Experiment No. 10

Title: Design and implementation of IIR filter to meet given specifications.

Objectives:

1) To design IIR low pass filter with the given specification using bilinear transformation technique.
2) To learn the conversion of analog filter to digital filter.

MATLAB Simulations:

Write a MATLAB code to design IIR Butterworth low pass digital filter for following specifications using bilinear transformation technique. Assume T=1 sec.

$$0.8 \le \left|H\left(e^{j\omega}\right)\right| \le 1 \qquad for \quad 0 \le \omega \le 0.2\pi$$

$$\left|H\left(e^{j\omega}\right)\right| \le 0.2 \qquad for \quad 0.6\pi \le \omega \le \pi$$

Plot the frequency response of the designed IIR filter.

[Useful MATLAB functions: *butter, tf, bilinear*]

Conclusion:

1) Write the steps to design IIR filter for given specifications using bilinear transformation technique.
2) Write a MATLAB command to calculate order of Butterworth filter.
3) Write a MATLAB command to calculate cut-off frequency of Butterworth filter.
4) The cut-off frequency of the designed IIR filter satisfies _____ band. (pass/stop/average of pass and stop).