Code: 13A04101

R13

B.Tech I Year (R13) Supplementary Examinations December 2019

NETWORK ANALYSIS

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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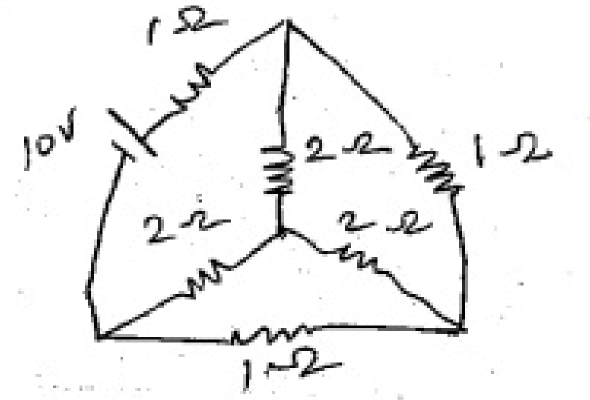
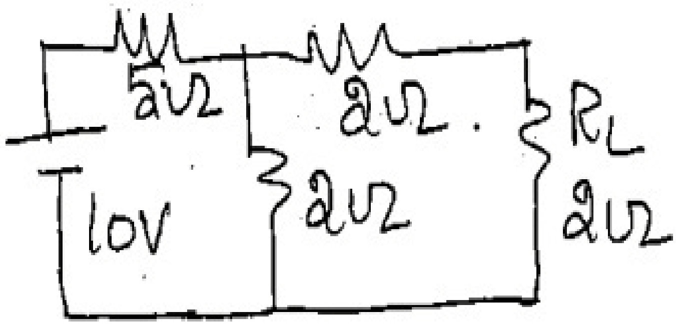
1 Answer the following: (10 X 02 = 20 Marks)

(a) Write the tie-set matrix of the circuit shown in figure below.



(b) Draw the Thevenin equivalent resistance for the given network.



(c) A resistor in parallel with a capacitor absorbs 20 W when the combination is connected to a 240 V, 50 Hz source. If the power factor is 0.7 leading, what are the resistance and capacitance?

(d) If a coil draws 0.5A from a 120 V, 60 Hz source at 0.7 lagging power factor, what are the coil resistance and inductance?

(e) Determine the quality factor of a RLC series circuit R = 10Ω, C = 100μF and L = 0.01mH.

(f) What values of inductor is to be used in a tank circuit to get a resonant frequency of 10 kHz and bandwidth of 1 kHz? The winding resistance is 30Ω.

(g) Define the Z parameters.

(h) Define ideal filter.

(i) Give the relation between Decibel and Nepers.

(j) Design a constant- K low pass filter (T-section and π section) having a cut-off frequency of 2 kHz to operate with a terminated load resistance of 500Ω.

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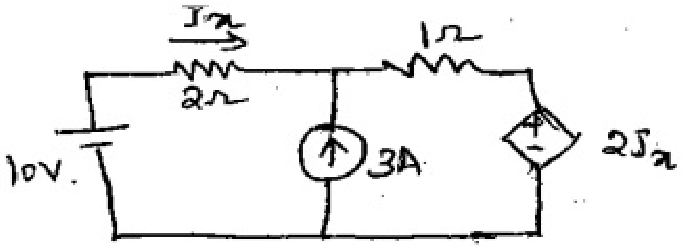
PART – B

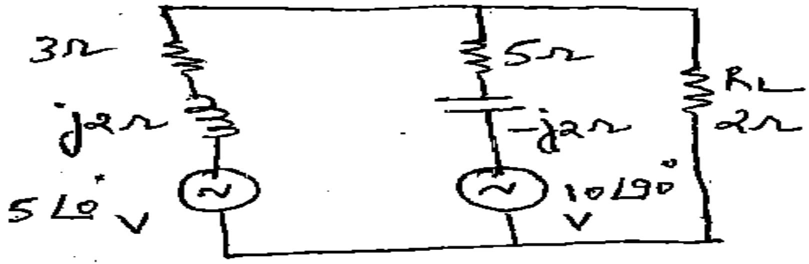
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Obtain the current I_x by Thevenin's theorem .

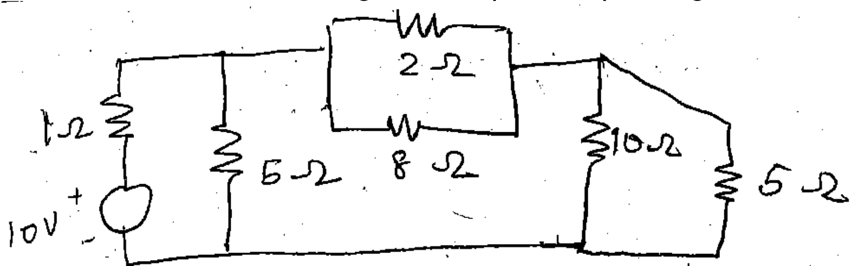


(b) Calculate the current through R_l of the network using superposition theorem.



OR

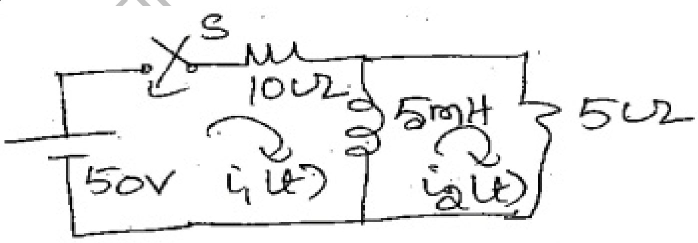
3 (a) A resistive network shown in figure, setup corresponding tie-set matrix and obtain KVL equation.



(b) A voltage source delivers 4A when the load connected is 5Ω and 2A when the load is 20Ω. What is the maximum power it can deliver, power transfer efficiency when it delivers 50 W?

UNIT – II

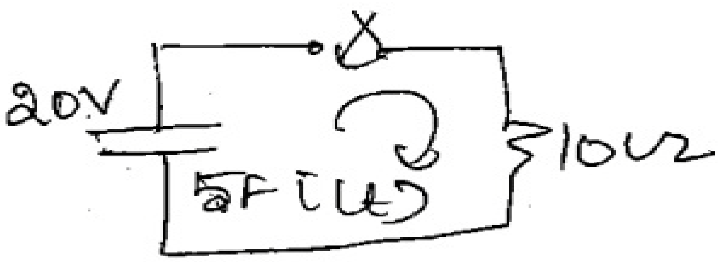
4 (a) Calculate the currents $i_1(t)$ and $i_2(t)$ of the circuit shown. Assume initially relaxed condition and the switch is closed at t = 0.



(b) Three coils are connected in series. Derive the expression for the equivalent inductance.

OR

5 In the circuit shown, the initial value of the charge on the capacitor is 20 V. Calculate: (i) i(t) for t>0. (ii) Time constant.



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UNIT – III

6 (a) A coil of 10H and resistance of 10Ω is in with 100pF capacitor. The combination is connected across a generator of 100 V, having internal resistance of $100\ k\Omega$. Determine: (i) Voltage across parallel circuit at resonance. (ii) Bandwidth.

(b) Derive the expression for resonant frequency for a tank circuit.

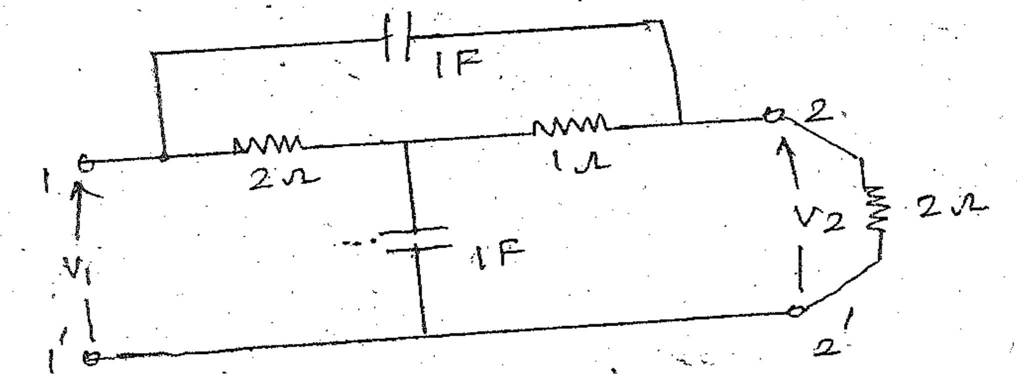
OR

7 (a) In a series resonant circuit the resistance is 6Ω, the resonant frequency is 4.1 x 10^6 rad/sec and the bandwidth is 10^5 rad/sec. Compute L and C of the network, half power frequencies and Q of the circuit.

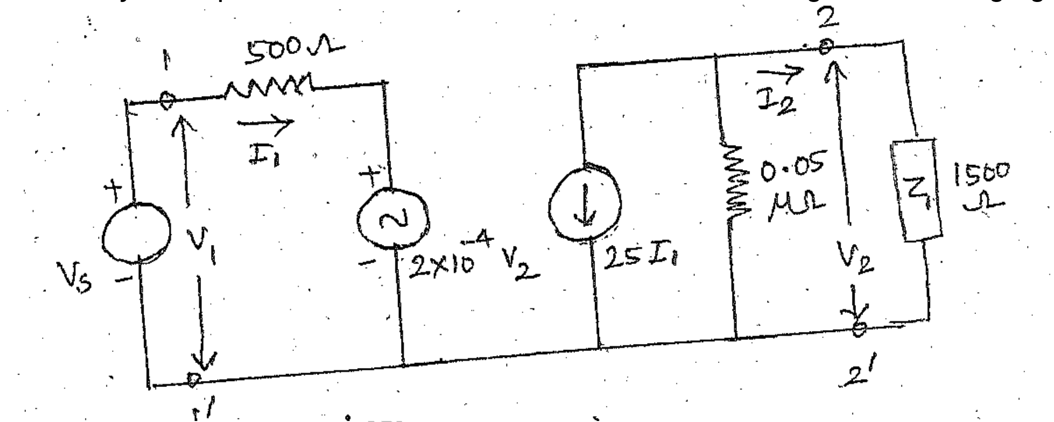
(b) Distinguish between reactance, impedance, admittance and suceptance.

UNIT – IV

8 (a) For the bridged T network shown, find the driving point admittance y_{11} and transfer admittance y_{21} with a 2Ω load resistor connected across port 2.

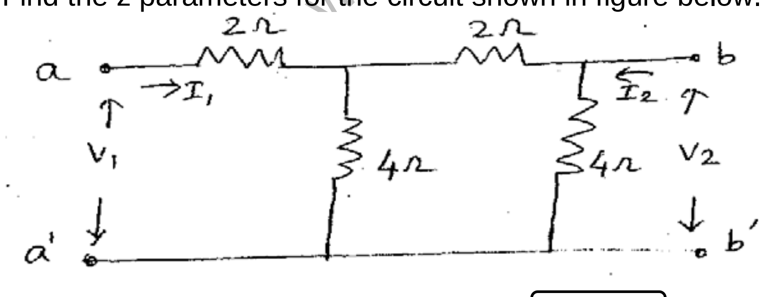


(b) For the hybrid equivalent circuit shown, determine the current gain and voltage gain.



OR

9 Find the z parameters for the circuit shown in figure below.



UNIT – V

10 (a) Design a m-derived low pass filter having cut-off frequency of 2 kHz, design impedance of 500Ω and the resonant frequency 2100 Hz.

(b) Design a constant-k high pass filter having a cut-off frequency of 1 kHz with a load resistance of 700Ω.

OR

11 Design a m-derived high pass filter with a cut-off frequency 5 kHz ,design impedance 500Ω and m = 0.4

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