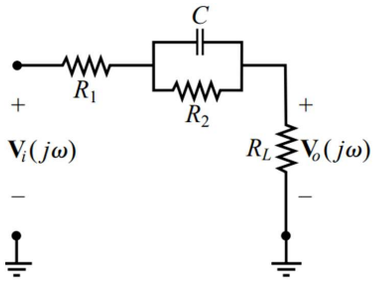
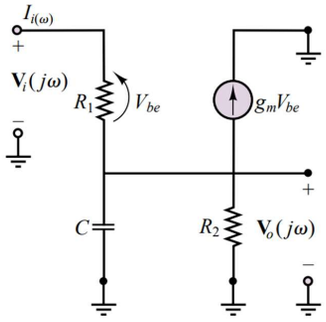
Q. 7 Determine the nature of filter for each one of the two circuits shown below. Give brief justification ------2 Marks





Filter-A

$$(\omega \to 0) \to V_O \to \frac{R_L}{R_1 + R_2 + R_L}$$

$$(\omega \to \infty) \to V_O \to \frac{R_L}{R_1 + R_L}$$

$V(\omega \to 0) < V(\omega \to \infty) \Rightarrow High\ Pass\ Filter$

Or All pass filter

Filter-B

$(\omega \to 0) \to V_O \to non\ zero$

$(\omega \to \infty) \to V_O \to 0$

$\Rightarrow LowPass\ Filter$

0.5 0.5 0.5 0.5 0.5

The most common mistakes and the related grading scheme

Filter A: A student shows that the circuit passes both low and high frequencies. ✓ 0.5

Hoewever concludes that the circuit is bandstop (or bandpass for some student) ✗ 0

Note: In order for a circuit to be band stop or band pass filter it has to stop some other band of frequencies. A circuit passes low and high frequencies does not imply that it stops some some other frequency band.

Filter B: A student claims that the ouput voltage is negative at low frequency and zero at high frequncy, hence the circuit must be a high pass fiter. ✗ 0 0.5

Note: (1) V0/Vi could be negative only under certain condition

(2) Most importantly, whether a filter is low pass or high pass depends on its **magnitude** response. Sign is irrelevent here.