# NETWORK ANALYSIS & SYNTHESIS (BEE 303)

**IMPORTANT QUESTIONS (According to last year paper pattern)**

1. Define (i) Tree (ii) Co- Tree (iii) Twigs (iv) Links.
2. Derive the expression of maximum power Transfer Theorem
3. State Reciprocity theorem.
4. Differentiate between natural response and forced
5. In a series RLC circuit, discuss (i) underdamped (ii) overdamped conditions
6. Define 'Z' and 'Y' parameters of a typical four terminal network
7. State the conditions for the network to be (i) Reciprocal (ii) Symmetrical
8. Name two methods of synthesis for a given positive real function
9. Discuss any two properties of LC Driving Point
10. State the properties of Hurwitz Polynomial.
11. What are the necessary and sufficient conditions of a Network function for a stable network?
12. Determine the response of a series RLC circuit to a step voltage, assuming initial conditions to be zero. Differentiate the responses in terms of damping in the system.
13. For two-port networks, establish, the relation between the transmission parameters and the open-circuit parameters.
14. Write the properties of a Complete Incidence matrix.
15. Write Kirchhoff's Current and voltage law.(KVL,KCL)
16. What is duality?
17. Define Ideal voltage & current source.
18. Define node.
19. Define Mesh in electric network.
20. What is a loop?
21. Discuss Nodal analysis .(with numerical)
22. Explain Mesh analysis. (With numerical).
23. State superposition theorem. Write the application of superposition theorem. Give the limitation of superposition theorem.
24. Give the advantages of Laplace transform.
25. Mention the application of Laplace transform.
26. State initial value theorem & Final value theorem .
27. Define the transfer function of a system.
28. Write system stability condition.
29. What are poles and zeros?
30. For a two port network define the driving point functions and transfer functions.

**31.** What do you mean by filter in network theory ?

**32.** What is a low pass filter?

**33.** What is a high pass filter?

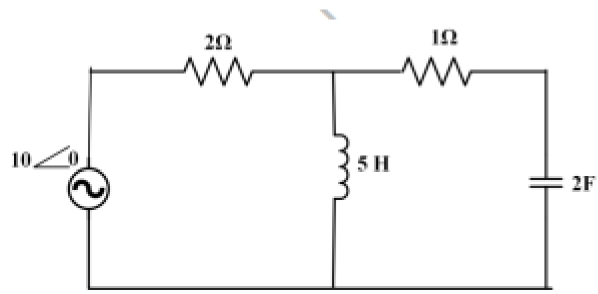
**34.** What are band pass & Band stop filters ?

**35.** Define resonance.

**36.** Define following terms-

- network function,
- Driving function
- transfer functions

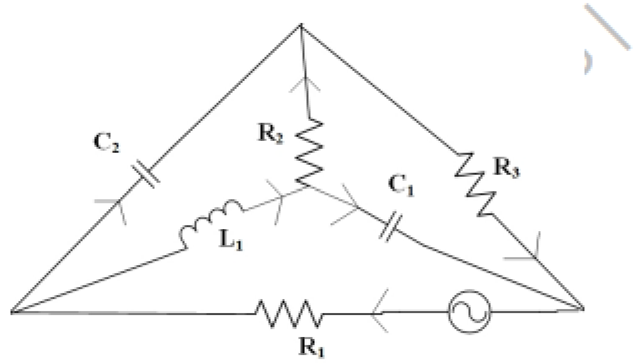
37. Determine the dual of the network –



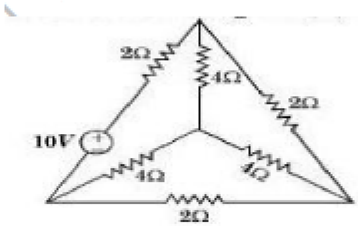

**38.** Test whether the function given below is a Positive Real Function (PRF) or not.

$$F(s) = \frac{5s^2 + 18}{s(s^2 + 9)}$$

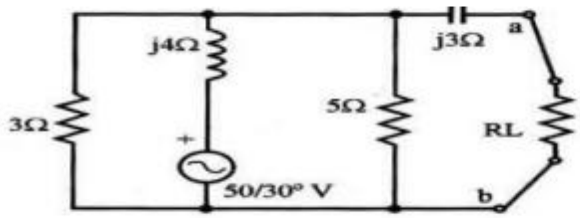
**39.** For the network shown in figure ,find the number of possible trees.




**40.** Draw the graph of the network shown in figure. Select a tree and write i. Incidence Matrix ii. Tie set matrix iii. Cut-set Matrix




**41.** What should be the value of RL so the maximum power can be transferred from the source to RL for the given figure?




**42.**

Currents $I_1$ and $I_2$ entering ports 1 and 2 respectively of a two port network are given by the following equations:

$I_1 = 0.5\,V_1 - 0.2\,V_2$ and

$I_2 = -0.2V_1 + V_2$ where $V_1$ and $V_2$ are the voltages at ports 1 and 2, respectively, find the *ABCD* parameters of the network

Determine the hybrid parameters of the network with the following data:

(i) Output terminals short circuited

$V_1 = 25V, I_1 = 1A, I_2 = 2A$

(ii) With input terminals open-circuited

$V_1 = 10V, V_2 = 50V, I_2 = 2A$

**43.**

**44.** Test the immittance function for L-C/R-C/ R-L synthesis condition and synthesize the Cauer Form II network for

$$Z(s) = \frac{s^3 + 4s}{3s^4 + 24s^2 + 36}$$

**45.** Find the 1st form of Foster for the following impedance function.

$$Z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}$$

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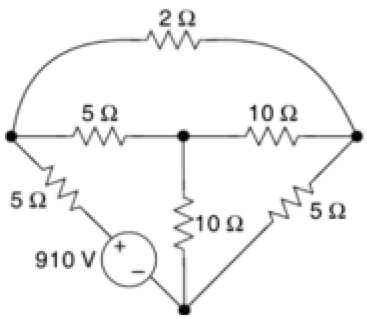
**46.** For the resistive network, write a cutset matrix and equilibrium equations on voltage basis. Hence obtain values of branch voltages and branch currents.




**47.** Obtain both Cauer I and II realizations of the driving point function given by:

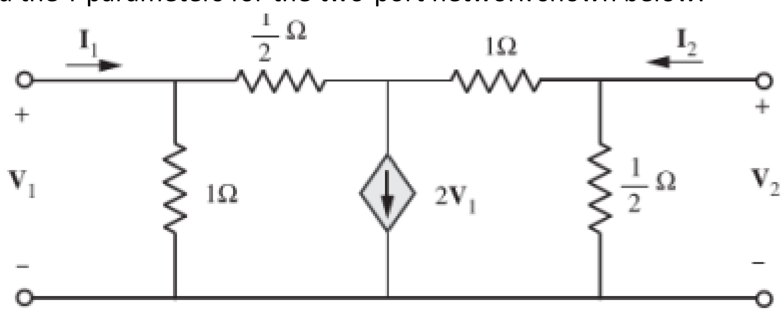
$$Z(s) = \frac{10s^4 + 12s^2 + 1}{2s^3 + 2s}$$

**48.** Check the positive realness of the following functions.

i. $\frac{2s+4}{s+5}$

ii. $\frac{s^2+2s+4}{(s+3)(s+1)}$

**49.** Find the Y parameters for the two-port network shown below:




**50.** The switch was in position S1 for a long time. Next, it is moved to position S2 at t=0. Calculate the voltage across the capacitor for t > 0. Further, evaluate the time at which the capacitor voltage becomes zero.