Serie 1 : Quality factor of passive components- Chapter 2

Exercice 1:

The series resistive loss Rs of an inductor Ls, whose value is equal to 50 nH, is equal to 10 Ohms at a frequency f0 equal to 100 MHz.

a) Calculate the quality factor Qs at 100 MHz of the series equivalent circuit.

b) Transform the series equivalent circuit (Ls, Rs) by the parallel equivalent circuit ((Lp, Rp)at 100 MHz by using the transformation from a serie equivalent circuit to a parallel equivalent circuit.

c) Calculate the quality factor Qp at 100 MHz of the parallel equivalent circuit.

Exercice 2:

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The internal impedance Rs of the voltage source is equal to 1000 Ohms.
The load impedance R_L of the load impedance is equal to 1000 Ohms.

It is assumed that the capacitor of the resonant circuit is lossless and that the quality factor of the inductor of the resonant circuit is equal to 85.

a) Design a parallel resonant circuit to provide a (-3 dB) bandwidth B of 10 MHz at a center frequency f0 equal to 100 MHz.

b) What is the effect of the resistive loss of the inductor on the value of the output voltage V_{out} at the resonance frequency ?