Total No. of printed pages = 6

ECE 181304

17/2/23

Roll No. of candidate ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

2023

B.Tech. 3rd Semester End-Term Examination

ETE / ECE

NETWORK THEORY

(New Regulation and New Syllabus)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *four* from the rest.

1. Choose the correct answer : $(10 \times 1 = 10)$

    (i)   A network which contains one or more than one source of emf is known as

          (a) Linear network   (b) Non linear network

          (c) Passive network   (d) Active network

    (ii) A non-linear network does not satisfy

          (a) Superposition condition

          (b) Homogeneity condition

          (c) Both Homogeneity and Superposition condition

          (d) Homogeneity, Superposition and associative condition

    (iii) The no. of independent equations to solve a network is equal to ————.

          (a) The number of chords

          (b) The number of branches

          (c) Sum of the no of branches and chords

          (d) Sum of the no of branches, chords and nodes

                                                                 [Turn over

(iv) For determining the polarity of a voltage drop across a resistor, it is necessary to know the

   (a) Value of resistor
   (b) Value of current
   (c) Direction of current flowing through the resistor
   (d) Value of emf in the circuit

(v) What is the condition on Z-parameters for a reciprocal network

   (a) $z_{11} = z_{22}$
   (b) $z_{12} = z_{21}$
   (c) $z_{12} = z_{11}$
   (d) $z_{22} = z_{21}$

(vi) The cut-off frequency of a series RL low-pass filter is

   (a) $W_c = \dfrac{L}{R}$
   (b) $W_c = \dfrac{R}{L}$
   (c) $W_c = \dfrac{1}{LR}$
   (d) $W_c = LR$

(vii) The rms value of a sine wave is 100 A. Its peak value is

   (a) 131.4 A
   (b) 141.4 A
   (c) 151.4 A
   (d) 161.4 A

(viii) The ratio of active power to apparent power is known as

   (a) RMS value
   (b) Peak factor
   (c) Power factor
   (d) Form factor

(ix) What is the dual of charge?

   (a) Resistor
   (b) Capacitor
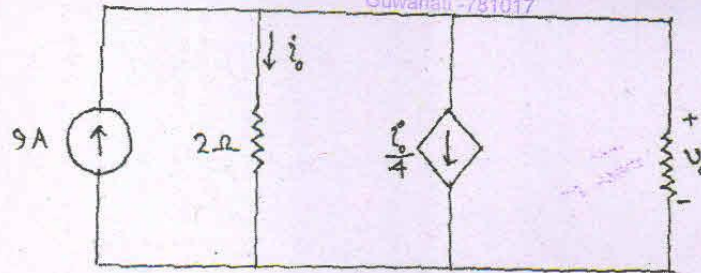   (c) Inductor
   (d) Flux

(x) A delta circuit has each element of value $R/2$. The equivalent elements of the star circuit will be
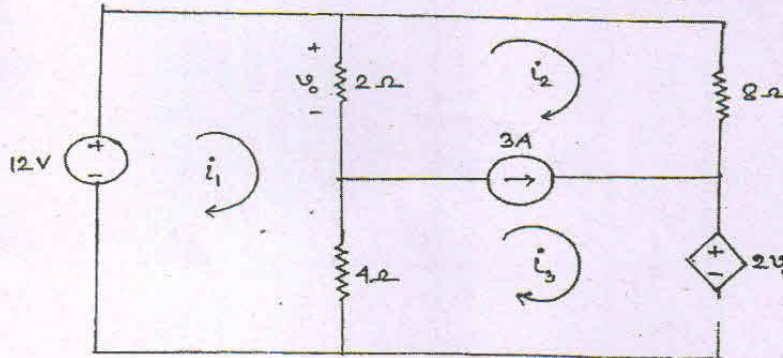
   (a) $R/6$
   (b) $R/3$
   (c) $2R$
   (d) $3R$
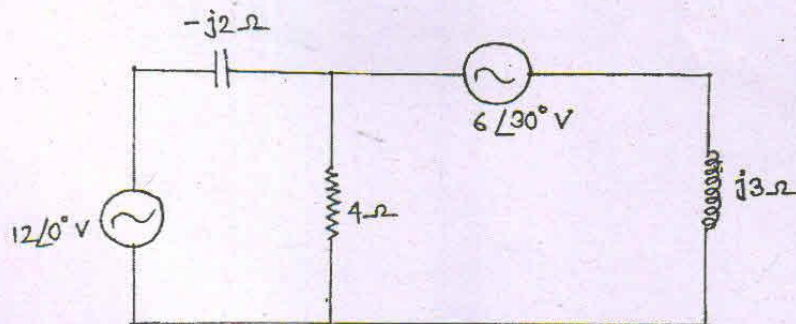
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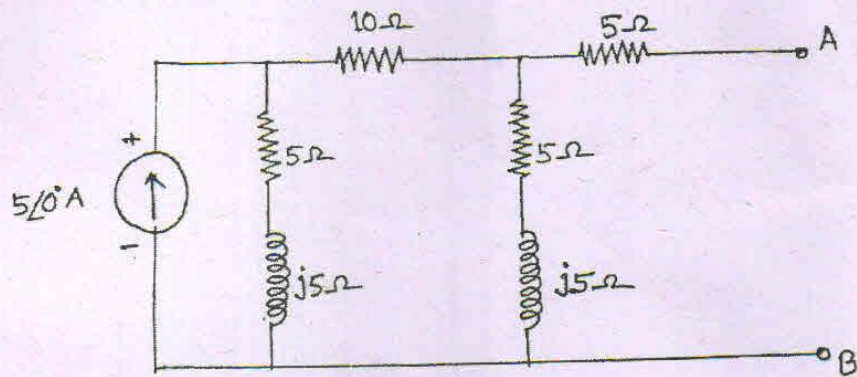2. (a) Find the power absorbed by the $5\,\Omega$ resistor. (5)
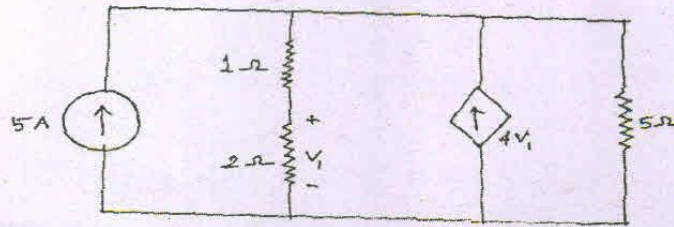
(b) Find v_0 and i_0. (4)

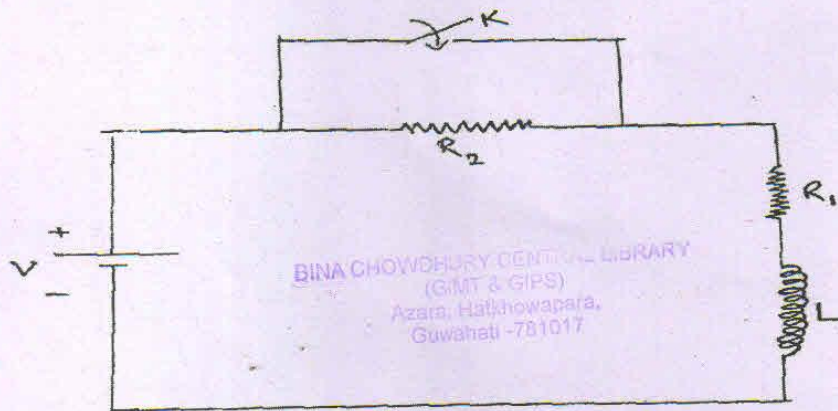(c) Find i_1, i_2 and i_3 in the circuit below : (6)

3. (a) Find the current through $j3\,\Omega$. (7)
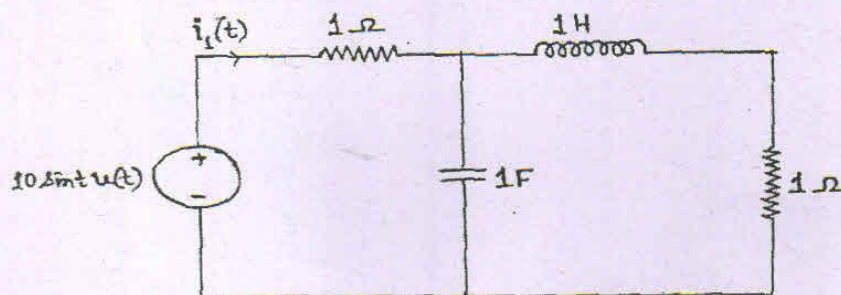

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(b) Find the value of Z_L to be connected between the terminals AB for maximum power transfer. Find maximum power. (8)

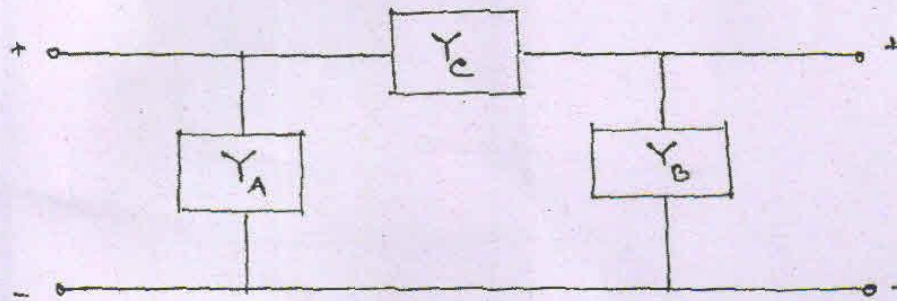4. (a) Find $i(t)$ in the circuit when the switch 'K' closed at $t = 0$. (8)
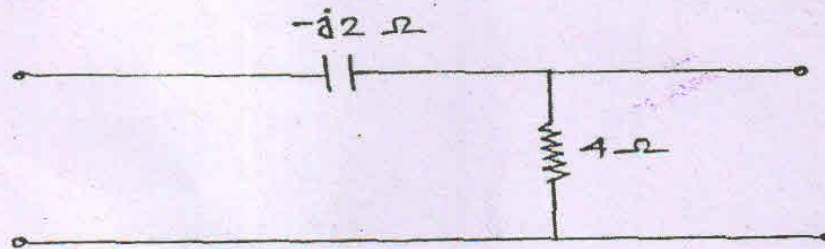
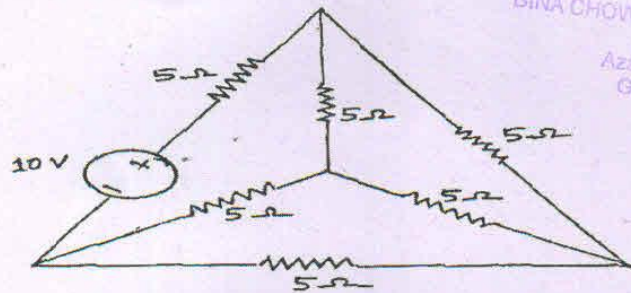(b) Find $I_1(s)$. Assume all initial conditions to zero. (7)

5. (a) Through Derivation express Z – parameters in terms of Y -parameters. (5)

(b) Find Y-parameters of the network. (5)

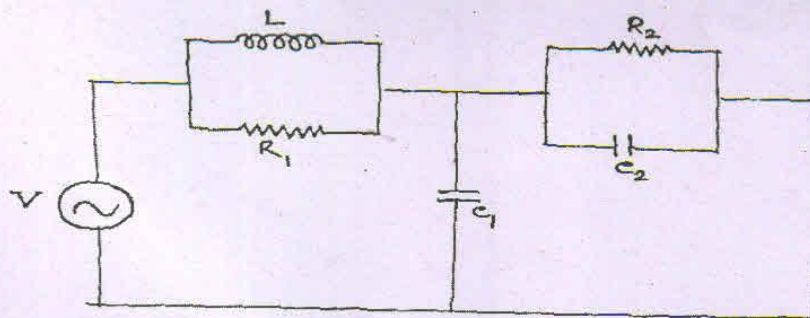

(c) Find the transmission parameters for the circuit. (5)

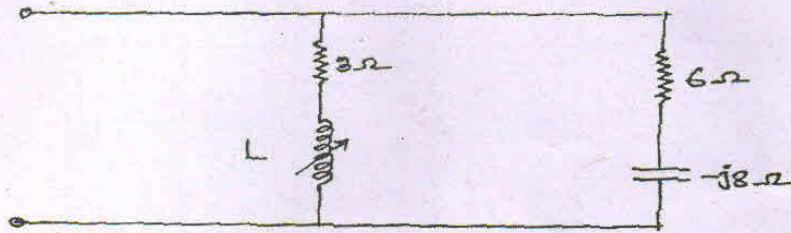6. (a) Draw the graph of the network below. Find incidence matrix and f-cutset matrix. (10)

(b) Construct the dual of the network. (5)

7. (a) Find the value of L for which the circuit is resonant at a frequency $w = 10000$ rad/sec. (5)

(b) Define passive filter. Explain different types of passive filters with proper diagram. (5)

(c) Find the power dissipated in $1\ \Omega$ resister. (5)