



[1] Determine the O.C. Z-parameters for the network shown in Fig. 1. Sketch its Z-parameters' equivalent circuits.

[2] Determine the S.C. Y-parameters for the network shown in Fig. 2. Sketch the two forms of its equivalent circuit.

[3] Calculate the Hybrid H-parameters for the network given in Fig. 1 and sketch its equivalent circuit.

[4] For the Hybrid equivalent circuit shown in Fig. 3, calculate the current gain A, and the voltage gain A_v.

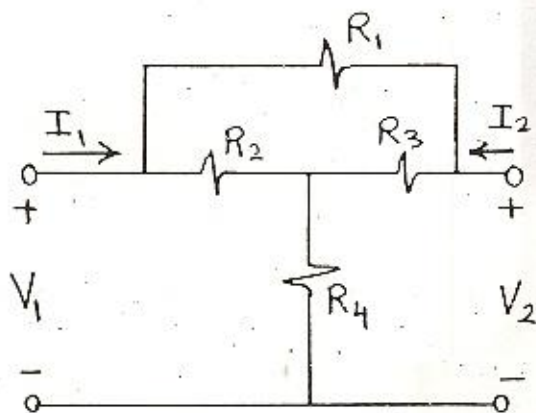


Fig.1

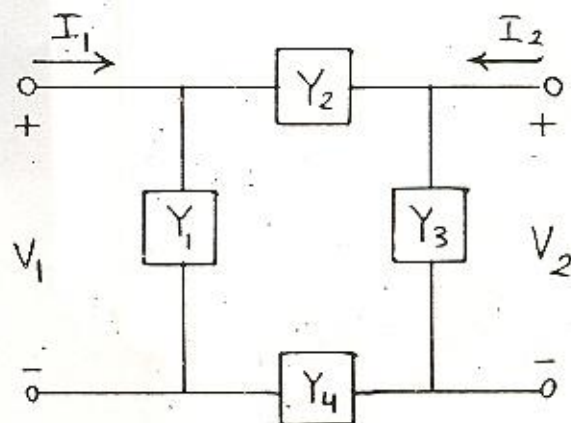


Fig.2

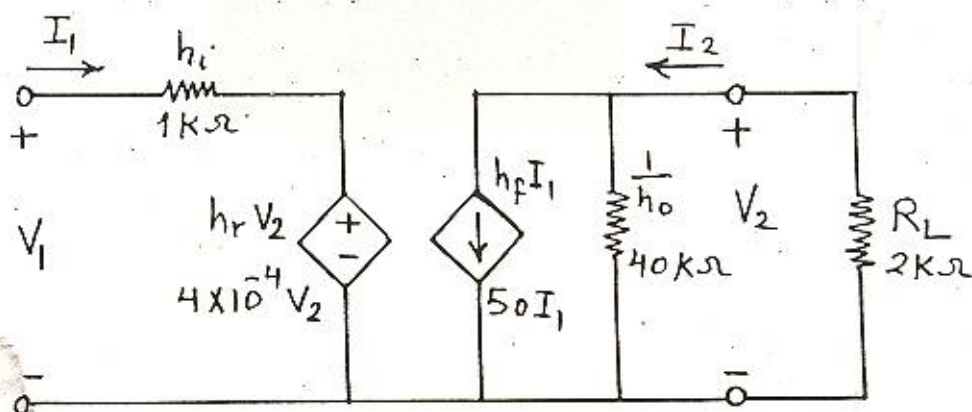
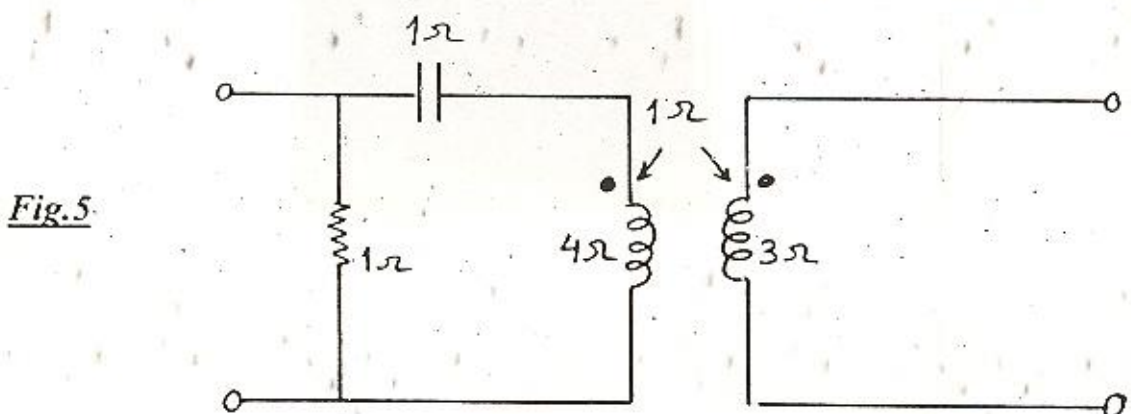
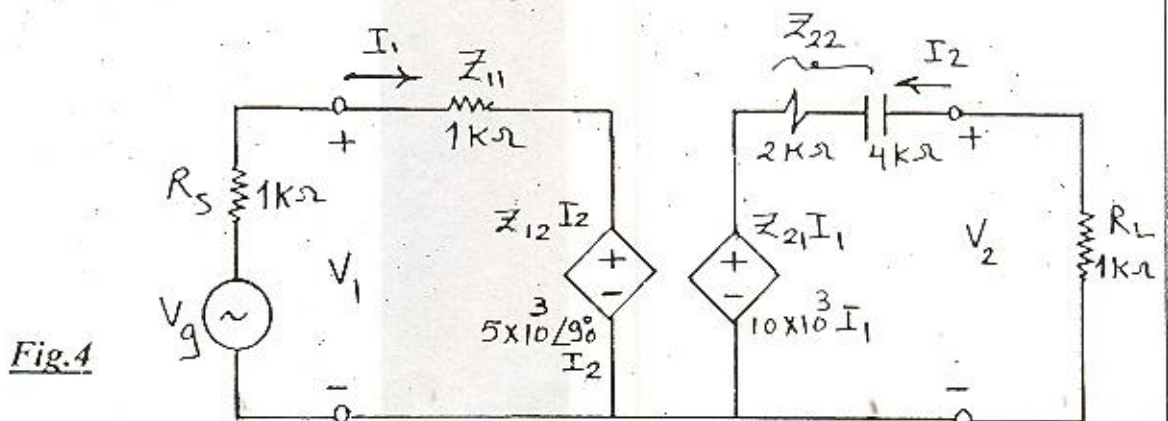


Fig.3

[5] For the Z-parameter equivalent circuit shown in Fig. 4, calculate the input and output impedances.

[6] The Hybrid H-parameters of a network are given by: $h_{11} = 1 \text{ K}\Omega$, $h_{12} = 0.0002$, $h_{21} = 100$ and $h_{22} = 20 \mu \text{ mho}$. Calculate the H-parameters of two of such network connected in: a) series. b) parallel.

[7] Determine the transmission-parameters for the network shown in Fig. 5 and write its 2-port equations in the A-form.



[8] Find the Z-parameters for the 2-port network shown in Fig. 6 and calculate the voltage gain of the entire circuit with a $4\text{ K}\Omega$ load attached to the output.

[9] Find the transmission-parameters for the 2-port network shown in Fig. 7.

[10] Simplify the network shown in Fig. 8 into two 2-port networks connected in parallel. Hence, calculate the Y-parameters' matrix of the whole network.

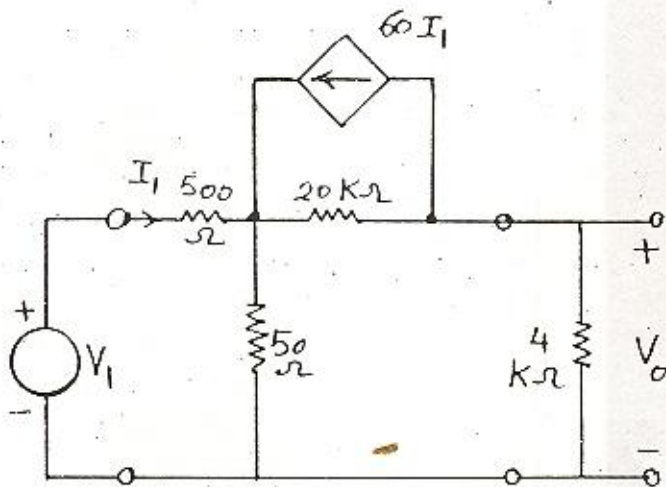


Fig.6

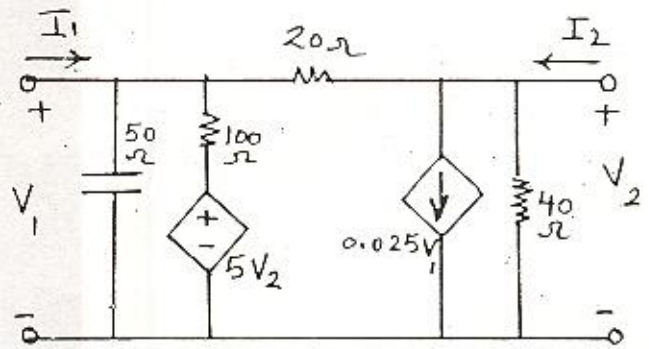


Fig.7

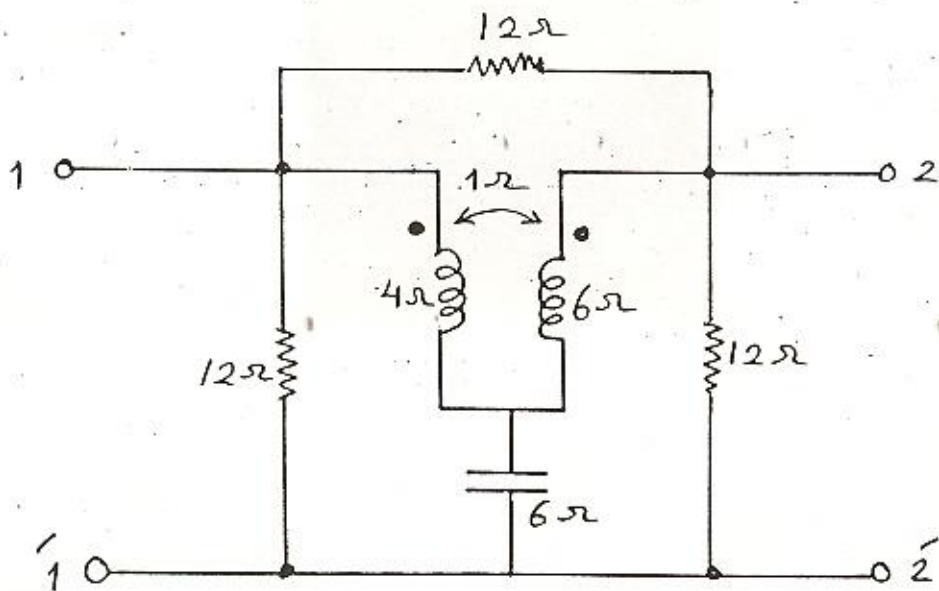


Fig.8

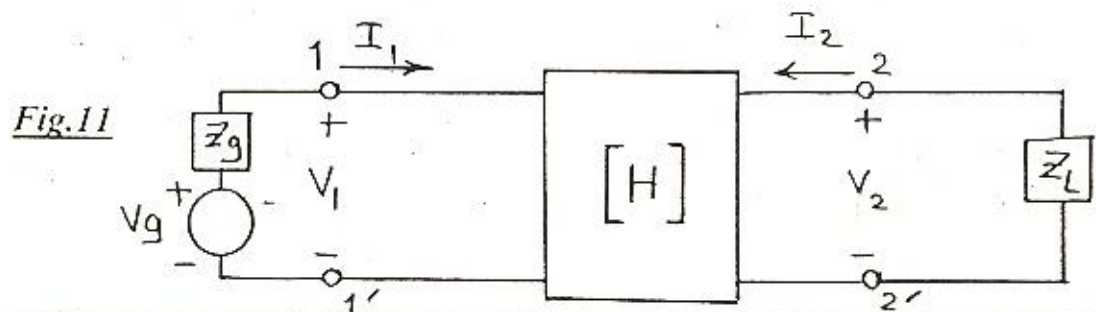
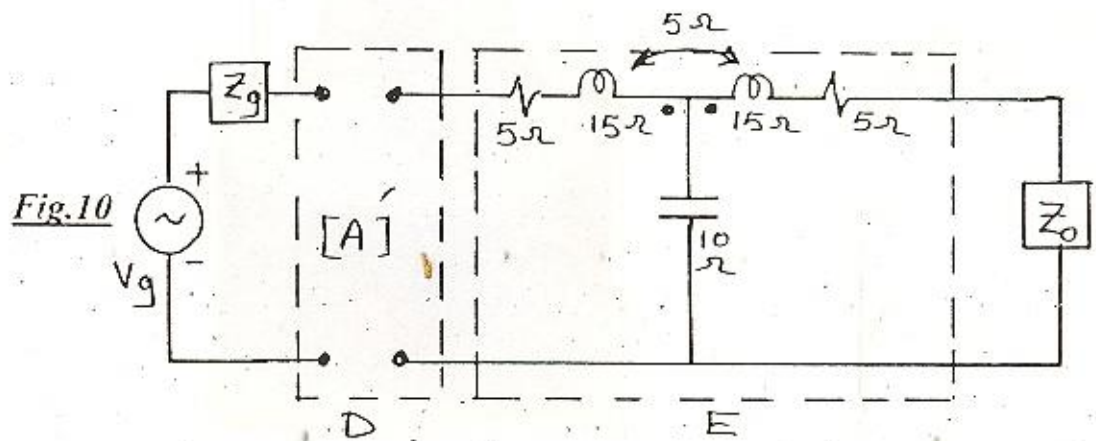
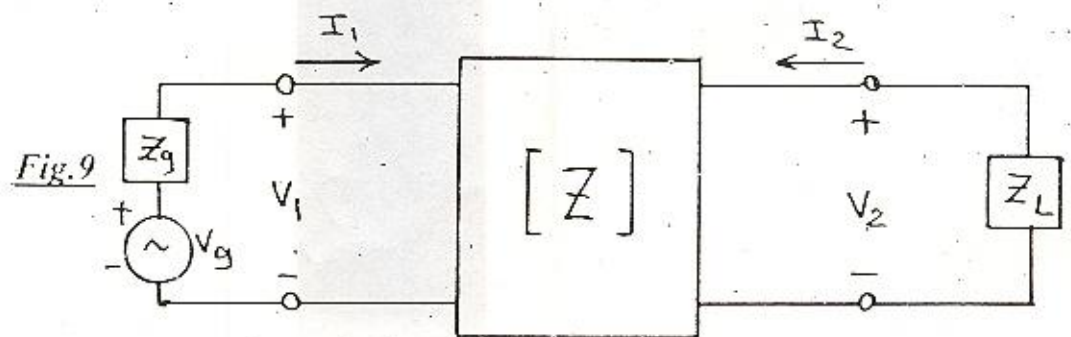
[11] Using the Z -parameters find Thevenin's equivalent circuit with respect to port 2 for the 2-port network shown in Fig. 9.

[12] The networks D and E in the circuit shown in Fig. 10 are reciprocal and symmetrical networks. D has $a_{11} = 5$ and $a_{12} = 24 \Omega$. The impedance Z_0 is adjusted for maximum average power transfer. Find Z_0 if $Z_g = 5 \Omega$.

[13] a) Derive an expression of the input and output impedances of the two-port network shown in Fig. 11 in terms of the H -parameters of the network, the internal impedance of the source Z_g and the load impedance Z_L .

b) If $h_{11} = 1500 \Omega$, $h_{12} = 10^{-3}$, $h_{21} = 50$, $h_{22} = 50 \mu \text{ mho}$, the internal impedance of the source is $Z_g = 1500 \Omega$ and the source voltage $V_g = 250 \angle 0^\circ$, calculate:

- i) The maximum average power delivered to the load.
- ii) The average power delivered to the input port of the network at the condition of maximum power transfer to the load.



[14] The H-parameters of a two-port network are given by the matrix :

$$[H] = \begin{bmatrix} 2 \Omega & 0.2 \\ -4 & 0.1 \text{ mho} \end{bmatrix}$$

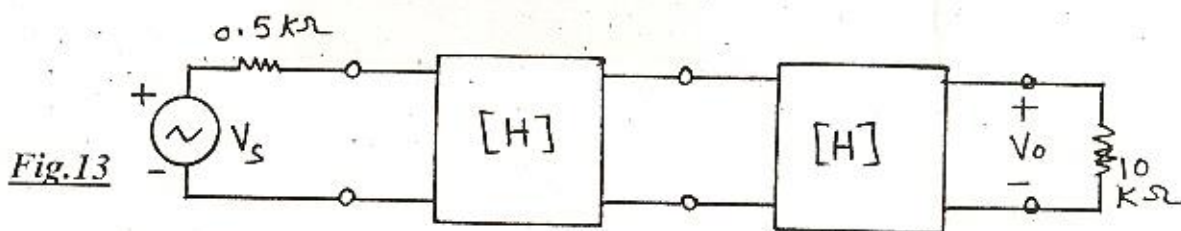
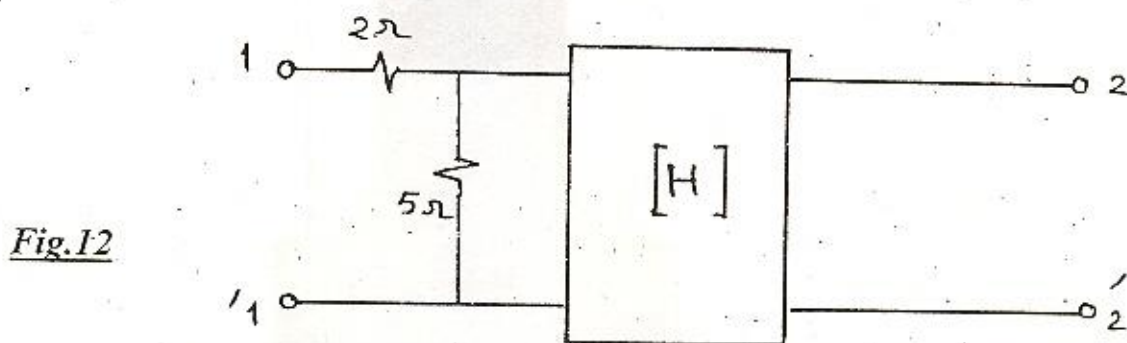
- Check the conditions of symmetry and reciprocity for the network.
- Sketch its equivalent circuit.
- If two resistors of 2Ω and 5Ω are added to the network as shown in Fig.12, calculate the H-parameters of the total network :

[15] a) Calculate the transmission A-parameters of a two-port network as a function of its Hybrid H-parameters.

- The amplifier circuit shown in Fig.13 is formed of two identical stages each having the Hybrid H-parameters given by :

$$[H] = \begin{bmatrix} 1 \text{ K}\Omega & 0.001 \\ 100 & 0.1 \text{ m.mho} \end{bmatrix}$$

What is the value of the input voltage V_s required to obtain an output voltage V_o of 25 volts ?



[16(a)] Two sets of measurements were made on the two-port network N shown in Fig. 14. The results were as follows:

Measurement 1

$$V_1 = 20 \text{ mV}$$

$$I_1 = 20 \text{ } \mu\text{A}$$

$$V_2 = 40 \text{ V}$$

$$I_2 = 0$$

Measurement 2

$$V_1 = 4 \text{ V}$$

$$I_1 = 5 \text{ mA}$$

$$V_2 = 0$$

$$I_2 = -200 \text{ mA}$$

Find the H-parameters representing the two-port network.

b) Using the H-parameters, calculate the value of the variable resistance R_o when adjusted to receive maximum power and find the value of this power.

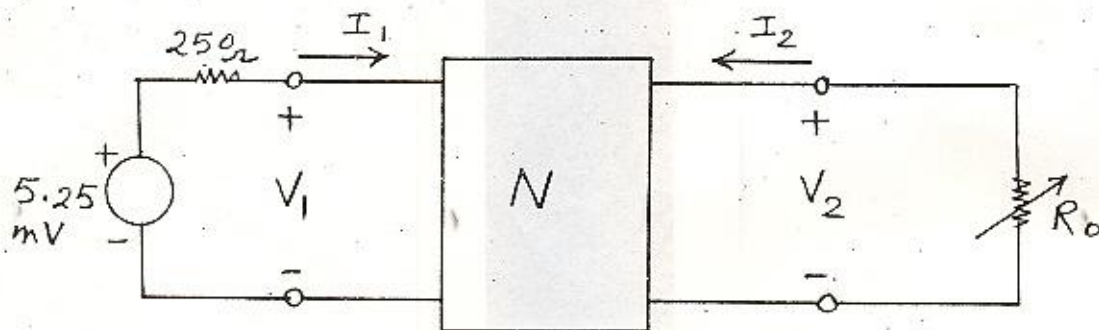


Fig.14