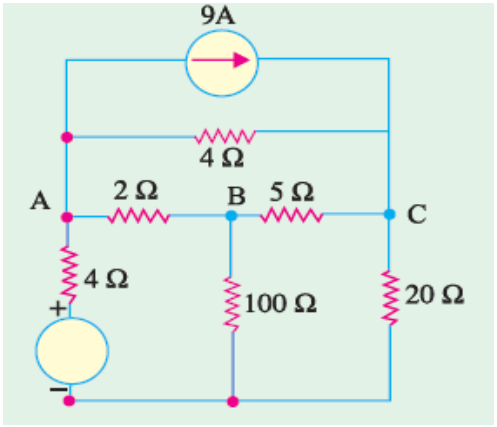
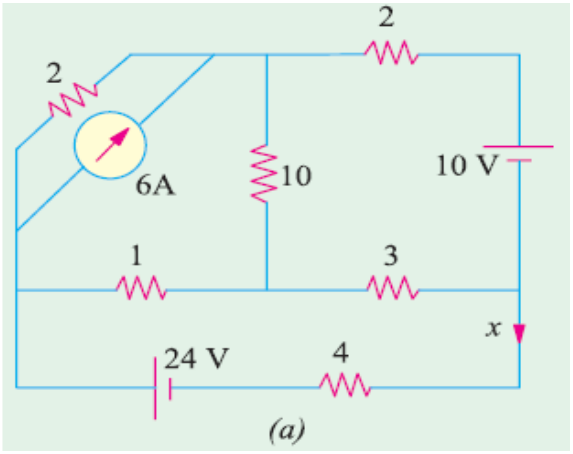
SUBJECT: Network Analysis and Synthesis

Class: B. Tech. (EEE) IV Sem.

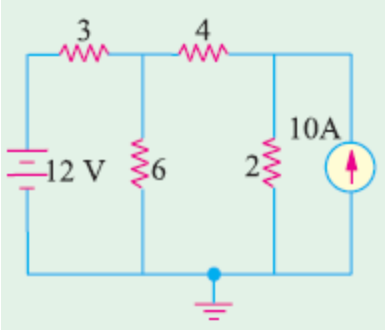
1. Define the following terms with an example: graph, tree, co-tree, node?
2. What do you mean by cut set and tie set matrix? Explain with an example.
3. What is nodal analysis for a network correlates it with Kirchhoff's current law?
4. Determine the current through 5 Ohm resistor using nodal analysis.



5. Find out the current x through 4 ohm resistor using mesh or loop analysis? (all resistors are in Ohms)



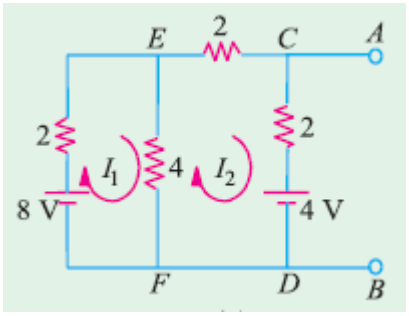
6. State and explain Norton's theorem with an example?
7. Find out current through 4 ohm resistor using thevenin's theorem? (all resistors are in Ohms)



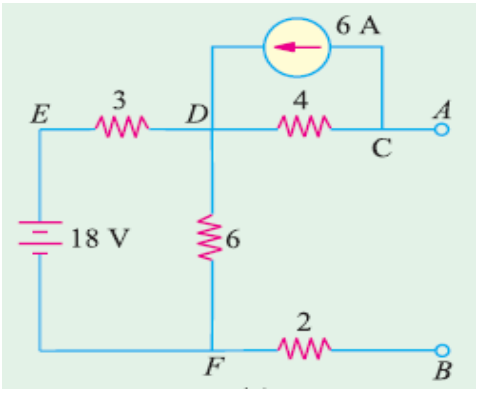
8. The incidence matrix of a given graph is given below. Draw the oriented graph?

$$\begin{bmatrix} -1 & 0 & 0 & -1 & 1 & 0 \\ -1 & 1 & 0 & 0 & 0 & 1 \\ 0 & -1 & 1 & 0 & -1 & 0 \\ 0 & 0 & -1 & 1 & 0 & -1 \end{bmatrix}$$

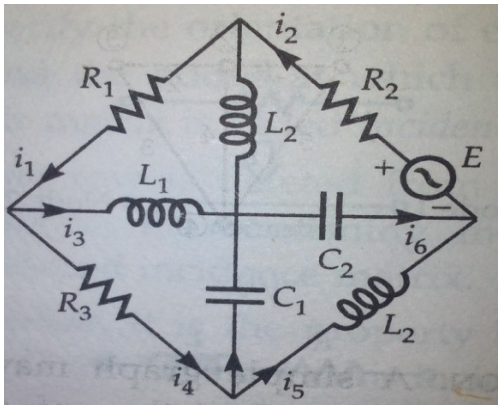
9. Find out the thevenin's equivalent across terminal A & B?



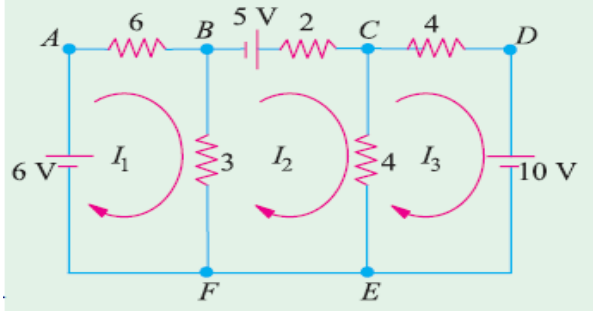
10. Find out the thevenin's equivalent across terminal A & B?



11. State and explain Kirchhoff's voltage law with an example?
12. Draw the oriented graph, tree and loop for the given network?



13. Develop the bus incidence and cut set matrix for the Ques 12 network?
14. Find out value of I_1, I_2 & I_3 for the network given below?



15. State and explain Maximum Power Transfer Theorem with an example?
16. Write the necessary conditions for positive real function.
17. Find the network for following function in Foster-1 form

$$Y(s) = \frac{(s+1)(s+3)}{(s+2)(s+4)}$$

18. Find the network for following function in Cauer-1 form

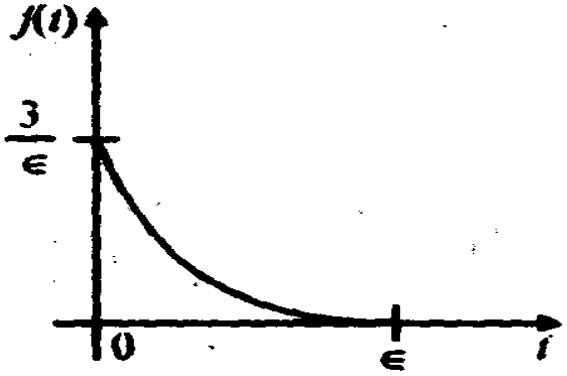
$$Y(s) = \frac{(s+1)(s+3)}{(s+2)(s+4)}$$

19. The wavelength f(t) in the given figure is defined as:

$$f(t) = \frac{3}{\varepsilon^3}(t-\varepsilon)^2, 0 \le t \le \varepsilon$$

$$= 0, \quad elsewhere$$

20. Show that as $\varepsilon \to 0$, f(t) f(t) becomes a Unit Impulse Function.



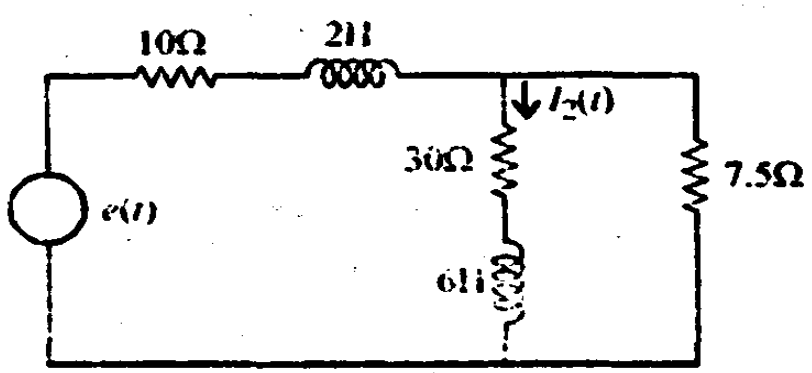
21. Use the convolution integral, find the inverse transform of the following:

$$(i) \qquad F(s) = \frac{K}{(s-a)(s+b)}$$

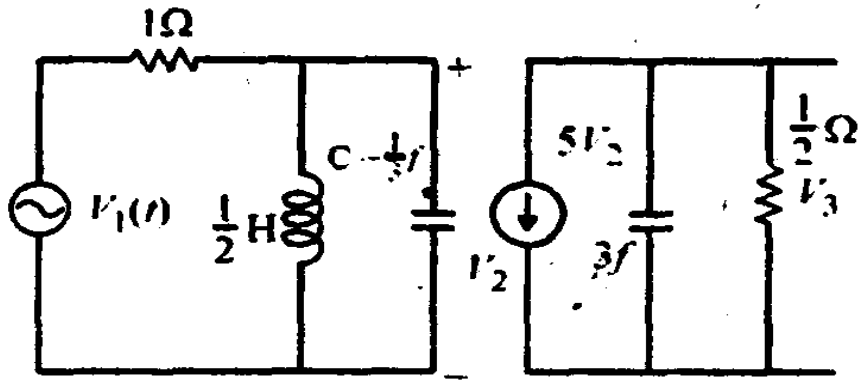
$$(i) \qquad F(s) = \frac{s}{(s+1)^2}$$

22. Find the requirement of the RC time constant in the RC differentiator circuit, such that output voltage is approximately the derivative of input voltage.

23. Find $i_2(t)$ for the circuit shown in figure using Thevenin's theorem. The excitation is $e(t) = 100cos20u(t)$



24. Determine the transfer function $H(s) = \frac{V_3(s)}{V_1(s)}$ $when\ V_1(t) = u(t), find\ V_3(t)$
For the circuit shown in figure. Assume zero initial conditions.



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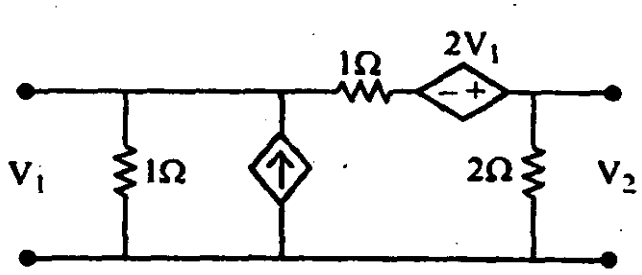
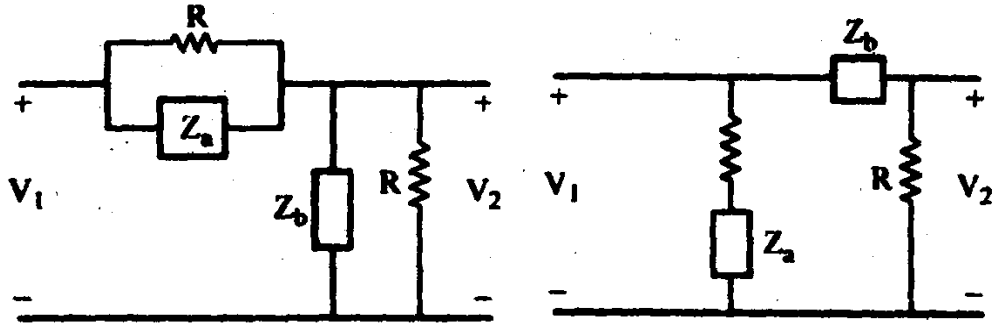
25. Prove that for a passive network reciprocal network AD – BC = 1, where A, B, C and D are transmission Parameters.
26. For the network shown in figure, determine the Y and Z parameter.

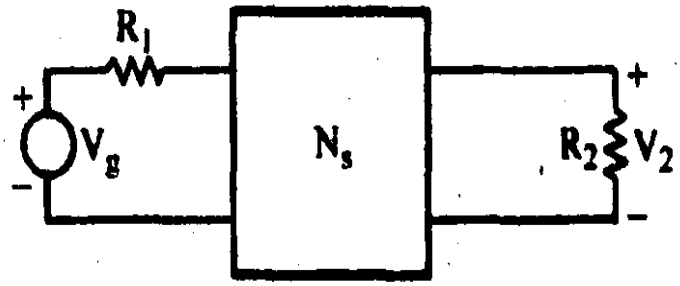


27. For the network shown in figure, show the driving point impedance Z_{in} are equal to T, when $Z_a Z_b = R^2$.

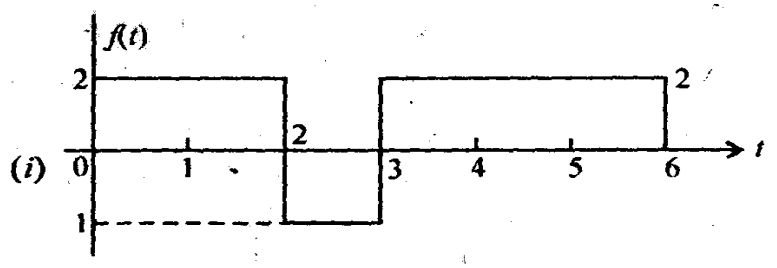


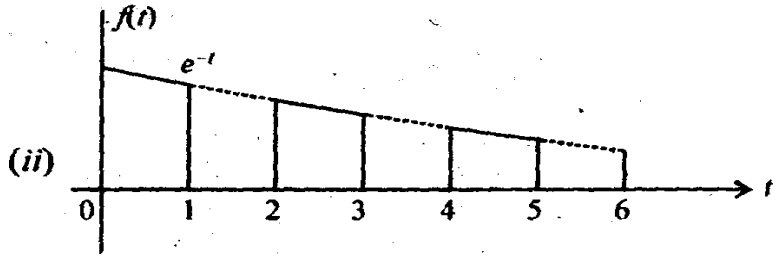
28. Synthesize N_a with termination resistor R_2 =4 ohm and R_1 = 1 ohm for

$$\frac{V_2}{V_g} = \frac{12s^2}{15s^2 + 7s + 2}$$

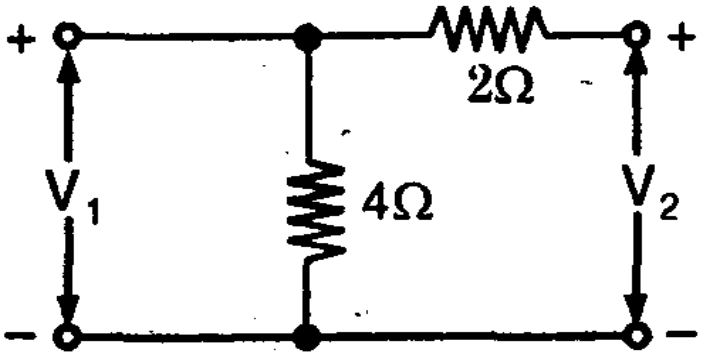


29. Represent the waveform shown in figure as mathematical expression:





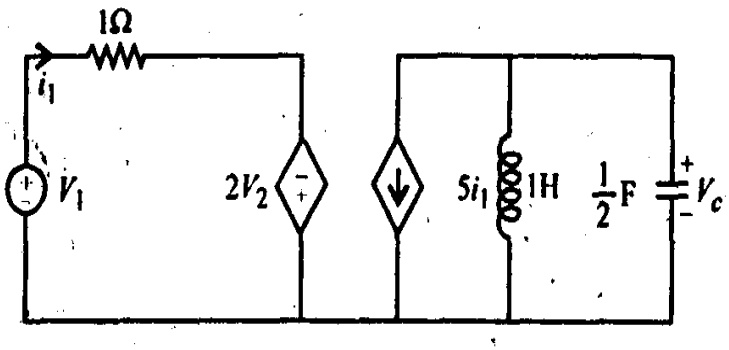
30. Briefly discuss the restrictions on pole-zero locations in s-plane for a driving point function.
31. Enlist the properties of an LC immittance driving point function. Obtain the driving point impedance in Laplace form of the given network across a-b shown in figure.



32. Give the advantages of active filters.
33. Give the advantages of passive filters.
34. The impuse response h(t) of a continuous time system is given by $h(t) = e^{-2t}cos3tu(t)$. Determine its response to a unit step input.
35. Determine the frequency response in terms of resonant peak magnitude and corresponding frequency of a system having following closed loop transfer function:

$$C(s) = \frac{1}{s^2 + s + 1}$$

36. In the given network find pole zero plot.


1Ω
i_1
V_1
$2V_2$
$5i_1$
1H
$\frac{1}{2}$F
V_c