4. Determine the Thevenin equivalent of the circuit in Fig. 4 as seen from the terminals a-b. Also find the voltage drop across a 10 ohm resistor if connected between terminals a and b.

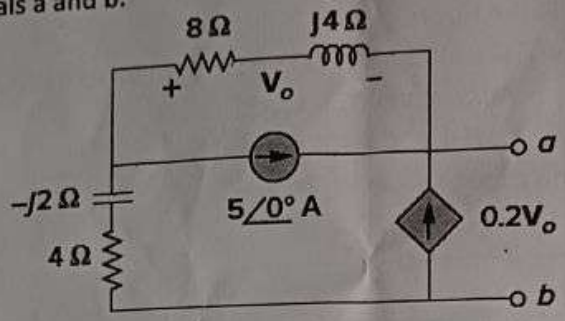

Fig. 4

5. Consider the Δ-Δ system shown in Fig.5., Take
$Z_1 = 8 + j6\Omega$, $Z_2 = 4.2 - j2.2\Omega$, $Z_3 = 10 + j0\Omega$.
(a) Find the phase current I_{AB}, I_{BC}, I_{CA}. (b) Calculate line currents I_{aA}, I_{bB}, and I_{cC}.

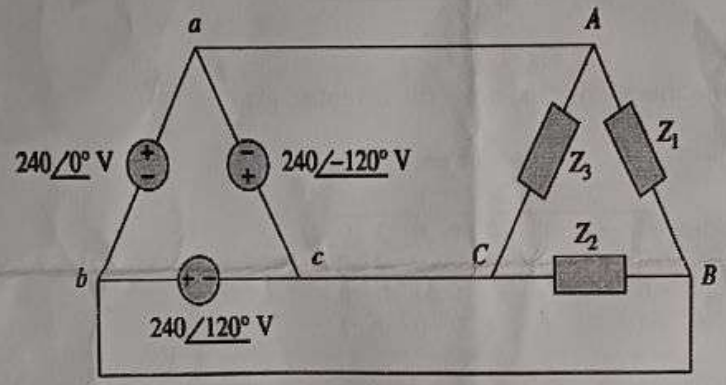

Fig. 5

6. Consider the circuit in Fig. 6, Find i(t) for t < 0 and t > 0.

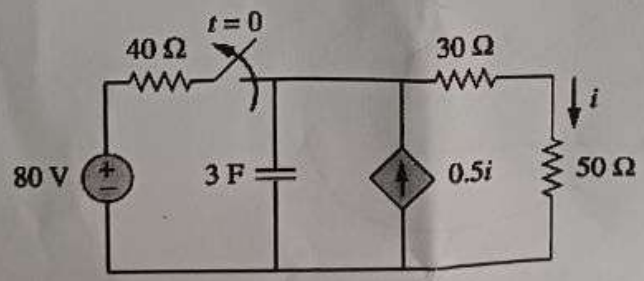

Fig. 6

7. Find i(t) for t > 0 in the circuit given in Fig.7

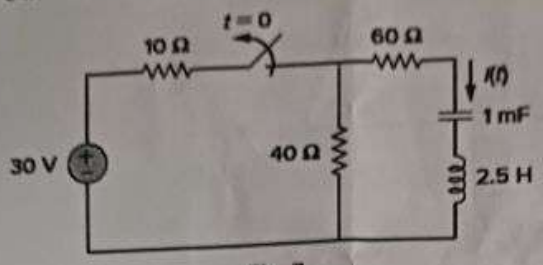

Fig. 7

8. Obtain the h parameters for the network given in Fig.8

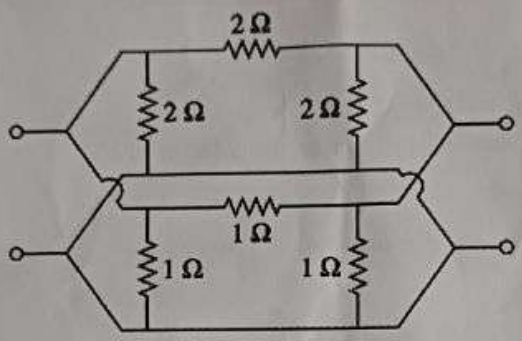

Fig. 8

9. Design a prototype high pass filter T and πsections with the nominal impedance K=400 ohms and cut off frequency f_c=2400Hz. Also find the characteristic impedance, attenuation constant and phase shift constant at 1000Hz and 3500Hz respectively.

10. Determine the average power supplied to the circuit in Fig. 9, if

$$i(t) = 2 + 10\cos(t + 10°) + 6\cos(3t + 35°)\ \text{A}.$$

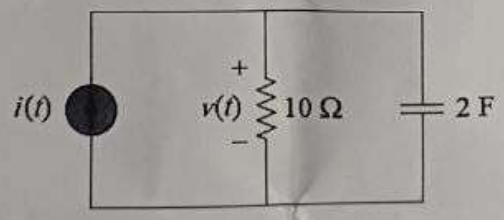

Fig. 9

11. Obtain the ABCD parameters for the network in Fig.10

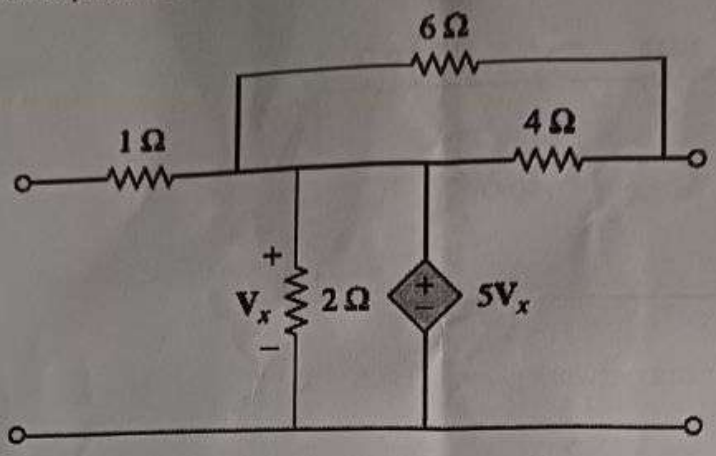

Fig. 10

12. A series-connected circuit has $R = 4\Omega$, L=35 mH.
    a) Calculate the value of C that will produce a quality factor of 25.
    b) Find w_1, w_2 and bandwidth.
    c) Determine the average power dissipated at $w = w_0, w_1 \& w_2$

    Take $V_m = 100V$

⇔⇔⇔

VIT
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Final Assessment Test – June 2023

Course: **BECE203L - Circuit Theory**

Class NBR(s): **6369 / 6371 / 6373**

Slot: **A1+TA1+TAA1**

Time: **Three Hours**

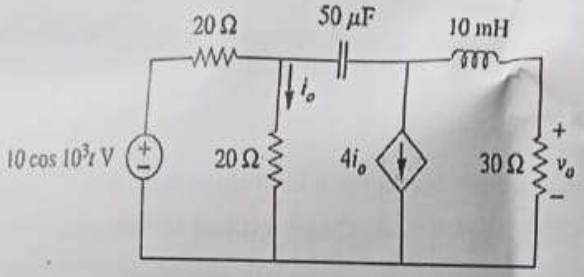
Max. Marks: **100**

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

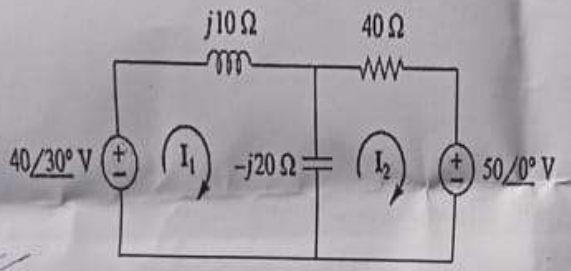
(10 X 10 = 100 Marks)

1.(a) Use nodal analysis to find v_o in the circuit of Figure given below

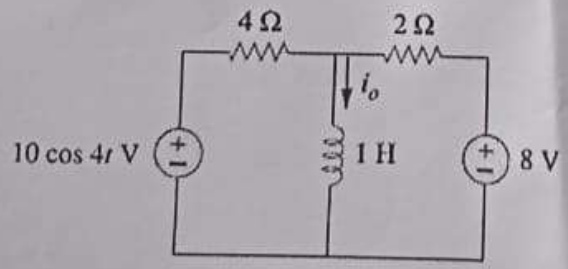


OR

1.(b) Using mesh analysis, find I_1 and I_2 in the circuit of Figure given below

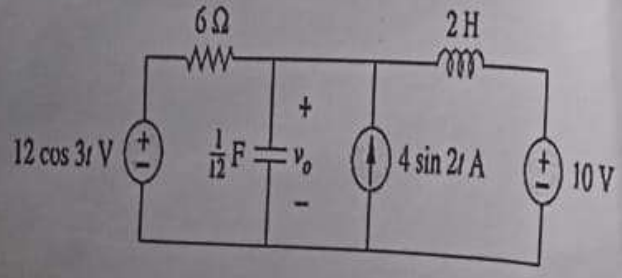


2.(a) Find i_o in the circuit shown in Figure given below using superposition.



OR

2.(b) Solve for v_o **(t)** in the circuit of Figure given below using the superposition principle.



Final Assessment Test – November/December 2023

VIT®
Vellore Institute of Technology

Course: BEEE203L - Circuit Theory
Class NBR(s): 2898 / 2899 / 2900
Time: Three Hours

Slot: C1+TC1+TCC1
Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. a) Draw the dual network for the circuit shown in Fig. 1. [5]

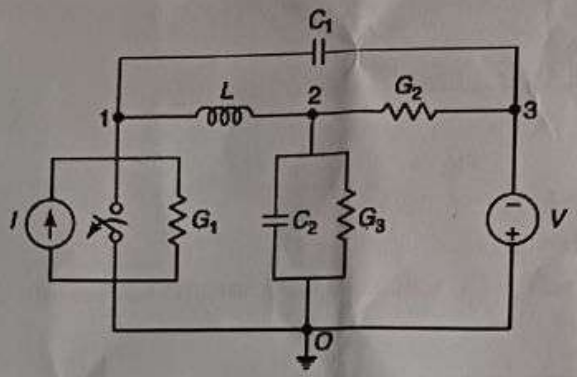


Fig. 1

b) For the given reduced incidence matrix, draw the oriented graph. [5]

Branches →

Nodes ↓	1	2	3	4	5	6	7	8
	−1	−1	0	0	0	0	1	0
	0	1	1	0	1	0	0	0
	0	0	−1	−1	0	1	0	0
	1	0	0	1	0	0	0	1

2. Write down the basic tie-set matrix and fundamental cut-set matrix for the given graph shown in Fig. 2, taking a tree of branches 2, 4, and 5.

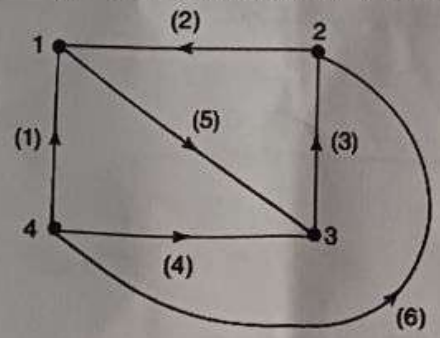


Fig. 2

3. Calculate V_o in the circuit of Fig. 3 using the superposition theorem.

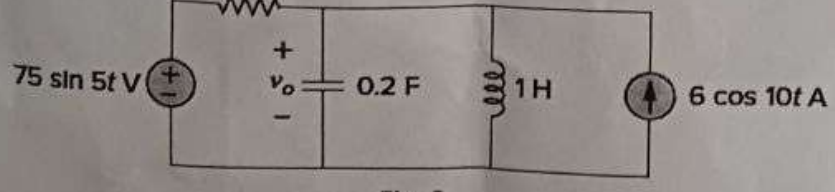


Fig. 3

5. (a) Find the complete incidence matrix and reduced incidence matrix on the directed graph of Fig.(a) given below. For writing the reduced incidence matrix, assume that node-4 is grounded. Also determine the total number of trees that can be drawn out of this graph. [5]

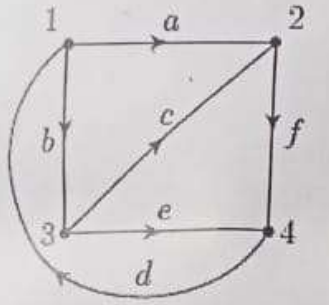


Fig. (a)

(b) Obtain a tie-set matrix for the following tree shown in Fig.(b) given below, in which **twigs** are specified by solid lines while **links** are specified by dashed lines: [5]

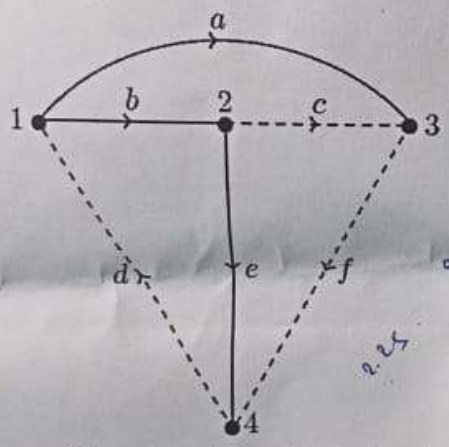
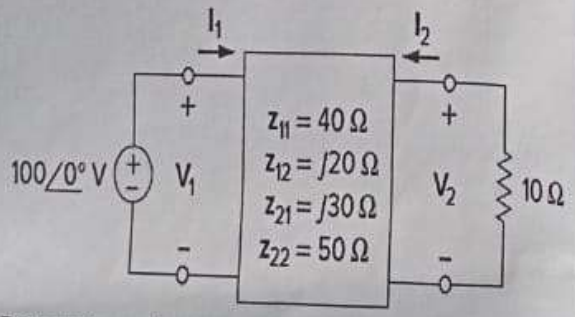
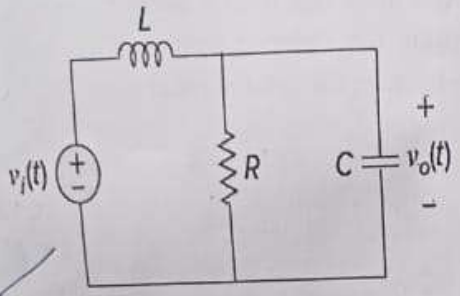


Fig. (b) A tree with twigs { a, b, e}

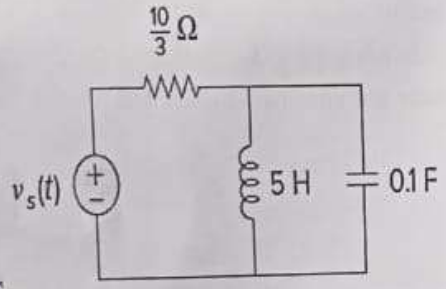
6. Find I_1 and I_2 in the circuit in Figure given below



7. Determine what type of filter is shown in Figure given below. Calculate the corner or cut-off frequency. Take $R = 2\ k\Omega$, $L = 2\ H$, and $C = 2\ \mu F$.

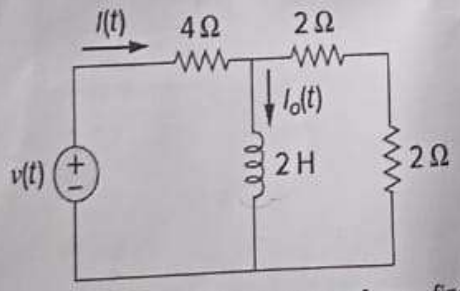


8. Consider the circuit in Figure given below. Using method of Laplace transform, find the value of the voltage across the capacitor assuming that the value of $v_s(t) = 10u(t)$ V and assume that at $t = 0$, -1 A flows through the inductor and +5 V is across the capacitor

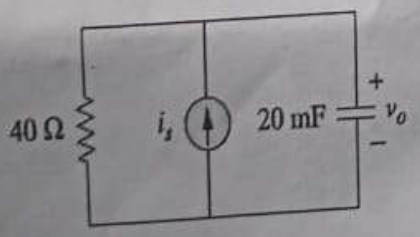


9. Find the response $i_o(t)$ of the circuit of Figure given below if the input voltage $v(t)$ has the Fourier series expansion

$$v(t) = 1 + \sum_{n=1}^{\infty} \frac{2(-1)^n}{1+n^2}(\cos nt - n \sin nt)$$

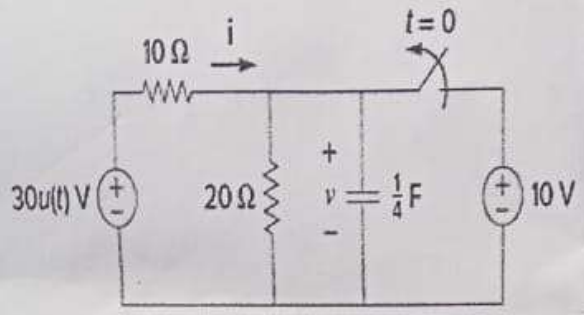


10. Using method of Fourier transform, find $v_o(t)$ in the circuit of Figure given below, where $i_s = 5e^{-t}u(t)$ A.



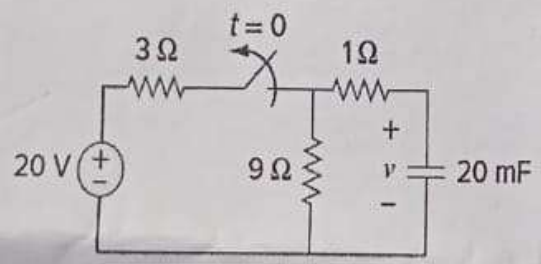
⇔⇔⇔

3.(a) In Figure given below, the switch has been closed for a long time and is opened at $t = 0$. Find i and v for all time.

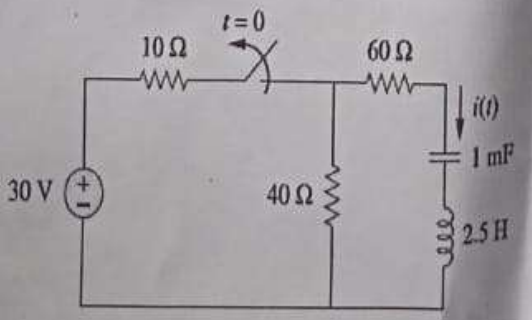


OR

3.(b) The switch in the circuit in Fig. given below has been closed for a long time, and it is opened at $t = 0$. Find $v(t)$ for $t \geq 0$. Calculate the initial energy stored in the capacitor.

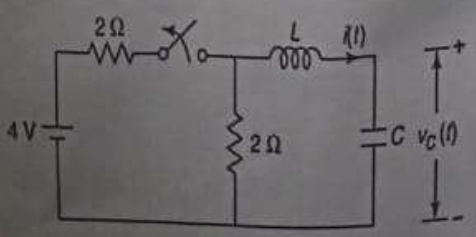


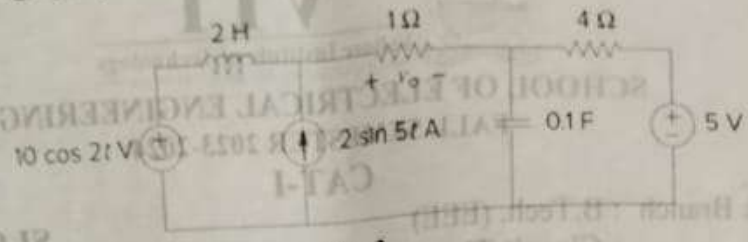
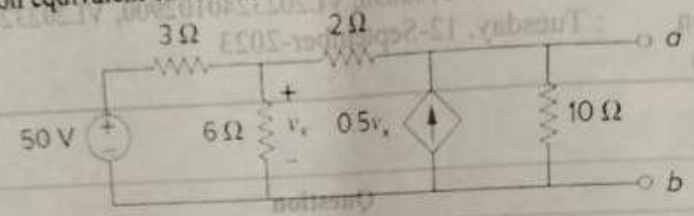
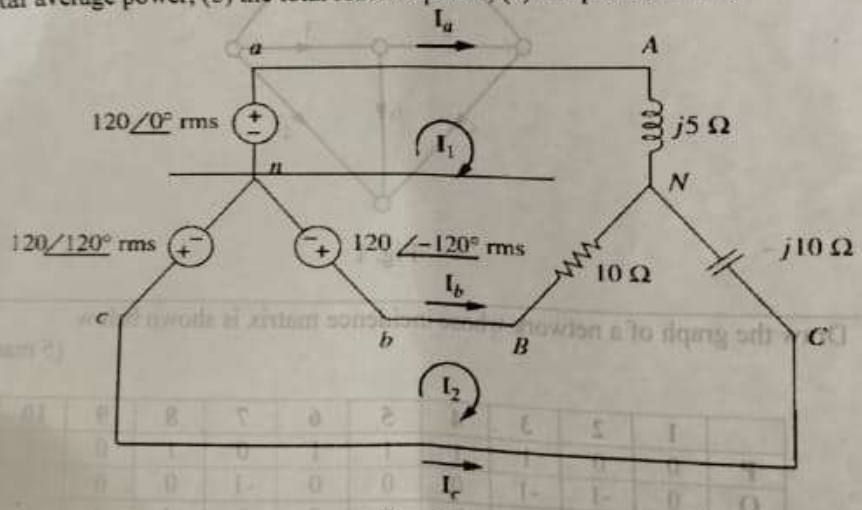
4.(a) Find $i(t)$ for $t > 0$ in the circuit of Figure given below. Assume that switch was closed from a long time and it is open for $t > 0$.



OR

4.(b) The switch in the network of Figure given below is opened at t = 0. Find $i(t)$ for $t > 0$ if, L =1/2 H and C = 1 F.



3.	Determine V_o using superposition theorem  Fig. 3	10
4.	Obtain the Norton equivalent circuit at terminals a-b for the circuit in Fig. 4.  Fig. 4	10
5.	For the 3-phase unbalanced system shown in Fig. 5, Determine: (a) the total average power, (b) the total reactive power, (c) the power factor,  Fig. 5	10

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – II

Programme Name & Branch: B. Tech Electrical and Electronics Engineering
Course Name & Code: BEEE203L Circuit Theory
Date: 17.10.2023 Exam Duration: 90 mins
Faculty Name: Dr. M. Janaki, Dr. J Belwin Edward, and Dr. I Jacob Raglend
Class numbers: VL2023240102899, VL2023240102898, VL20232401022900

Slot: C1+TC1+TCC1
Semester: Fall 2023-2024
Maximum Marks: 50

Answer ALL Questions

Q. No.	Question Text	Marks
1.	In the given 3-wire three phase circuit of Fig.1, apply Millman's theorem to find phase currents and voltages across load.	10

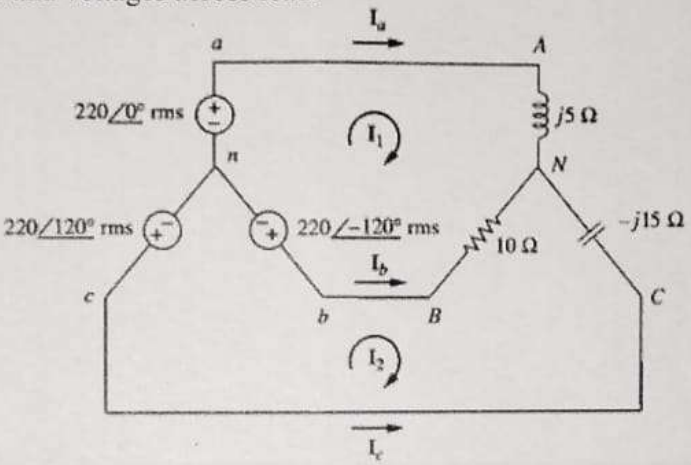


Fig.1

2.	Find h-parameters in the given circuit of Fig.2	10

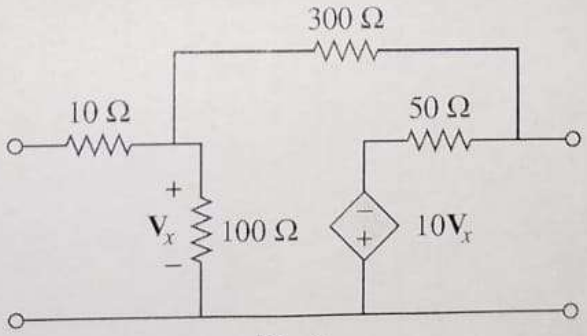


Fig.2

3.	Find T parameters in the given circuit of Fig.3.	10

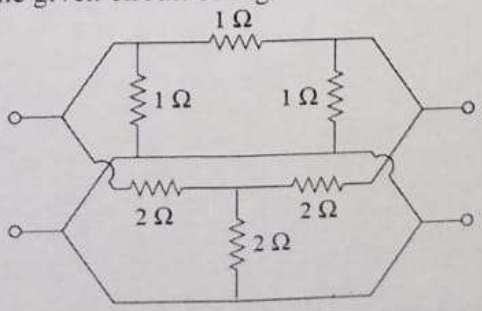


Fig.3

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(Deemed to be University under section 3 of UGC Act, 1956)

School of Electronics Engineering

CAT I

Programme Name & Branch: B.Tech - ECE

Circuit Theory (BECE 203L)

Winter Semester 22-23

Slot: D2+TD2+TDD2 **Exam Duration: 90 mins** **Maximum Marks: 50**

Answer all the questions

Q1. Apply mesh analysis to find the voltage across the 4 Ω resistor in the network shown in Figure 1. 10

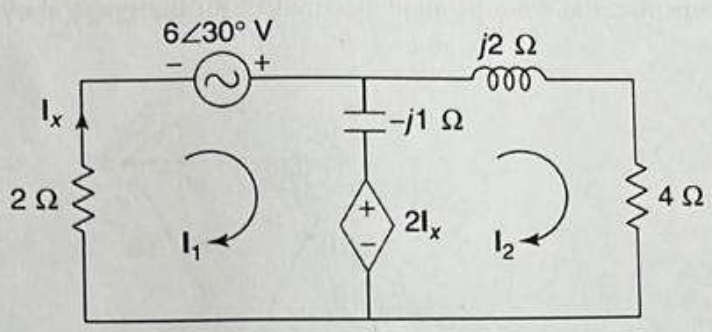

Figure 1

Q2. Obtain the Norton's equivalent network for Figure 2. What should be the value of load so that maximum power will be delivered across the load? Also, calculate the maximum power.

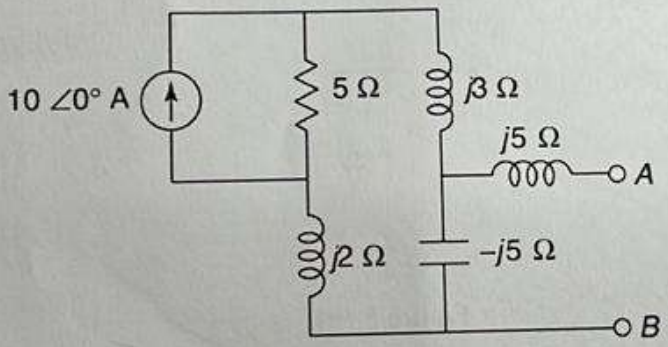

Figure 2

Q3. Apply superposition theorem to find the current through the $(3 + j4)$ Ω impedance of Figure 3.

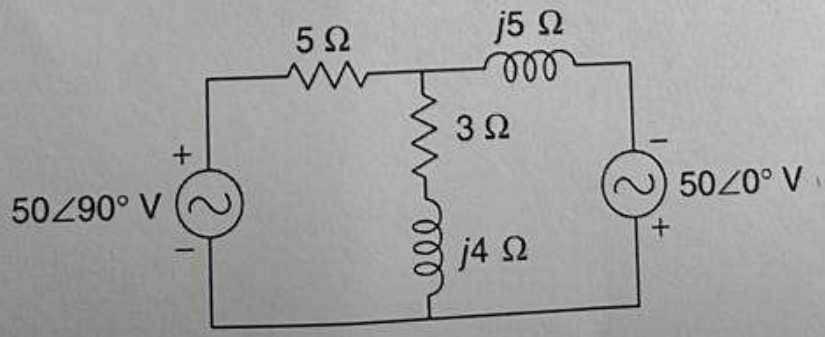

Figure 3

VIT

Vellore Institute of Technology

School of Electronics Engineering

CAT I

Programme Name & Branch: B.Tech - ECE

Circuit Theory (Course Code-BECE 203L)

Winter Semester 22-23

Slot: A1+TA1+TAA1 | Exam Duration: 90 mins | Maximum Marks: 50

Answer all 5 questions. Each question carries 10 Marks

Q1. Solve for i_o in Fig.1 using mesh analysis. 10 M

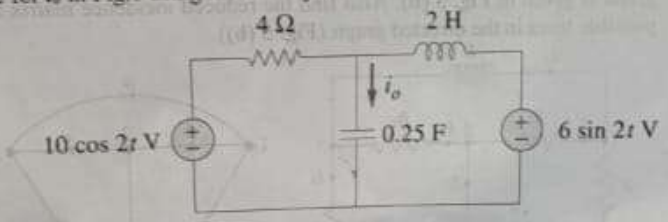

Fig.1

Q2. Obtain current I_o in Fig.2 using Norton's theorem. 10 M

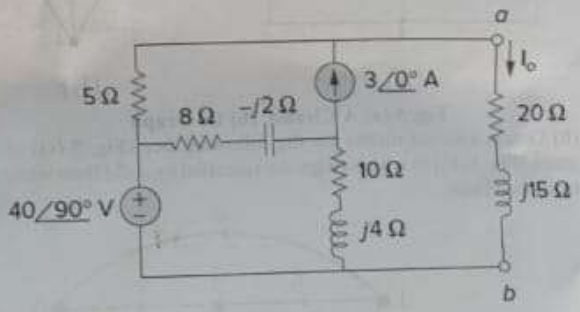

Fig. 2

Q3. Find the current through inductive reactance (j2 Ω) in the circuit of Fig.3 using the superposition theorem. 10 M

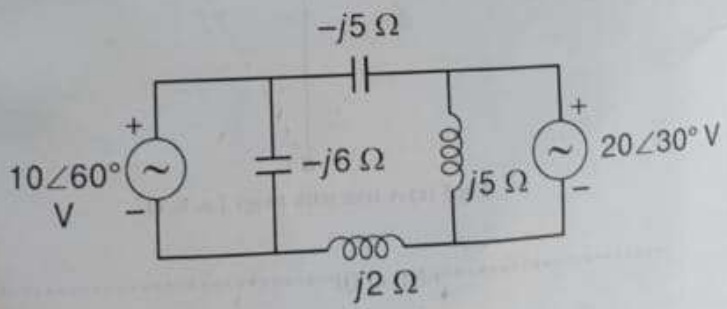

Fig. 3

Q4. The switch in the circuit of **Fig.4** has been closed for a long time. At $t = 0$, the switch is opened. Calculate $i(t)$ for $t > 0$. 10 M

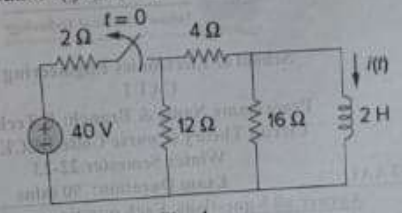

Fig. 4

Q5. **(a)** Find the complete incidence matrix of the circuit of **Fig. 5 (a)**, for which directed graph is given in **Fig. 5 (b)**. Also find the reduced incidence matrix and number of possible trees in the directed graph (**Fig. 5 (b)**).

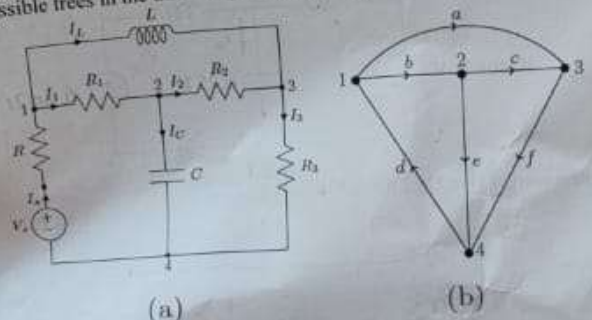

Fig. 5 (a) A Circuit, (b) Its Graph

(b) Obtain a tie-set matrix for the following tree (**Fig. 5 (c)**) obtained from above graph [Fig. 5 (b)] in which **twigs** are specified by solid lines while **links** are specified by dashed lines: 10 M

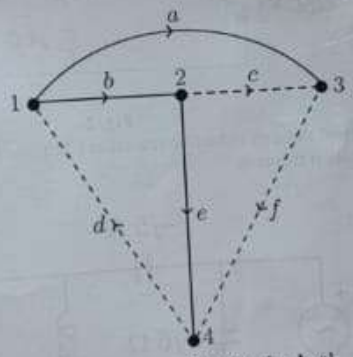

Fig.5 (c) A tree with twigs { a, b, e}

**********END of QP**********

VIT

Slot: A2+TA2+TAA2

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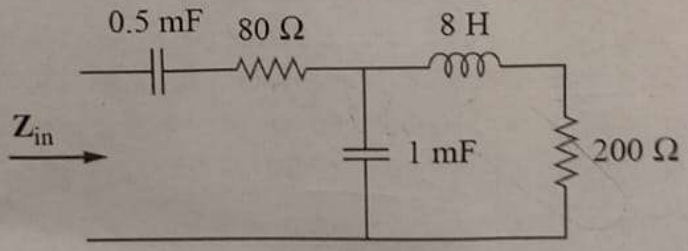
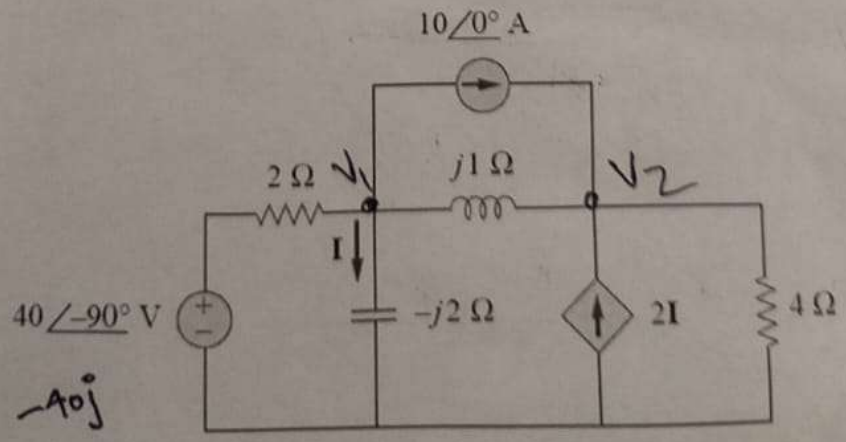
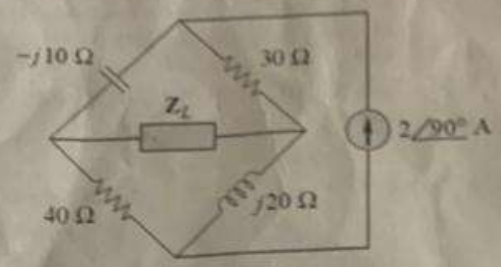
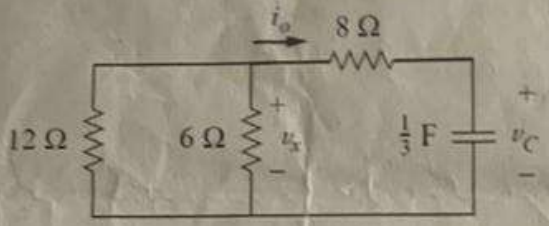
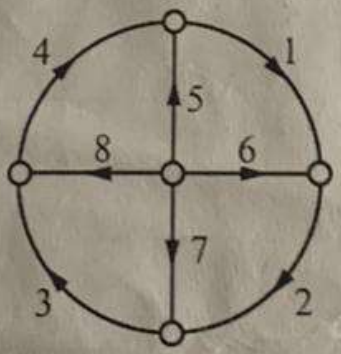
SCHOOL OF ELECTRONICS ENGINEERING (SENSE)
CONTINUOUS ASSESSMENT TEST- 1
Winter Semester: 2022-23

Programme Name & Branch: B.Tech & ECE | **Class Number: VL2022230506379**
Course Code: BECE203L | **Course Title : Circuit Theory**
Faculty Name: Dr. Shanidul Hoque | **Date: 26/03/2023**
Exam Duration: 90 Minutes | **Maximum Marks: 50**

Answer all the following questions

S. No	Questions	Marks
1	(a) Find the voltage $v(t)$ in a circuit described by the following integrodifferential equation using the phasor approach. $$\frac{dv}{dt} + 5v(t) + 4\int v\,dt = 20\sin(4t + 10°)\ \text{V}$$	5
	(b) Determine the input impedance of the circuit shown in Figure 1 at ω=10 rad/s.  Figure 1	5
2	Find the node voltages and current I in the circuit shown in Figure 2.  Figure 2	10

3	Calculate the value of Z_L that maximizes the average power drawn from the circuit shown in Figure 3. What is the maximum average power received by Z_L?  Figure 3	10
4	Determine v_c, v_x and i_0 for $t \geq 0$ in the circuit shown in Figure 4 assuming $v_c(0) = 45$ V.  Figure 4	10
5	Obtain the fundamental tie-set matrix for the given network graph in Figure 5 and express the branch currents in terms of loop currents by selecting a tree branches as 5, 6, 7, 8. Also obtain the fundamental cut-set matrix.  Figure 5	10

3 Calculate the value of Z_L that maximizes the average power drawn from the circuit shown in Figure 3. What is the maximum average power received by Z_L?

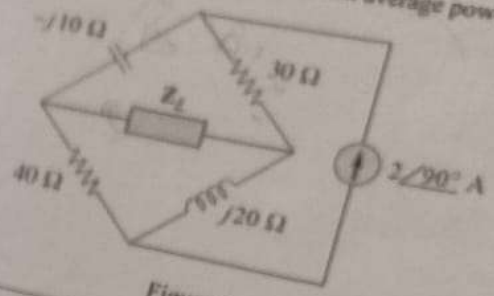


Figure 3

4 Determine v_C, v_x and i_o for $t \geq 0$ in the circuit shown in Figure 4 assuming $v_c(0) = 45$ V. 10

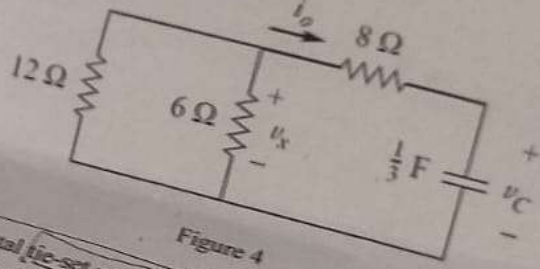


Figure 4

5 Obtain the fundamental tie-set matrix for the given network graph in Figure 5 and express the branch currents in terms of loop currents by selecting a tree branches as 5, 6, 7, 8. Also obtain the fundamental cut-set matrix. 10

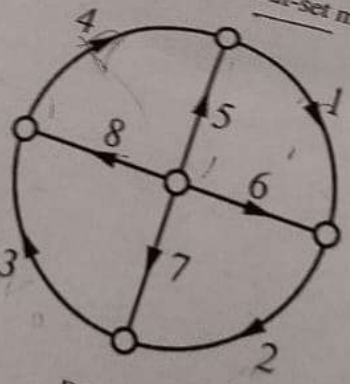
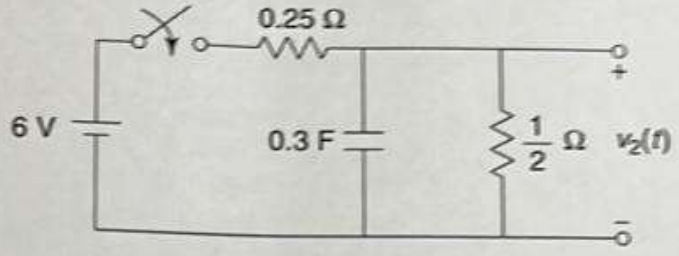


Figure 5

Q4. In the network of Figure 4, the switch is open for a long time and at $t = 0$, it is closed. Determine $v_2(t)$.



10 M

Figure 4

Q5. a) Construct the reduced incidence matrix for the graph shown in Figure 5 (a).

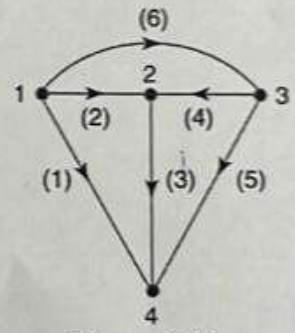


Figure 5 (a)

10 M

b) Construct the Tie-set matrix for the tree in Figure 5 (b), which is identified from the graph in Figure 5 (a).

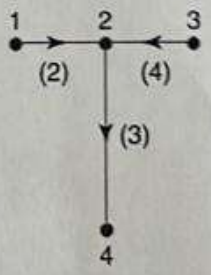


Figure 5 (b)