In-class problem

We wish to design an FIR lowpass filter satisfying the specifications

\[
0.95 \leq |H(e^{j\omega})| \leq 1.05, \quad 0 \leq |\omega| \leq 0.25\pi \\
|H(e^{j\omega})| \leq 0.1, \quad 0.35\pi \leq |\omega| \leq \pi
\]

by applying a window \( w[n] \) to the impulse response \( h_d[n] \) for the ideal discrete-time lowpass filter with cutoff \( \omega_c = 0.3\pi \). Which of the windows listed in Section 7.21 of Oppenheim and Schafer can be used to meet this specification? For each window that you claim will satisfy this specification, give the minimum length \( M + 1 \) required for the filter.