

Reg No.: SNCL9E005

Name: Sanishma

0800ECT205122002

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)

Course Code: ECT205

Course Name: NETWORK THEORY

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks

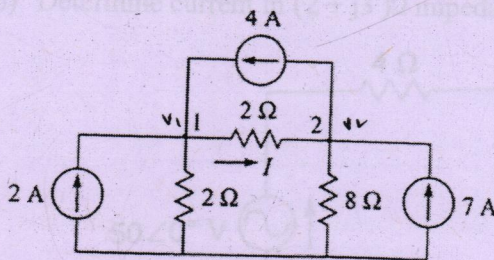
- | | Marks |
|--|-------|
| 1 Explain super mesh analysis | (3) |
| 2 Differentiate ideal and practical voltage sources. | (3) |
| 3 State Reciprocity theorem | (3) |
| 4 What is the significance of Superposition theorem? | (3) |
| 5 State initial value and final value theorem | (3) |
| 6 Find expression for current when an unit impulse is given to a series RC circuit. | (3) |
| 7 Is $\alpha_{12} = \frac{2s^2 + 5s + 1}{s + 7}$ a valid function? Justify. | (3) |
| 8 What do you mean by open circuit natural frequency and short circuit natural frequency? | (3) |
| 9 What are image parameters? | (3) |
| 10 The impedance parameters of a two-port network are $\begin{bmatrix} 6 & 3 \\ 3 & 4 \end{bmatrix}$. Find its admittance parameters. | (3) |

PART B

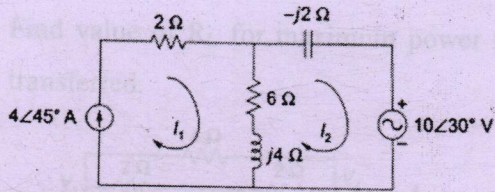
Answer any one full question from each module. Each question carries 14 marks

Module 1

- 11 a) Find I in the network shown using nodal analysis (7)

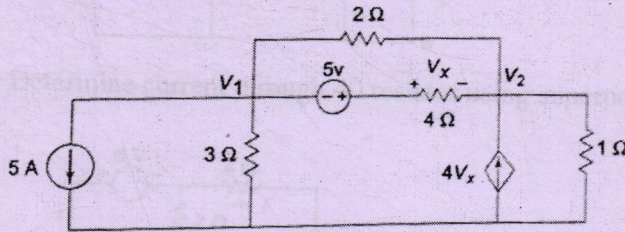


- b) Find voltage across 6Ω resistor using mesh analysis (7)

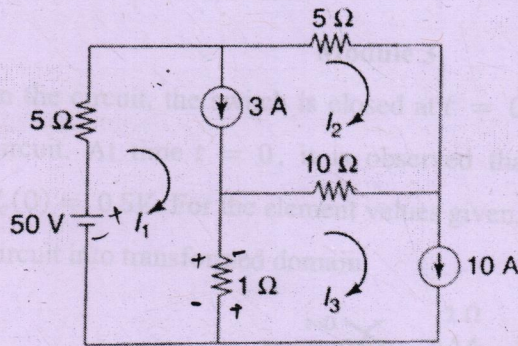


- 12 a) Find voltage across 4Ω resistor using nodal analysis

(7)



- b) Determine current through 10Ω resistor using mesh analysis



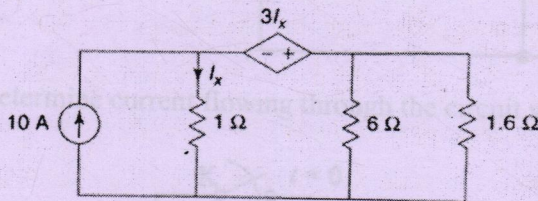
$$V = IR$$

$$I = \frac{V}{R}$$

Module 2

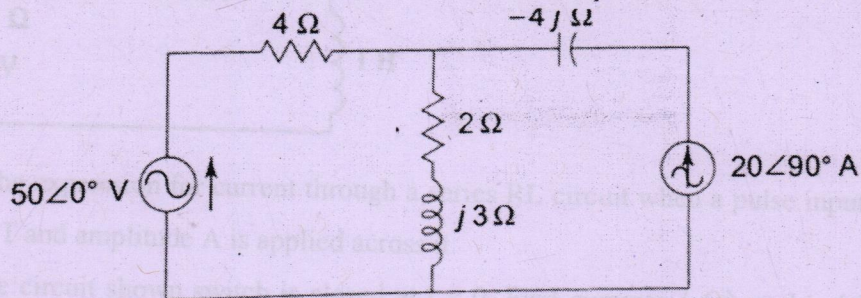
- 13 a) Find current through 1.6Ω resistor using Thevenin's Theorem

(7)



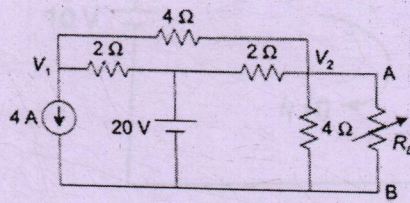
- b) Determine current in $(2 + j3)\Omega$ impedance using superposition theorem

(7)

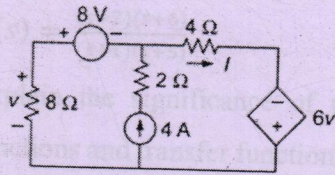


$$R = \frac{V}{I}$$

- 14 a) Find value of R_L for maximum power transfer. Also find the maximum power transferred. (7)

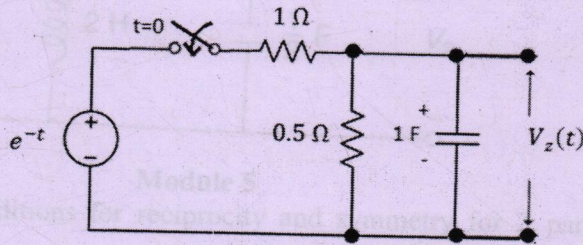


- b) Determine current through 4Ω resistor using superposition theorem. (7)

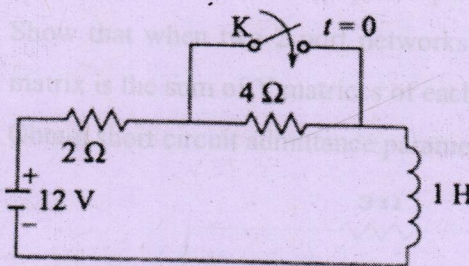


Module 3

- 15 a) In the circuit, the switch is closed at $t = 0$, connecting a source e^{-t} to the RC circuit. At time $t = 0$, it is observed that capacitor voltage has the value $V_c(0) = 0.5V$. For the element values given, determine $V_z(t)$ after converting the circuit into transformed domain. (8)

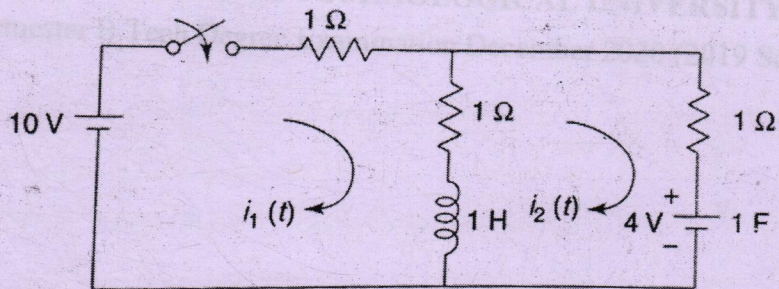


- b) Determine current flowing through the circuit shown for $t \geq 0$ (6)



- 16 a) Find the expression for current through a series RL circuit when a pulse input of width T and amplitude A is applied across it (6)

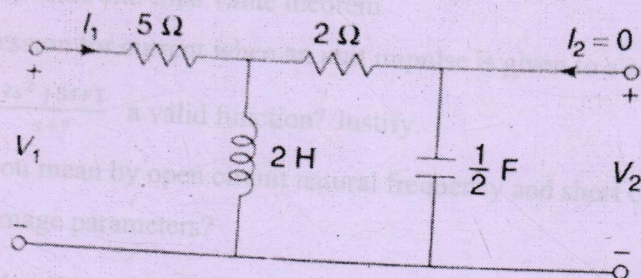
- b) For the circuit shown switch is closed at $t = 0$. Find currents $i_1(t)$ and $i_2(t)$ if initial current through inductor is zero and initial voltage on capacitor is 4V (8)



Module 4

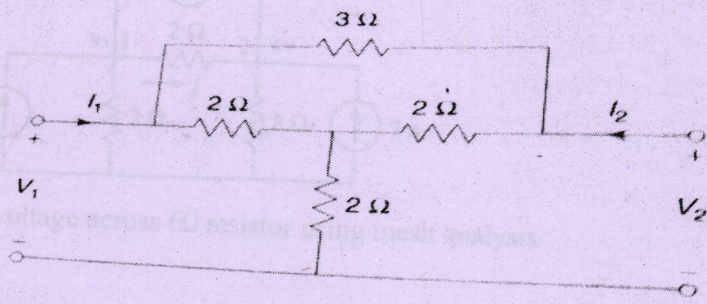
- 17 a) Obtain the time domain response of the given function using pole zero diagram (8)

$$V(s) = \frac{(s+2)(s+6)}{(s+1)(s+5)}$$
- b) Explain the significance of poles and zeros with reference to driving point functions and transfer functions. (6)
- 18 a) What are the necessary conditions for transfer function? (6)
- b) Determine driving point impedance $Z_{11}(s)$, transfer impedance $Z_{21}(s)$ and voltage transfer ratio $G_{21}(s)$ for the network shown (8)



Module 5

- 19 a) Derive the conditions for reciprocity and symmetry for Z parameters and for ABCD parameters. (8)
- b) Express g parameters in terms of h parameters and T parameters. (6)
- 20 a) Show that when two 2 port networks are connected in parallel, the resultant Y matrix is the sum of Y matrices of each individual network. (6)
- b) Obtain short circuit admittance parameters of the circuit shown. (8)



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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Third Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: ECT205
Course Name: NETWORK THEORY

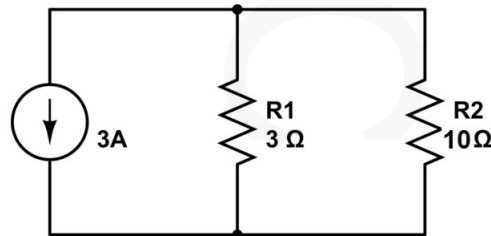
Max. Marks: 100

Duration: 3 Hours

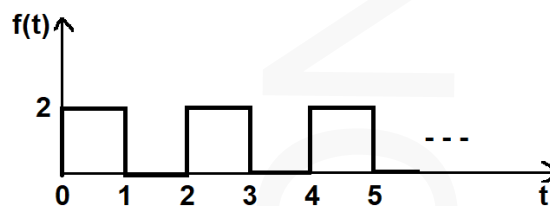
PART A*Answer all questions. Each question carries 3 marks*

Marks

- 1 Determine the voltage across 10Ω resistor by applying suitable source transformation. (3)



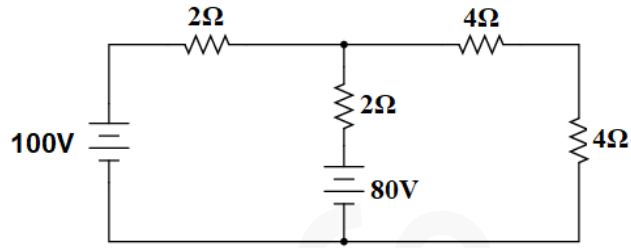
- 2 Explain the different types of sources in electrical network. (3)
- 3 Write the steps for finding the Norton equivalent circuit of a given network having only dependent sources with model equivalent circuit. (3)
- 4 Explain Superposition theorem with the help of an example. (3)
- 5 Obtain the Laplace Transform of the following signal. (3)



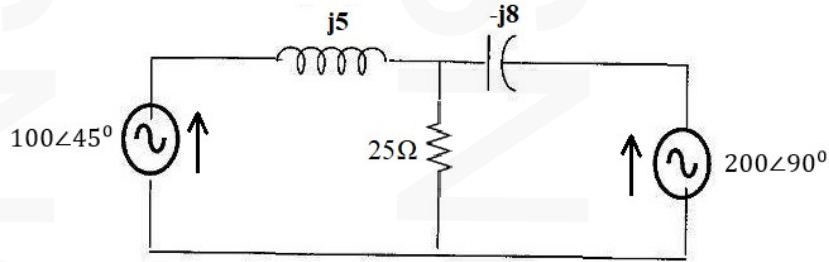
- 6 Derive the time domain response of the RL circuit with step input. (3)
- 7 Describe the significance of poles and zeros of a network function (3)
- 8 Write the necessary conditions for the transfer functions. (3)
- 9 Derive the condition of symmetry and reciprocity in terms of open circuit impedance parameters. (3)
- 10 Deduce open circuit impedance parameters in terms of transmittance parameters. (3)

PART B*Answer any one full question from each module. Each question carries 14 marks***Module 1**

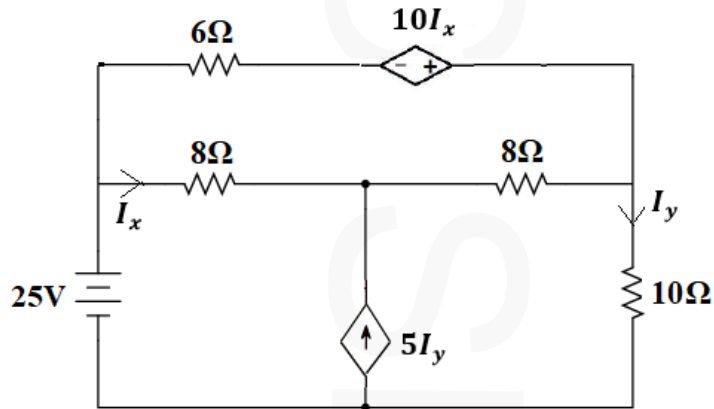
- 11 (a) Find the current through the 2Ω resistors using mesh analysis (6)



(b) Evaluate the current through 25Ω resistor using node analysis (8)

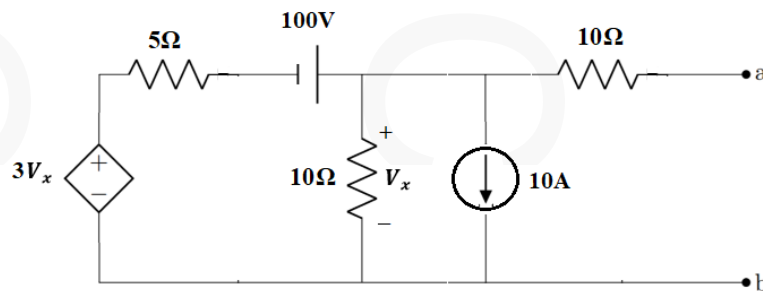


12 Evaluate the voltage across 10Ω resistor in the following network. (14)

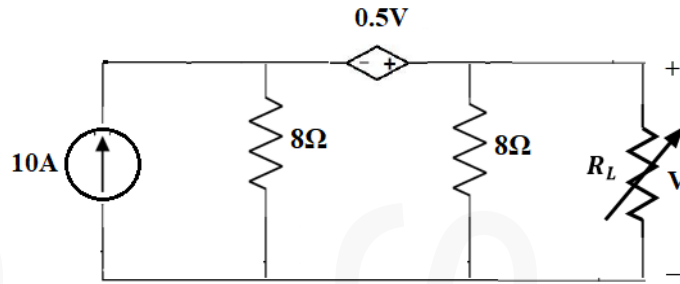


Module 2

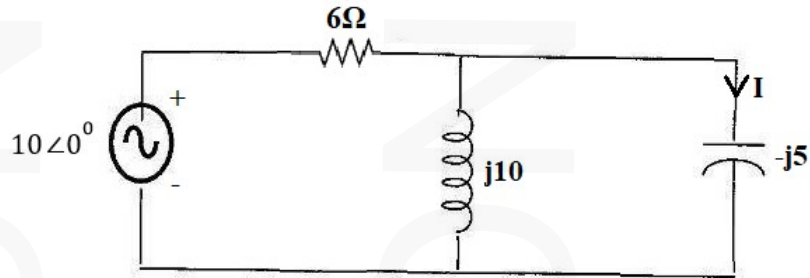
13 (a) Obtain the Thevenin equivalent circuit across the terminal a-b. (8)



(b) Evaluate the value of R_L for maximum power. Also evaluate the maximum power across the load. (6)



- 14 Evaluate I and verify Reciprocity theorem for the following network (14)



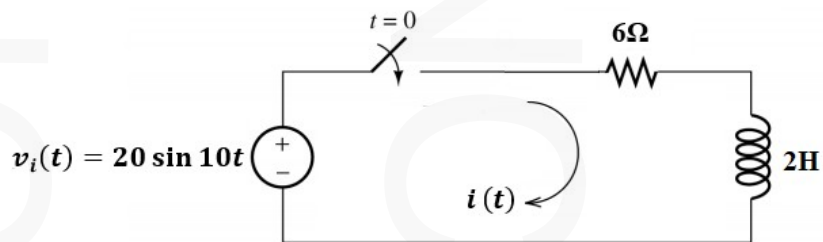
Module 3

- 15 (a) Verify initial and final value theorems of Laplace Transform for the following function. (8)

$$f(t) = e^{-t}(t^2 + t^3 + \sin 2t)$$

- (b) Derive the time domain response of an RC network for unit ramp input by assuming the initial condition as zero. (6)

- 16 Evaluate $i(t)$ in the network for $v_i(t) = 20 \sin 10t$. Switch is closed at $t = 0$. Assume that the initial value of current through the inductor is zero. (14)

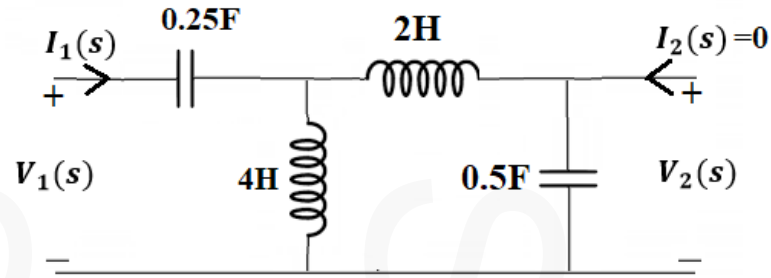


Module 4

- 17 Draw the pole zero diagram of the following function and deduce the time domain response from it. (14)

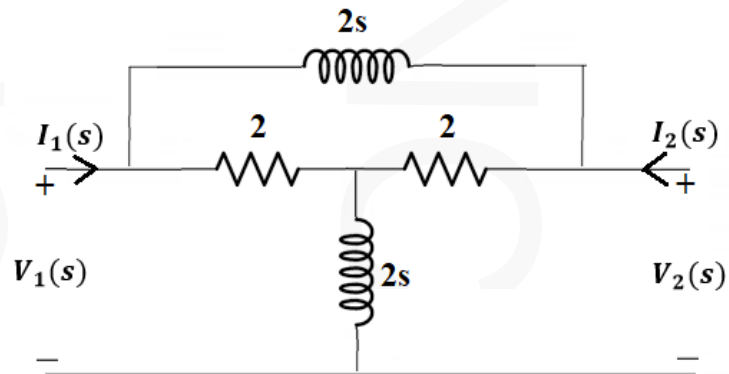
$$V(s) = \frac{(s+3)(s+5)}{s(s+1)(s+4)}$$

- 18 Determine the driving point impedance in the input side of the following network. Also determine voltage gain transfer function. (14)

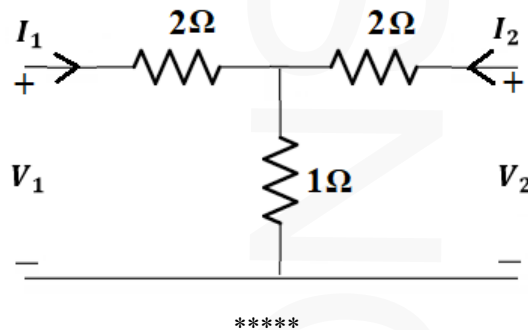


Module 5

- 19 Determine the Y-parameters of the following network (14)



- 20 Two identical sections of the following network are connected in series-parallel combination. Determine the hybrid parameters (14)



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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Regular and Supplementary Examination December 2022 (2019 Scheme)

Course Code: ECT205**Course Name: NETWORK THEORY**

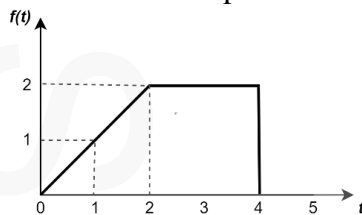
Max. Marks: 100

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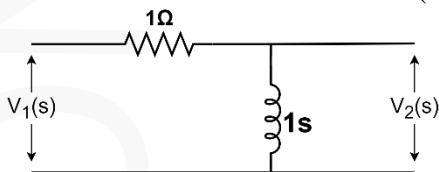
PART A*Answer all questions. Each question carries 3 marks*

Marks

- | | | |
|---|--|-----|
| 1 | State and explain Kirchhoff's voltage law. | (3) |
| 2 | Explain any three types of dependent or controlled sources. | (3) |
| 3 | List and explain the steps involved in determining Norton's equivalent circuit. | (3) |
| 4 | State and explain maximum power transfer theorem. | (3) |
| 5 | Draw the parallel and series model s-domain equivalent circuits for an inductor. | (3) |
| 6 | Determine the Laplace transform of the waveform shown in Fig. | (3) |



- | | | |
|---|---|-----|
| 7 | Classify different types of network functions and explain. | (3) |
| 8 | Obtain the transfer functions $Z_{21}(S)$ and $G_{21}(S)$ for the network shown in Fig. | (3) |

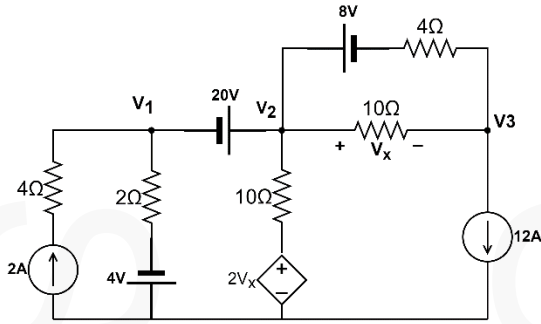


- | | | |
|----|---|-----|
| 9 | Explain the reciprocity and symmetry conditions for ABCD network. | (3) |
| 10 | Find the impedance parameters of a two-port network, its admittance parameter | (3) |

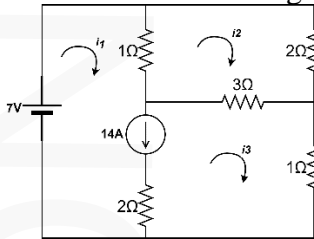
$$\text{is } \begin{bmatrix} 1/2 & -1/4 \\ -1/4 & 3/8 \end{bmatrix}.$$

PART B*Answer any one full question from each module. Each question carries 14 marks***Module 1**

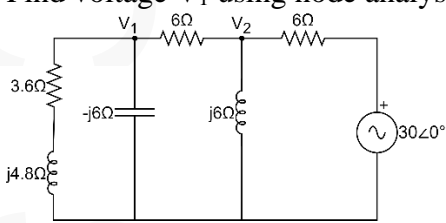
- | | | |
|----|--|-----|
| 11 | a) Find voltage V_x using node analysis. | (8) |
|----|--|-----|



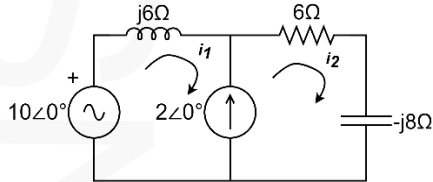
- b) Find the current through 7V source using mesh analysis. (6)



- 12 a) Find voltage V_1 using node analysis. (8)



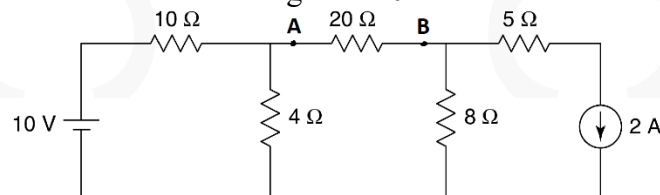
- b) Find the current I_2 using mesh analysis. (6)



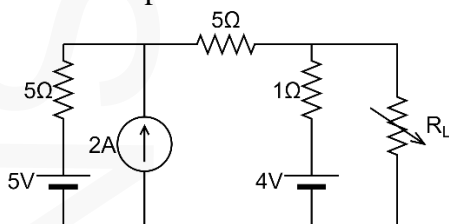
Module 2

- 13 a) Obtain the Thevenin equivalent network for the given network of Fig. at terminals A and B. (7)

Find the current through the 20Ω resistor.

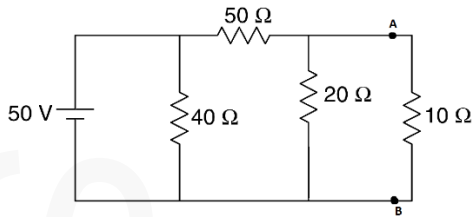


- b) Find the value of load resistor, R_L for maximum power transfer and calculate maximum power. (7)

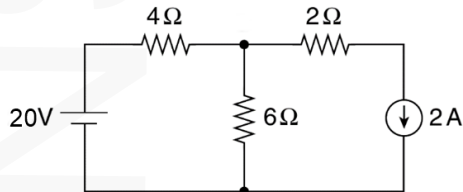


- 14 a) For the network shown in Fig., obtain Norton's equivalent network across (7)

terminals A and B. Find the current in the 10Ω resistor.

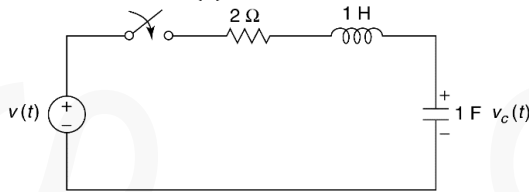


- b) Calculate the current through the 6Ω resistor using the superposition theorem. (7)

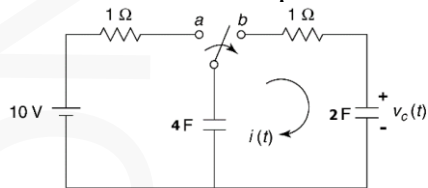


Module 3

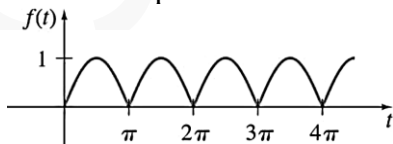
- 15 a) Find the voltage across the capacitor, $v_c(t)$ for $t > 0$ in the network shown in Fig. (Assume zero initial conditions) for
 1) $v(t) = 5u(t)$
 2) $v(t) = 6\delta(t)$



- b) Find the expression for current through a series RC circuit when a unit ramp signal is applied across it. (6)
 16 a) The switch is switched from the position 'a' to 'b' at $t = 0$ after steady state is achieved. Find the expression for the transient current $i(t)$ for $t > 0$. (8)

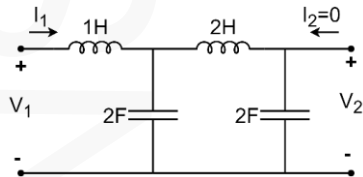


- b) Find the Laplace transform of the periodic function as shown in Fig. (6)

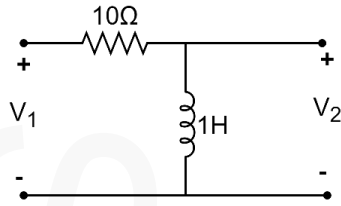


Module 4

- 17 a) Determine the driving-point impedance, transfer impedance and voltage transfer ratio for the network shown in the figure. (8)



- b) Plot amplitude and phase response for the transfer function $V_2(s)/V_1(s)$ of the given network. (6)

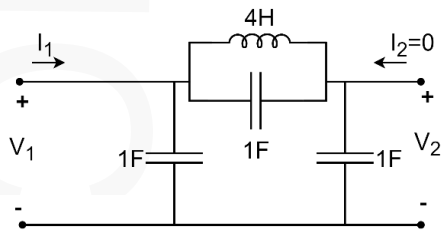


- 18 a) For the given function (8)

$$V(s) = \frac{(s+2)(s+4)}{(s+1)(s+5)}$$

Find the Time domain function $v(t)$ using the pole-zero plot (graphical method)

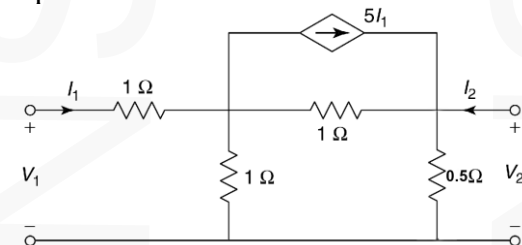
- b) Determine $\frac{V_2(s)}{V_1(s)}$ and $\frac{I_1(s)}{I_2(s)}$ for the network shown in Fig. (6)



Module 5

- 19 a) Express Y parameters in terms of Z parameters and ABCD parameters. (8)

- b) Draw equivalent circuit of two port network as shown in the figure in terms of Y parameters. (6)



- 20 a) Derive conditions for reciprocity and symmetry for Y parameters and h parameters. (8)

- b) Two identical sections of the network shown in Fig. are connected in series. Obtain the Z-parameters of the combination. (6)

