Tutorial Sheet No.-12

question 01:- Design a two-pole bandpass filter that has the center of its passband at $\omega = \pi/2$; zero in its frequency response characteristic at $\omega = 0$ and at $\omega = \pi$; and a magnitude response of $1/\sqrt{2}$ at $\omega = \pi 4/9$. Plot its magnitude response and phase response.

question 02:- Transform the single-pole lowpass Butterworth filter with system function

$$H(s) = \frac{\Omega_p}{s + \Omega_p}$$

into a bandpass filter with upper and lower band-edge frequencies Ω_U and Ω_L, respectively. (Use frequency transformations for analog filters).

question 03:- Convert the single-pole lowpass Butterworth filter with system function

$$H[z] = \frac{0.245(1 + z^{-1})}{1 - 0.509z^{-1}}$$

into a bandpass filter with upper and lower cutoff frequencies ω_u and ω_l, respectively. The lowpass filter has 3-dB bandwidth with passband edge frequency $\omega_p = 0.2\pi$. (Use frequency transformations for digital filters)