

Question 1

Consider the circuit shown in Fig. 1 that is made by interconnection of several two-ports and one-ports. Let the transmittance matrix of the two-port N_0 be $T_0 = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$. Further, assume that the interconnection of the two-ports does not violate two-port current conditions.

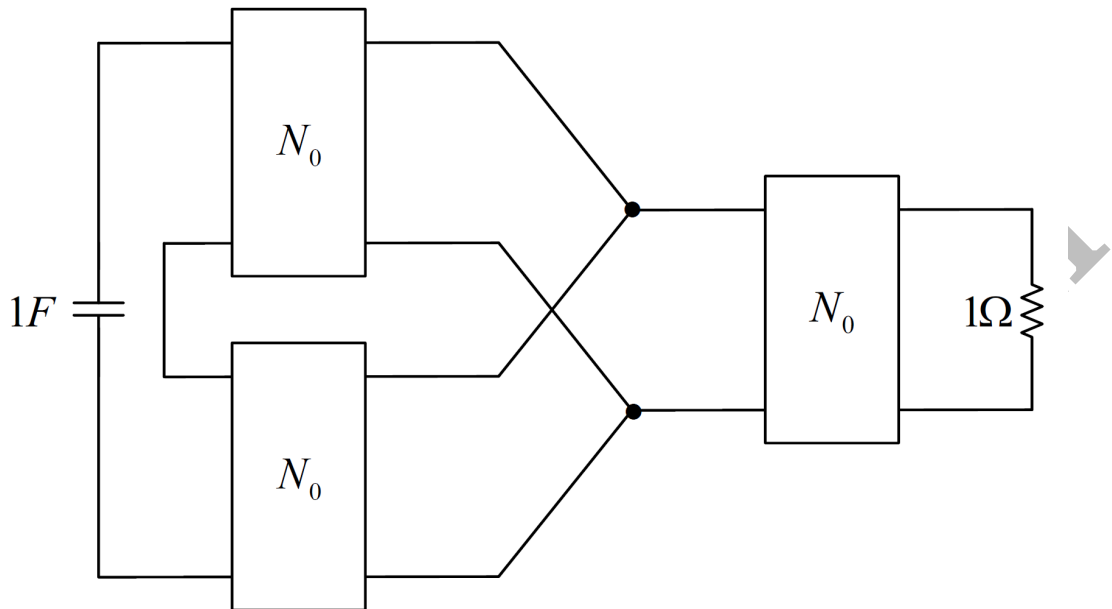


Figure 1: A circuit made from several internal two-ports.

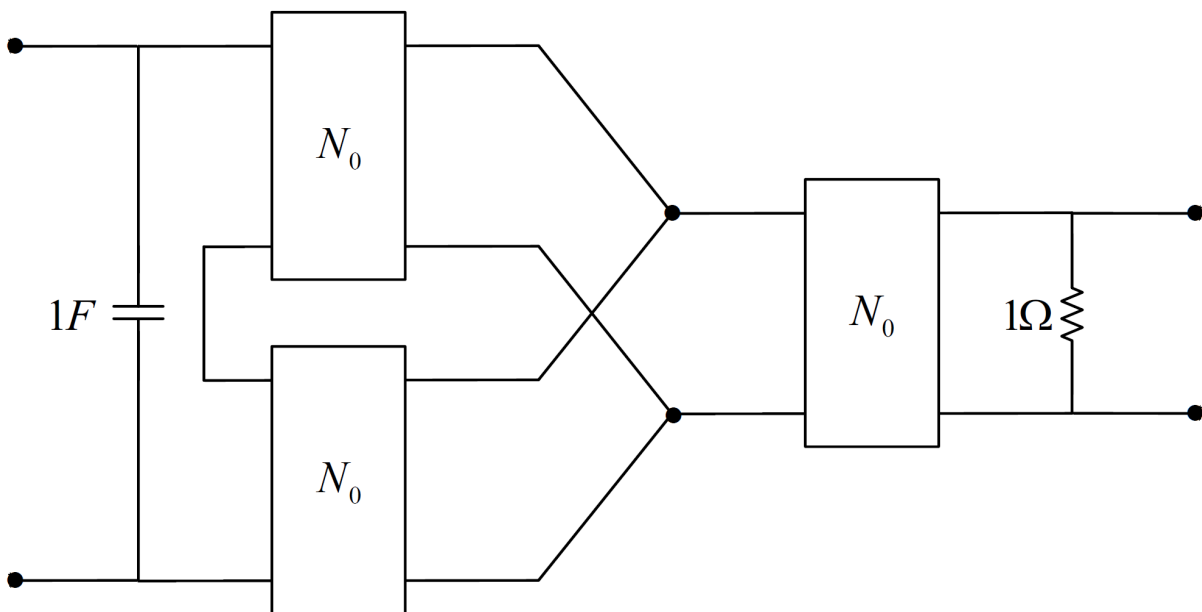


Figure 2: Two-port extension of the circuit shown in Fig. 1.

(a) Find as much as you can the natural frequencies of the circuit.

(b) Now, consider the two-port shown in Fig. 2. The two-port is made from the circuit of Fig. 1 by adding the shown ports. How many descriptions does the two-port have? Determine which descriptions exist and which does not exist. Obtain two descriptions if the two-port has more than two descriptions.

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