Post lab Questions:

1. An analog filter has a transfer function H(s)= $\frac{10}{s^2+7s+10}$. Design a digital filter equivalent tom this using impulse invariant method for T=0.2 sec.

```
clc;
clear all;
close;
s = %s;
T = 0.2;
HS = (10)/(s^2+7*s+10);
elts = pfss(HS);
disp(elts,'Factorized HS= ');
//The poles associated are P1 and P2
p1 = -2;
p2 = -1;
s = %s;
HZ = (2/(1-%e^(p2*T)*s^(-1)))-(2/(1-%e^(p1*T)*s^(-1)));
disp(HZ,'HZ= ')
```

```
                (1)


      3.3333333
      ---------
        2 +s

                (2)


      -3.3333333
      ----------
         5 +s

     "Factorized HS= "


            0.2968214s
      -------------------------
      0.5488116 -1.4890508s +s²

     "HZ= "
```

2. For the analog transfer fuction, H(s)= $\frac{2}{s^2+3s+2}$,determine H(z) using bilinear transformation if (a) T=1 second (b) T=0.1 second.

```
clc;
clear all;
close;
ap = input('Enter the value of ap in dB= ');
as = input('Enter the value of as in dB Hz= ');
fp = input('Enter the value of fp in Hz= ');
fs = input('Enter the value of fs in Hz= ');
f = input('Enter the value of f= ');
T = 1/f;
wp = 2*%pi*fp;
ws = 2*%pi*fs;
op = 2/T*tan(wp*T/2);
os = 2/T*tan(ws*T/2);
N = log(sqrt((10^(0.1*as)-1)/(10^(0.1*ap)-1)))/log(op/os);
disp(ceil(N));
s = %s;
HS = 1/(s+1);
oc = op;
HS1 = horner(HS,oc/s);
disp(HS1,'Normalized Transfer Function,H(s)= ');
s = %s;
HZ = horner(HS,(2/T)*(s-1)/(s+1));
disp(HZ,'H(s)= ');
```

CASE 1:

```
Enter the value of ap in dB= 3

Enter the value of as in dB Hz= 10

Enter the value of fp in Hz= 1000

Enter the value of fs in Hz= 350

Enter the value of f= 1

   2.


   1
   -
   1

  "Normalized Transfer Function,H(s)= "


    1 +s
   ------
   -1 +3s

  "H(s)= "
```

CASE 2:

```
Enter the value of ap in dB= 3

Enter the value of as in dB Hz= 10

Enter the value of fp in Hz= 1000

Enter the value of fs in Hz= 350

Enter the value of f= 10


   0. + 0.i


   1
   -
   1

  "Normalized Transfer Function,H(s)= "


     1 +s
   --------
   -19 +21s

  "H(s)= "
```