VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR- 440010
Department of Electronics and Communication Engineering
(End Semester Examination, Dec. 2020)

EEL209 – Linear Network Theory

CLASS	: B. Tech	SEMESTER	: III
BRANCH	: ECE	SESSION	: W2020
TIME	: 1.5 HOURS	FULL MARKS	: 35

INSTRUCTIONS:
1. The missing data if any may be assumed suitably.
2. Before attempting the questions, be sure that you have the correct question paper.
3. Name, Enrolment number and signature should be written at the top of the every page of the answer sheet.

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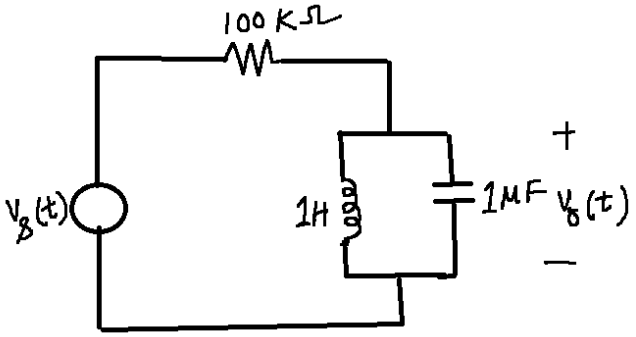
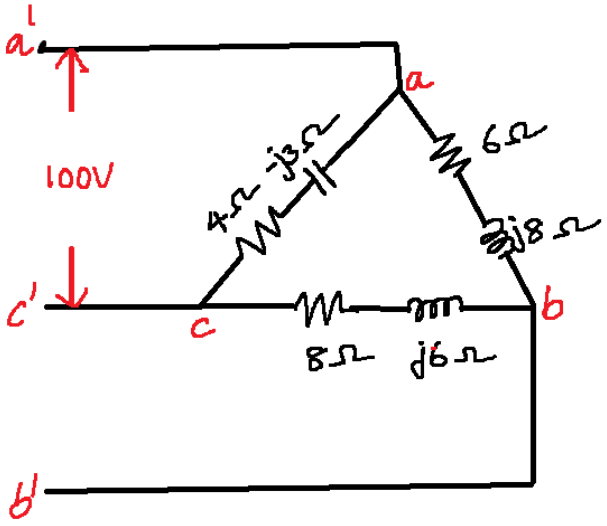
1. In the circuit shown in figure, $V_S(t)$ is periodic with a period equal to 2π msec and has the following values during that period, [7] CO-5

$V_S(t)$ = 10 volts 0 < t < π msec
= 0 volts π msec < t < 2π msec .

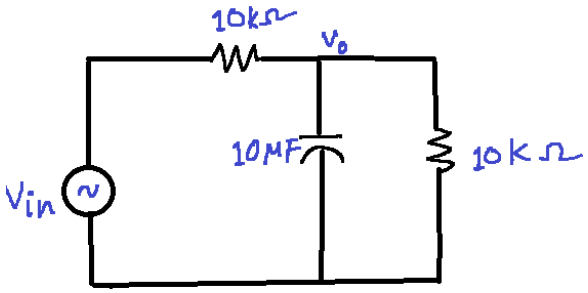
Determine the value of $V_0(t)$.



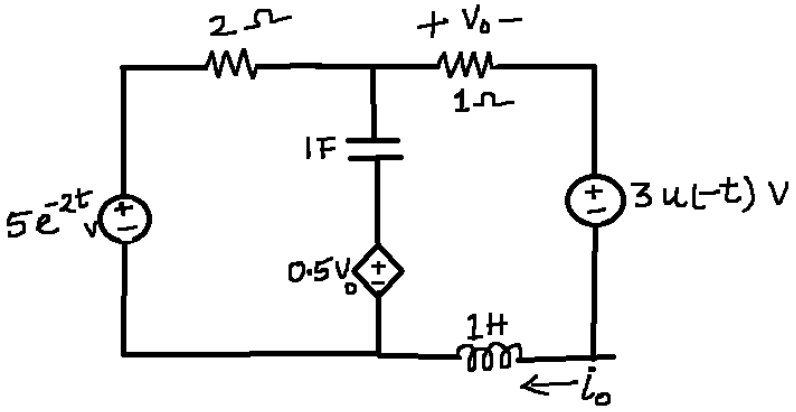
2. For the unbalance Δ-connected load shown in following figure, find , the phase currents, line currents and total power consumed by the load when phase sequence is (a) ***abc*** (b) ***acb*** **.** Also, draw the phasor diagram for each sequence. [8] CO-1



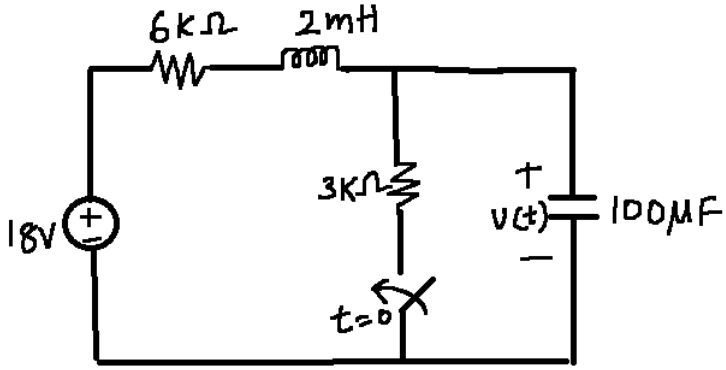
3. What type of filter is represented by the circuit shown in the following figure. Calculate the cut-off frequency? [5] CO-4



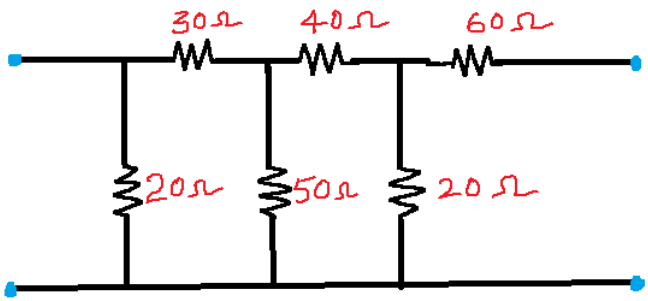
4. Using the Laplace transform, find the $i_0(t)$ in the circuit for t > 0. [5] CO-3



5. In the following circuit the switch was opened before $t = 0$. If it closes at $t = 0$ then find the value of $\frac{dv(t)}{dt}$ at $t = 0^+$. [5] CO-1,4



6. Obtain the ABCD parameter representation of the following circuit. [5] CO- 4



*** All the Best ***

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR- 440010
Department of Electronics and Communication Engineering
(Mid sessional examination, Oct. 2020)

EEL209 – Linear Network Theory

CLASS	: B. Tech	SEMESTER	: III
BRANCH	: ECE	SESSION	: W2020
TIME	: 1 HOURS	FULL MARKS	: 25

INSTRUCTIONS:
1. The missing data if any may be assumed suitably.
2. Before attempting the questions, be sure that you have the correct question paper.
3. Name, Enrolment number and signature should be written at the top of the every page of the answer sheet.

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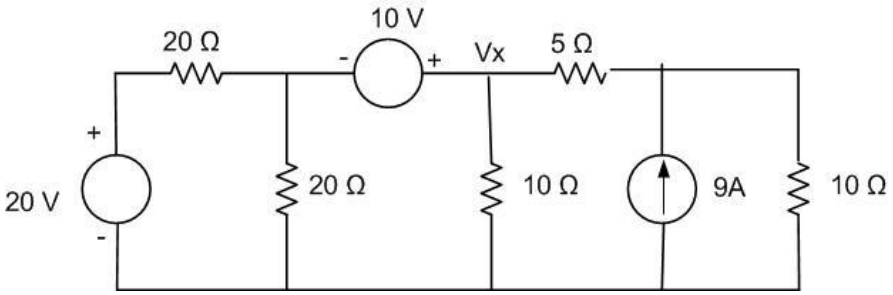
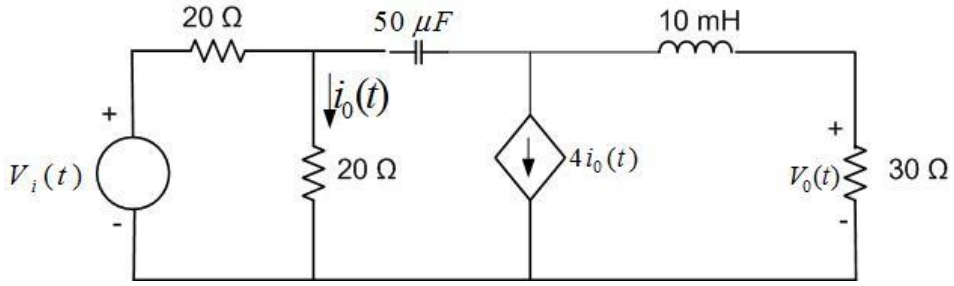
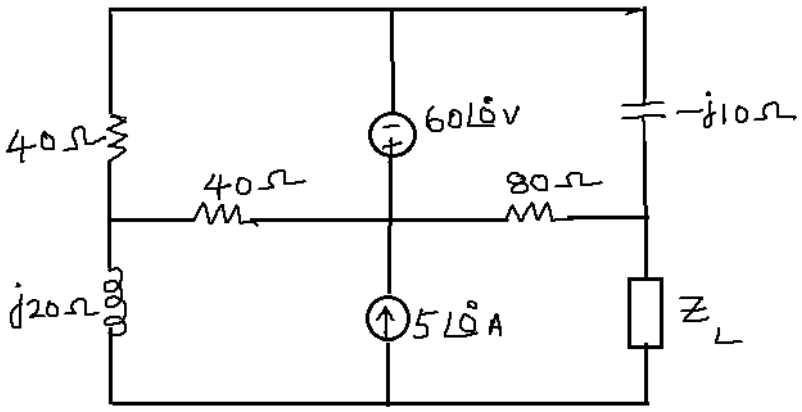
1. Find the voltage Vx in the circuit, using nodal analysis. [4] CO-1



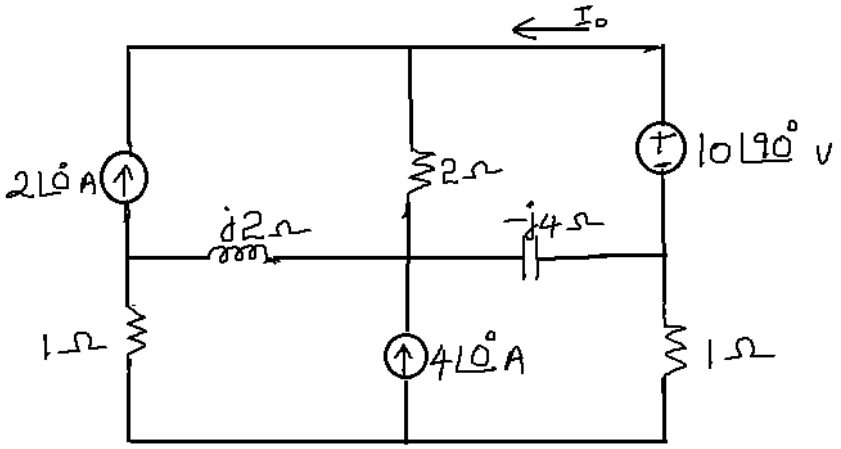
2. For the given circuit, if the source voltage $v_i(t) = 10\cos(1000t)$ volts, find $v_0(t)$. [4] CO-1



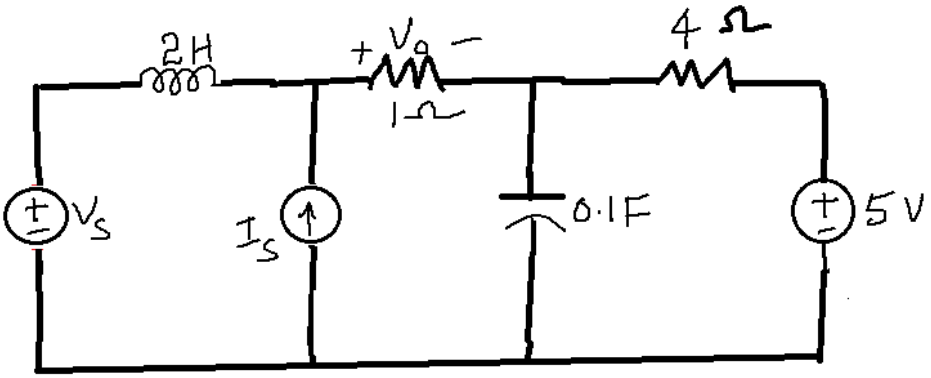
3. Find the value of Z_L for maximum average power, also calculate the maximum average power received by Z_L, in the circuit shown below. [6] CO-2



4. Obtain the current I_0 in the circuit shown below. [5]
CO-1



5. For the circuit shown below, if $V_S = 10\cos 2t\ V$ and $I_S = 2\sin 5t\ A$., then find V_0 using the super position theorem. [6]
CO-2



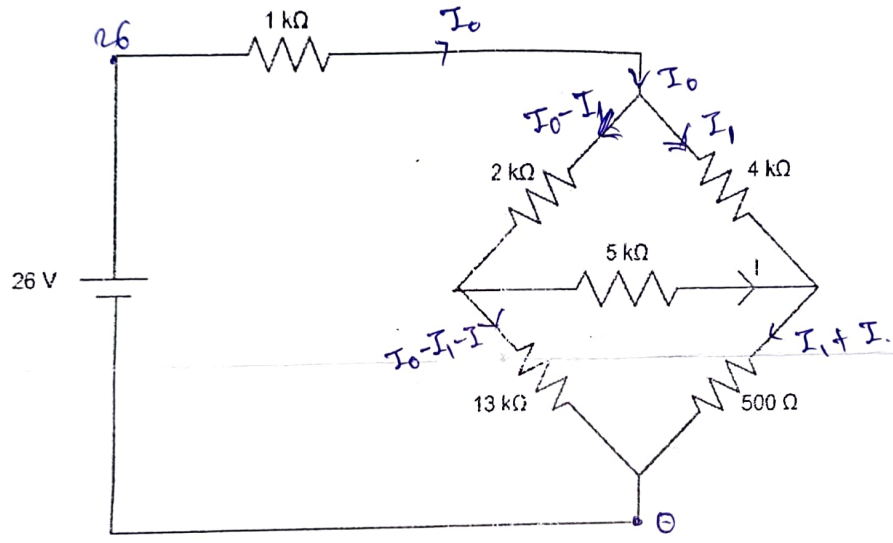
VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR- 440010
Department of Electronics and Communication Engineering
(Sessional-I Examination, Sep. 2022)

EEL209 – Linear Network Theory

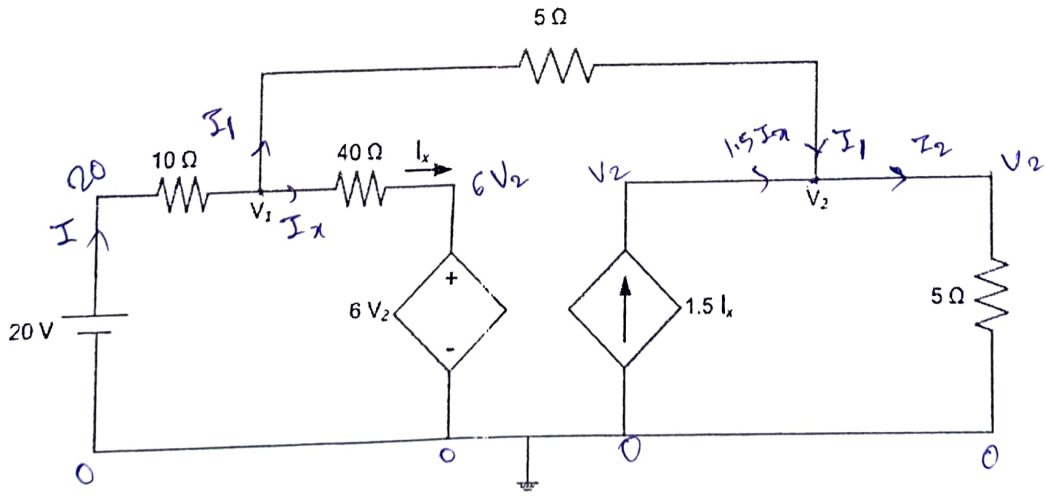
CLASS	: B. Tech	SEMESTER	: III
BRANCH	: ECE	SESSION	: W2022
TIME	: 1 HOUR	FULL MARKS	: 15

INSTRUCTIONS:
1. The missing data if any may be assumed suitably.
2. Before attempting the questions, be sure that you have the correct question paper.

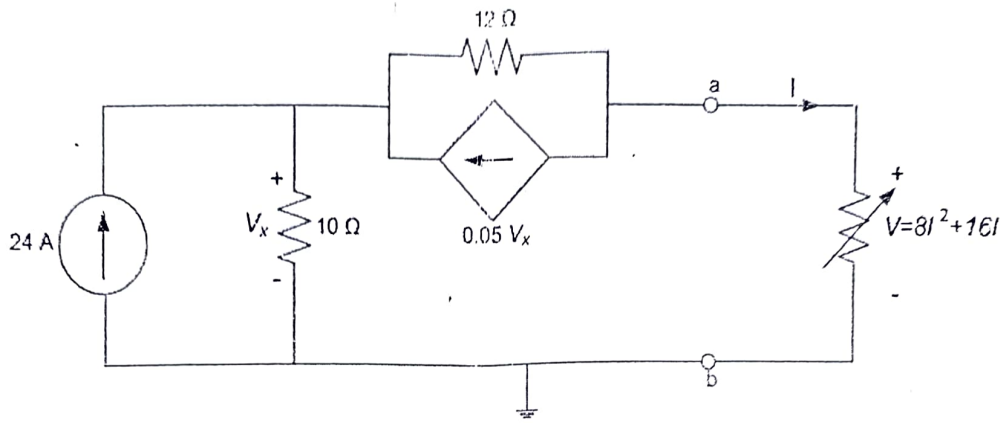
1. In the given circuit, find the current *I* flowing through the 5 kΩ resistor. CO1 4



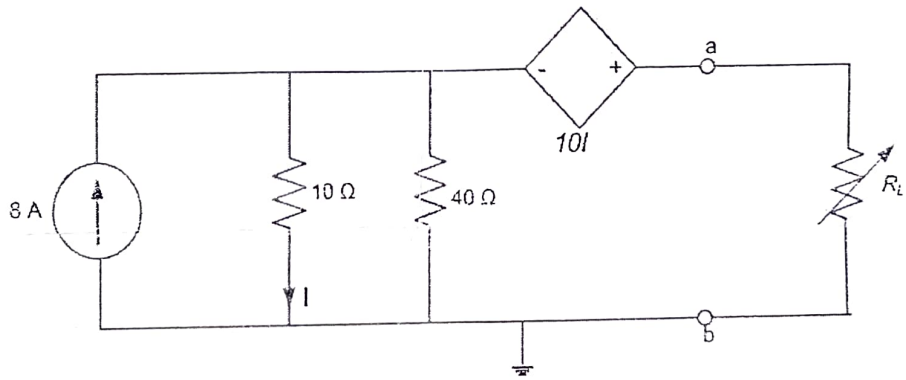
2. Determine the node voltages V_1 and V_2 in the circuit shown below. CO-1 3



3. For the circuit shown below, obtain the Thevinin's equivalent circuit to the left of the terminals a-b, and determine the current I. CO-2 5



4. Determine the value of R_L for maximum power transfer in the circuit and calculate the maximum power. CO-2 3



*** All the Best ***

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR- 440010

Department of Electronics and Communication Engineering

(2nd sessional examination, Oct. 2022)

SLOT-E

CLASS	: B. Tech	SEMESTER	: III
BRANCH	: ECE	SESSION	: W2022
TIME	: 1 HOUR	**FULL MARKS**	**: 15**

Subject: EEL209: Linear Network Theory

INSTRUCTIONS:

1. The missing data, if any, may be assumed suitably.
2. Before attempting the questions, be sure that you have got the correct question paper.
3. All questions are compulsory.

Q1. For the circuit shown in Figure 1, find V_C using the superposition theorem

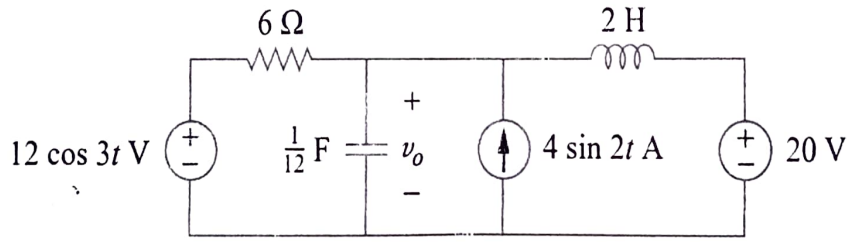


Figure 1

[5] *CO-2*

Q2. In the following circuit (Figure 2), determine the current I_x by applying source transformation.

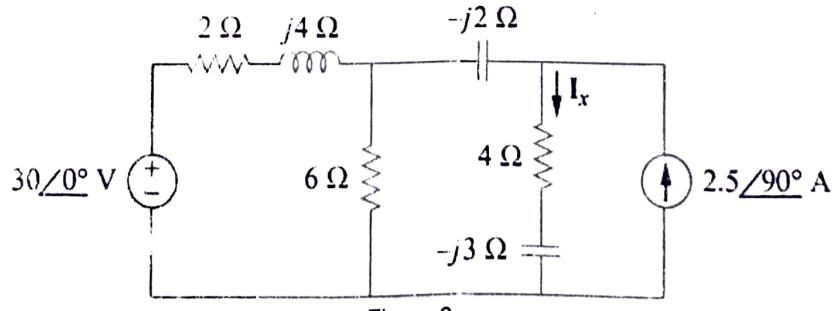


Figure 2

[3] *CO-1*

Q3. The variable resistor **R** in the circuit of Figure 3 is adjusted until it absorbs the maximum average power. Find the value of **R** and the maximum average power absorbed

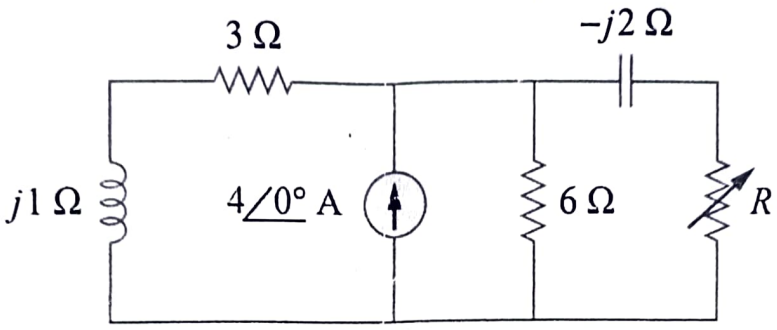


Figure 3

[3]
CO-2

Q4 Determine the type of filter shown in Figure 4. Also, calculate the cut off frequency. Take R = 2kΩ, L = 2 H, and C = 2 μF.

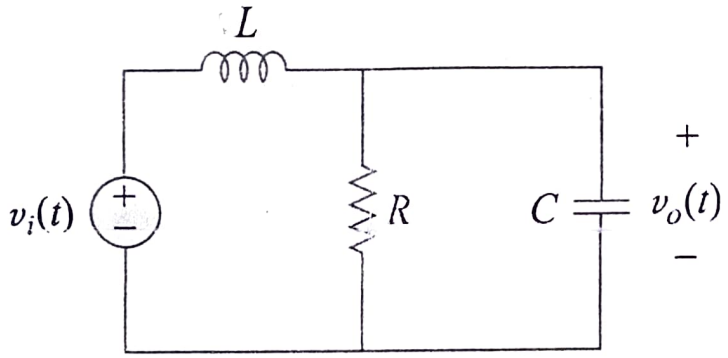


Figure 4

[4]
CO-3

BT21ECE[redacted]

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR- 440010
Department of Electronics and Communication Engineering
(End Semester Examination, Nov/Dec. 2022)

EEL209 – Linear Network Theory

CLASS	: B. Tech	SEMESTER	: III
BRANCH	: ECE	SESSION	: W2022
TIME	: 3 HOURS	FULL MARKS	: 60

INSTRUCTIONS:
1. The missing data if any may be assumed suitably.
2. Before attempting the questions, be sure that you have the correct question paper.

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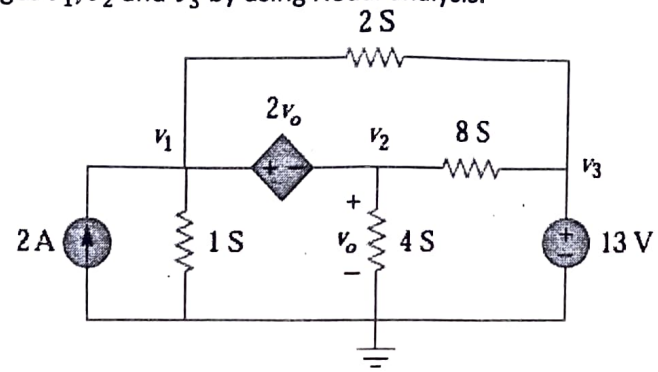
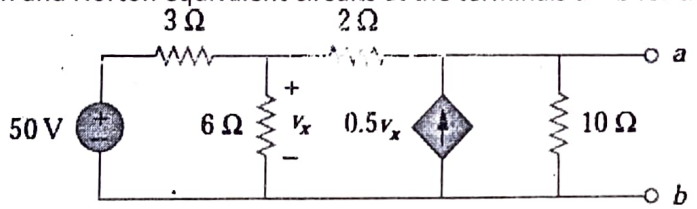
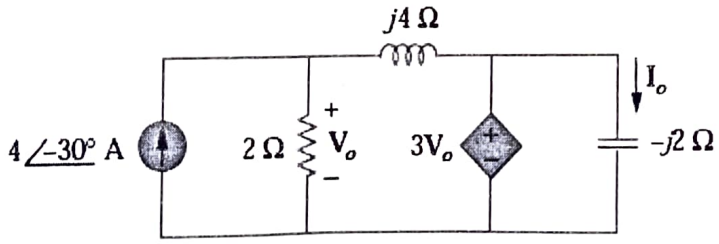
1. Determine the voltages v_1, v_2 and v_3 by using Nodal analysis. CO-1 6



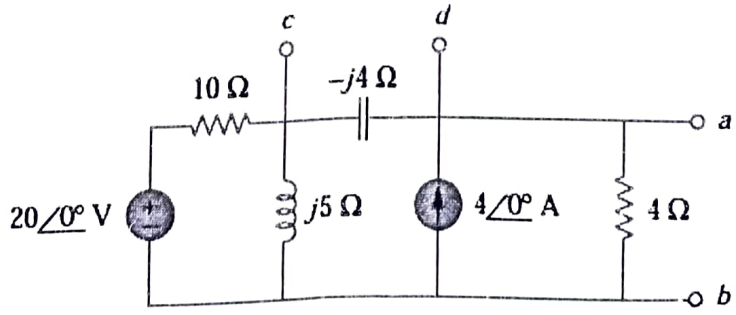
2. Obtain the Thevenin and Norton equivalent circuits at the terminals $a-b$ for the following circuit. CO-2 6



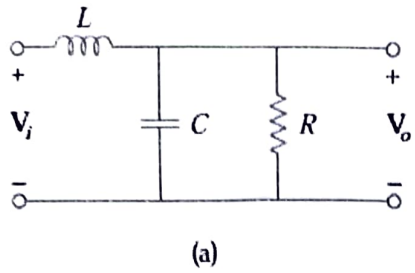
3. Determine v_0 and i_0 in the circuit using mesh analysis. CO-1 6



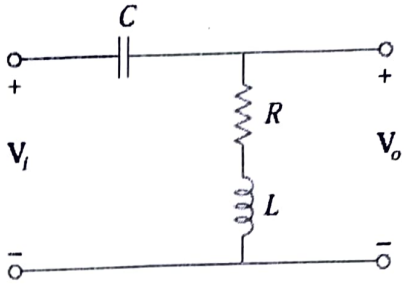
4. For the following circuit find the Thevenin equivalent circuit as seen from **(a)** *Terminals a-b* **(b)** *Terminals c - d* CO-2 8



5. Find the transfer function $H(\omega) = \frac{V_0}{V_i}$ of the following circuits. CO-4 6

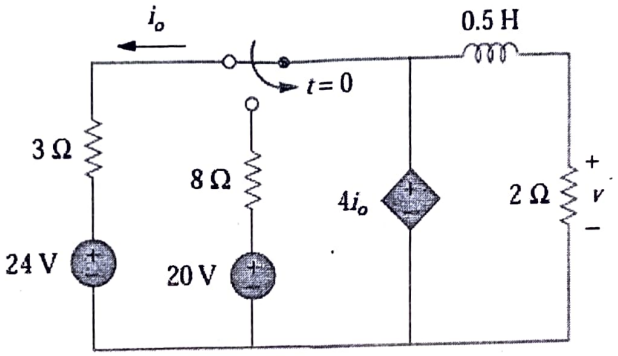


(a)

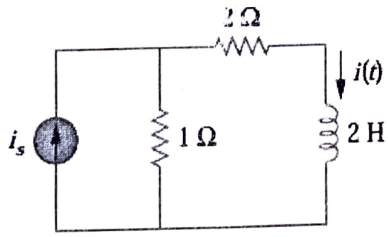


(b)

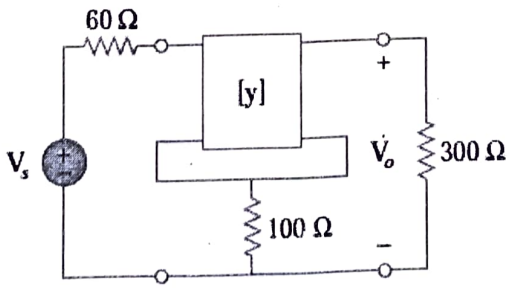
6. Find $v(t)$ for t < 0 and t > 0 in the following circuit. CO-3 7



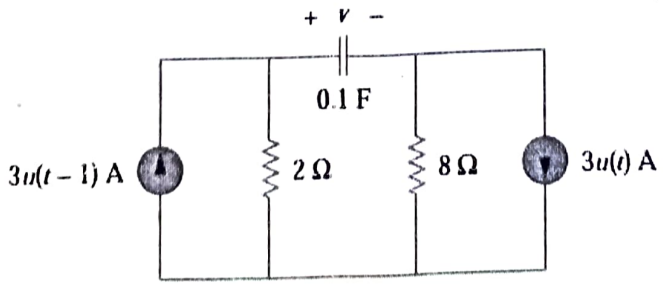
7. Find $i(t)$ in the following circuit, if $i_s(t) = 1 + \sum_1^{\infty} \frac{1}{n^2} \cos(3nt)\ A$. CO-5 7



8. In the following two port network, let $y_{12} = y_{21} = 0, y_{11} = 2\ mS$ and $y_{22} = 10\ mS$. Find $\frac{V_0}{V_s}$ CO-4 8



9. Determine $v(t)$ for t > 0 in the circuit, if $v(0) = 0$. CO-3 6



Visvesvaraya National Institute of Technology, Nagpur

Department of Electronics & Communication Engineering

Class: III Sem. B. Tech. (ECE)

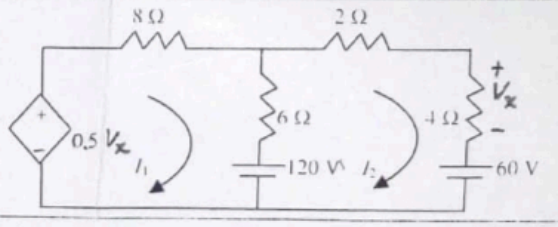
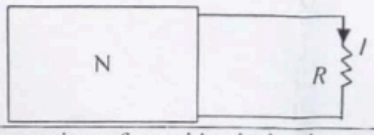
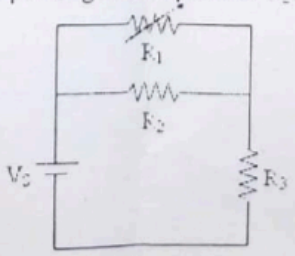
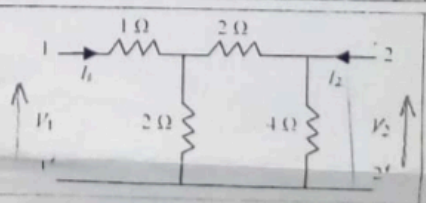
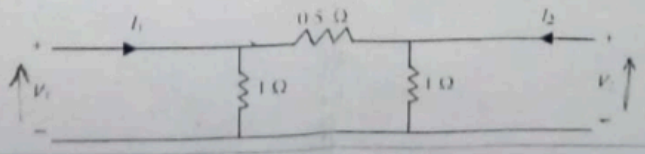
Slot: G

Subject: Linear Network Theory (EEL209)

First Sessional Examination, 2018

Duration: 1 hr. **Full Marks:** 15

Instructions: 1. Attempt all questions.
2. Numbers in the last but one column indicate maximum marks to the question.
3. Use of non-programmable scientific calculator is permitted.

Q. 1	(a)	Obtain the mesh currents in the circuit. 	3	CO_1 CO_2
	(b)	The network 'N' shown in the figure below contains only resistances and independent DC sources. The current I = 3 A and 1.5 A when R = 0 Ω and 2 Ω respectively. Determine I when R = 1 Ω. 	2	CO_1 CO_2
	(c)	A certain network consists of two identical voltage sources and a large number of ideal resistors. The power consumed in one of the resistors is 4W when either of the two sources is active and the other is replaced by short circuit. What would be the possible power consumed by the same resistor when both the sources are simultaneously active?	2	CO_1 CO_2
	(d)	For what value of R_1 maximum power gets dissipated in R_2? 	1	CO_2
Q. 2	(a)	Find the h-parameters of the circuit shown below. 	3	CO_2
	(b)	Two identical sections of the network as shown in the figure are connected in parallel. Find the Y-parameters of the resulting network. Also verify the result by direct calculation. 	4	CO_2
		Total	15	

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Visvesvaraya National Institute of Technology, Nagpur

Department of Electronics & Communication Engineering

Class: III Sem. B. Tech. (ECE)

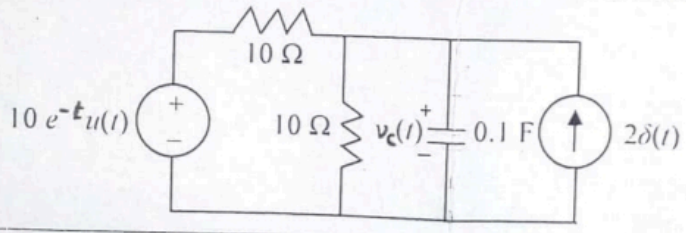
Slot: G

Subject: Linear Network Theory (EEL209)

Second Sessional Examination, 2018

Duration: 1 hr. **Full Marks:** 15

Instructions:
1. Attempt all questions.
2. Numbers in the last but one column indicate maximum marks to the question.
3. Use of non-programmable scientific calculator is permitted.

Q. 1	Show that using a single wattmeter it is possible to measure 3-phase reactive power for a balanced circuit.	2	CO_2
Q. 2	Find the voltage across the capacitor. Consider the capacitor was in relaxed condition initially. 	3	CO_3
Q. 3	If the current source and the shunt resistance (parallel to capacitor) in the figure of Q.2 are removed from the circuit and the voltage across the capacitor is taken as the output variable, find out the gain of the modified circuit. Also calculate the corner frequency of the modified system. Derive the error at the corner frequency in dB.	4	CO_4
Q. 4	Find out the Fourier transform of the current source shown in the figure of Q.2. Draw the variation of the transformed variable w.r.t. frequency.	2	CO_5
Q. 5	One inductance of value 1 H is inserted in series with the 10 Ω resistor in the network of Q.3 (modified network of Q.2). The voltage source is replaced by a sinusoidal source of frequency 50 Hz. For this newly formed series RLC circuit, determine the half power bandwidth.	2	CO_5
	Total	15	

Visvesvaraya National Institute of Technology, Nagpur

Department of Electronics & Communication Engineering

Class: III Sem. B. Tech. (ECE)

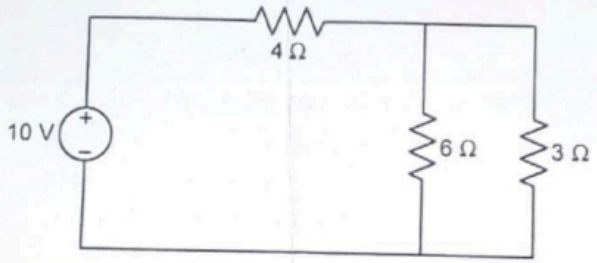
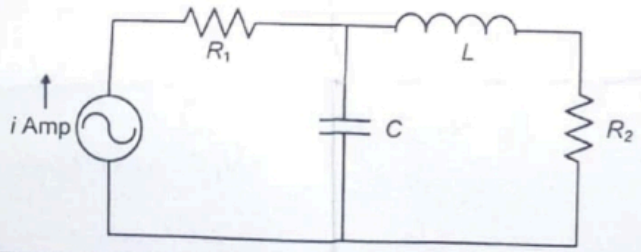
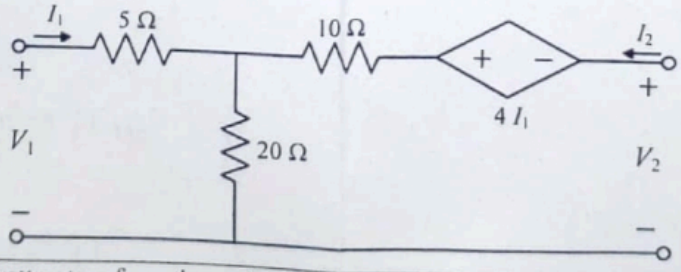
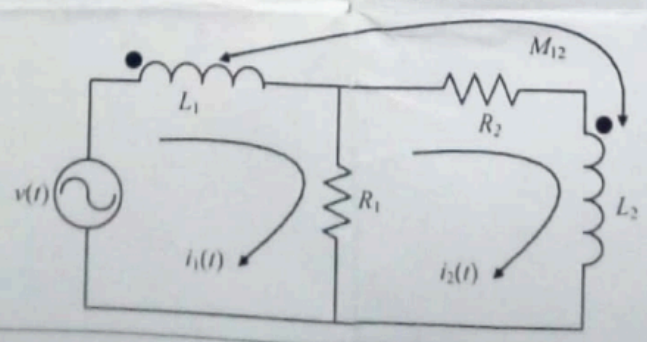
Slot: G

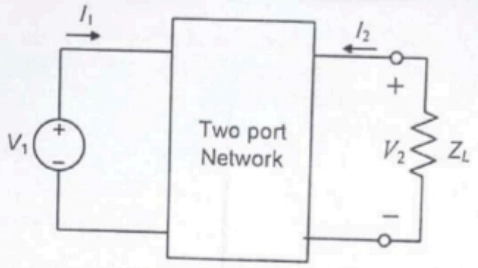
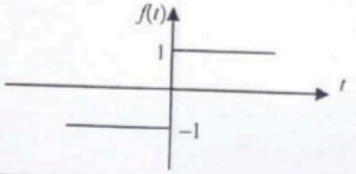
Subject: Linear Network Theory (EEL209)

End Semester Examination, 2018

Duration: 3 hrs. **Full Marks:** 50

Instructions:
1. Attempt all questions.
2. Numbers in the last column indicate maximum marks to the question.
3. Use of non-programmable scientific calculator is permitted.
4. Any missing data may be assumed suitably.

Q. 1	(a)	Determine the ammeter reading when placed in series with 3 Ω resistor. The internal resistance of ammeter is 1 Ω. 	4 CO_1 CO_2
	(b)	Draw the dual of the circuit shown below. 	4 CO_1 CO_2
Q. 2	(a)	Compute Z parameter for the circuit shown below 	5 CO_2
	(b)	Reading of two wattmeters for a three phase capacitive load are: −4000 W and 8000 W. Calculate - (i) input current and (ii) power factor of the load.	3 CO_2
Q. 3	(a)	Find the expressions of $I_1(s)$ and $I_2(s)$ for the circuit shown below. 	6 CO_2 CO_3

	(b)	In the circuit of Q. 3(a), replace L_1 by 1F capacitor and consider $v(t) = 12u(t)$ V, $R_1 = R_2 = 1\Omega$, $L_2 = 1$H. Also assume that $v_c(0) = 4$V and $i_L(0) = 2$A. Find out the voltage across R_2 at $t = 0+$.	6 CO1
Q. 4	(a)	Derive and comment on the rate of change of voltage gain (in dB) of a first order low pass active filter.	5 CO4
	(b)	For unity feedback, find out the steady state errors due to (i) unit step input, (ii) unit ramp input and (iii) unit parabolic input when $G(s) = \frac{20(s+2)}{s(s+5)}$	6 CO4
Q. 5	(a)	Deduce the expression of driving point impedance (V_1/I_1) in terms of Z parameter for the range of load impedance Z_L as $0 \le Z_L < \infty$ 	6 CO1
	(b)	Evaluate the Fourier transform of the function $f(t)$ shown in figure below. 	5 CO1

$Z_L \to 0$

$V_2 \to 0$

$V_1 = Z_{11} I_1 + Z_{12} I_L$

$V_2 = Z_{21} I_1 + Z_{22} I_L$

$I_2 = -\frac{Z_{21}}{Z_{22}} I_1$

$V_1 = Z_{11} I_1 - \frac{Z_{12} Z_{21}}{Z_{22}} I_1$

$\frac{Z_{11} Z_{22} - Z_{12} Z_{21}}{Z_{22}} I_1$