Experiment-6

Aim:- To study & plot the polar plot of any higher order transfer function.

Software Used: MATLAB 2016.

Theory: The polar plot is a plot which can be drawn between the magnitude & phase angle of transfer function by varying from 0 to ∞. The graph sheets consists of concentric circle & radial lines. The concentric circles is the radius lines represented by the magnitude & phase angle respectively

These angles can be represented by (+ve) values in anti clockwise direction. Similarly we can represent angles with negatives in clockwise direction

Practical Soln:- Transfer Function: $G(s) \cdot H(s)$

$$= \frac{1}{s(1+s)}$$

$$s = j\omega;$$

$$G(j\omega) H(j\omega) = \frac{1}{j\omega(1+j\omega)}$$

$$|G(j\omega) H(j\omega)| = \frac{1}{\omega\sqrt{\omega+1}}$$

$$\angle G(j\omega) H(j\omega) = \omega.$$

Result: Successfully implemented on MATLAB.

Code

```
pkg load control

w = 0:10:100;
x1 = w.*w;
x2 = sqrt((w.*w)+10)
phase = 90 - atan(w/10);
mag = 1./(x1.*x2)
num = [1];
den = [1 10];
sys = tf(num, den)
polar(phase, mag)

pause
```

Output

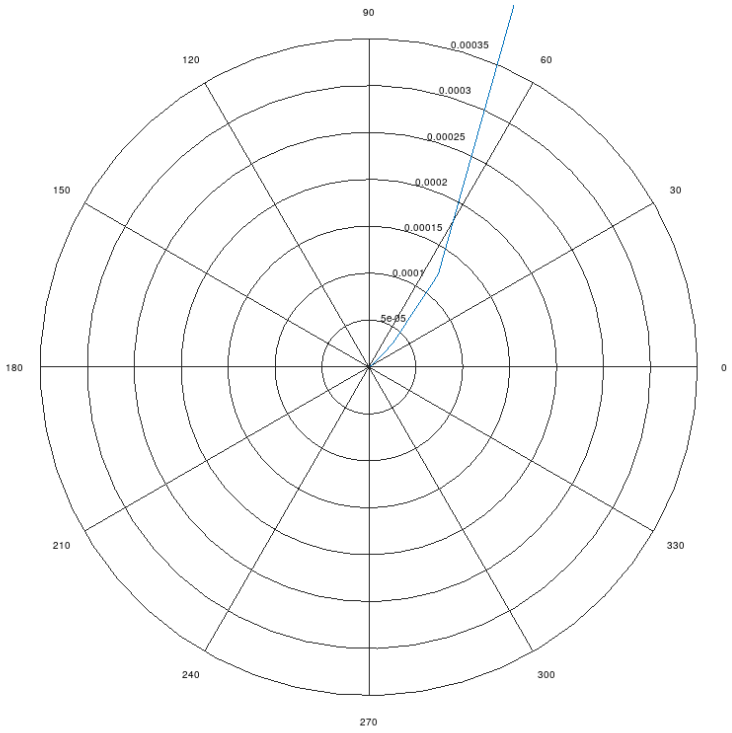

Figure 1: Polar Plot of Higher order sytem