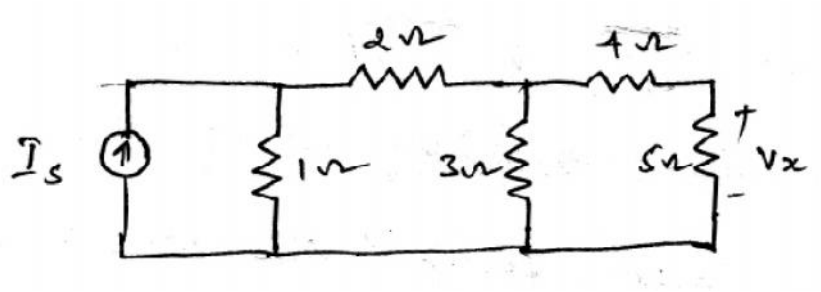
2. Find the power absorbed by the 1 Ω, 10 Ω and the 13 Ω resistors in the circuit shown below:



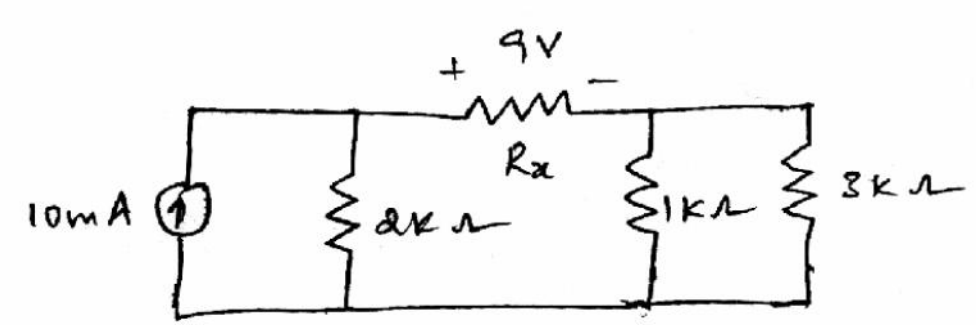
P.T.O.

(OR)

3. a) In the fig. below let V_x = 10v, find I_s.

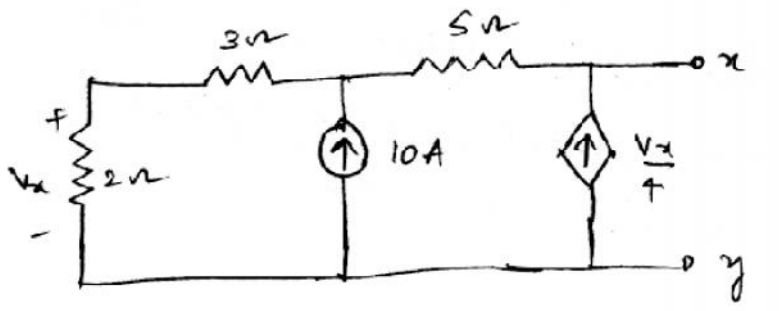


b) Determine how much power is absorbed by R_x in the circuit below :

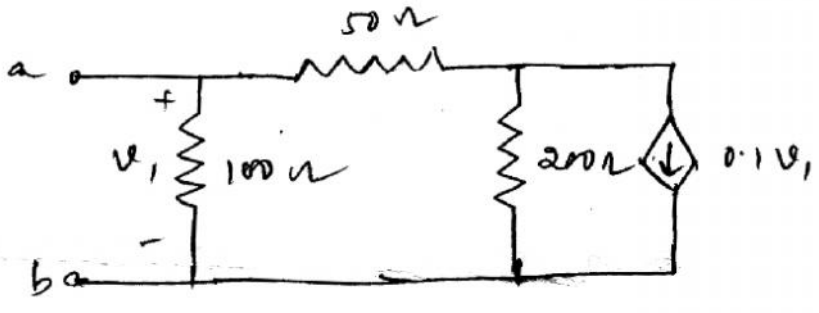


UNIT - II

4. a) Find the Thevenin equivalent of the network shown :

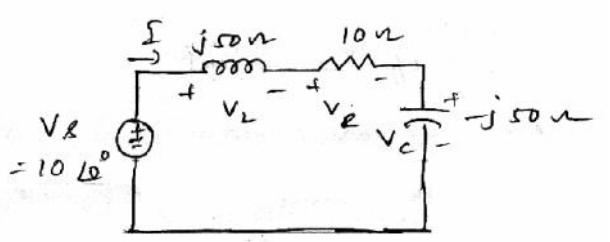


b) Find the Norton equivalent of the network below :

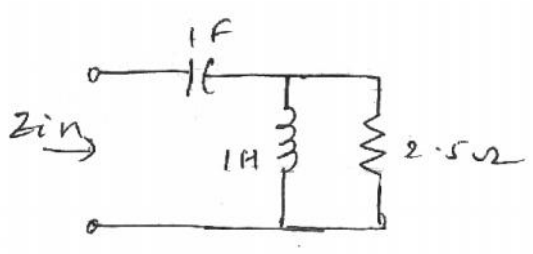


(OR)

5. a) Draw the phasor diagram for V_R, V_L, V_C and I in the circuit and comment about its operating condition.



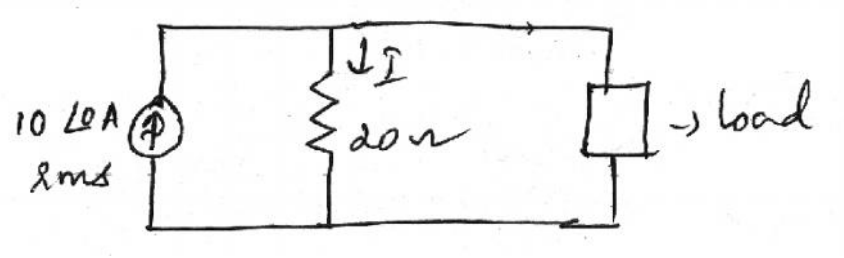
b) Plot a curve of $|Z_{in}|$ versus w for the network shown. Cover the frequency range $0.2 \leq w \leq 5$ rad/s.



UNIT - III

6. a) Define instantaneous power, average power, apparent power and power factor. What two powers constitute apparent power ?

b) In the circuit shown let $I = 4 \angle 35^\circ$ A rms. Find the average power being supplied : (i) by the source (ii) to the 20 Ω resistor (iii) to the load. Find the apparent power supplied to the load and find the load power factor.



(OR)

7. a) Derive Z_{in} (W) for the circuit. Find (i) W_o, (ii) Q_o.

b) A coil of 1kΩ resistance and 0.15 H inductance is connected in parallel with a variable capacitor across a 2v, 10kHz, AC supply. It is given that the supply current is minimum. Find

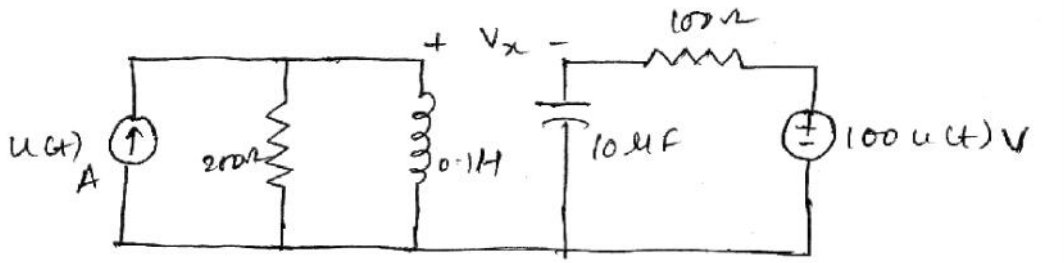
(i) the value of C.

(ii) the effective impedance of the circuit.

(iii) the supply current.

UNIT - IV

8. Find the first instant of time after t = 0 at which $V_x = 0$.



(OR)

9. In the circuit shown below $V_1(0^-) = 10V$ and $V_2(0^-) = 25V$. Find $V_2(t)$ using Laplace transforms technique.