

**Special Problem 2.3-12**

The **impedance** of the load in the circuit below is **dependent** on **frequency**  $f$ :

$$Z_L(f) = 3f^2 + j\frac{5-f}{2} \quad \Omega$$

where  $f$  is frequency in GHz.

The characteristic impedance  $Z_0$  of the lossless transmission line is **unknown**.

What is known is that at **one** specific frequency  $f$ , a **perfect match** occurs (i.e.,  $\Gamma_L = 0$ ).

Determine the **frequency** at which this perfect match occurs, **and** the value of **characteristic impedance**  $Z_0$ .

