**LAB#**

**Object:** Analysis of digital filter.

**TASK #01:**

Generate transfer function so that system become stables , unstables & margionally stable plot their the impulse respone of all the systems.

1. 1/(z+0.5)
2. 1/(z+1)
3. 1/(Z+2)

**CODING:**

n=[1]

d=[1 0.5]

a=tf(n,d,1)

subplot(3,2,1)

pzmap(a)

subplot(3,2,2)

impulse(a)

n1=[1]

d1=[1 1]

b=tf(n1,d1,1)

subplot(3,2,3)

pzmap(b)

subplot(3,2,4)

impulse(b)

n2=[1]

d2=[1 2]

c=tf(n2,d2,1)

subplot(3,2,5)

pzmap(c)

subplot(3,2,6)

impulse(c)

**RESULT:**

a = 1

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z + 0.5

b = 1

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z + 1

c = 1

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z + 2

**FIGURE:**



**TASK #02:** Given a filter H(z) = .Plot its magnitude & phase response.

**CODING:**

n = [1 2 1]

d = [1 -0.5 0.25]

freqz(n,d)

**FIGURE:**



**TASK #03:** Given the difference equation

a)y(n) = x(n-1) -0.75y(n-2) – 0.125y(n-2) . Use filtic & filter command to calculate system response . Take n=0 to 10 & i/p x(n) = 0.5^nu(n)

b) y(n) = 2x(n) – 25x(n-2) -28y(n-2) take n = 0 to 20 & i/p x(n) = (0.75)^nu(n)

initial conditions:

x(-1) = -1 ,y(-1) = 1,y(-2) = 2

1. **y(n) = x(n-1) -0.75y(n-2) – 0.125y(n-2) .**

**CODING:**

n=0:10

X=0.5.^n

b=[0 1 0]

a=[1 -0.75 -0.125]

y1=[1 2]

x1=[-1 0]

z=filtic(b,a,y1,x1)

filter(b,a,X,z)

**RESULT:**

Columns 1 through 9

0 1.1250 1.3438 1.3984 1.3418 1.2437 1.1317 1.0199 0.9142

Columns 10 through 11

0.8170 0.7290

1. **y(n) = 2x(n) – 25x(n-2) -28y(n-2)**

**CODING:**

n=0:20

X=0.75.^n

b=[2 0 25]

a=[1 0 28]

y1=[1 2]

x1=[-1 0]

z=filtic(b,a,y1,x1)

filter(b,a,X,z)

**RESULT:**

1.0e+16 \*

Columns 1 through 9

-0.0000 -0.0000 0.0000 0.0000 -0.0000 -0.0000 0.0000 0.0000 -0.0000

Columns 10 through 18

-0.0000 0.0000 0.0000 -0.0000 -0.0000 0.0001 0.0001 -0.0021 -0.0020

Columns 19 through 21

0.0581 0.0552 -1.6266

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**TASK #04:** Plot the poles & zeroesin z-plane . State whether the system is FIR or IIR . plot the frequency response.

1. H(z) =z/z-0.5
2. H(z)=1-0.5z^-1
3. H(z) = 0.5z^2 – 0.32/z^2-0.5z+0.25
4. H(z) = 1-0.9z^-1+0.81z^-2/1-0.6z^-1+0.36z^-2

**CODING:**

1. **H(z) =z/z-0.5**

**Poles & Zeroes:**

n=[1 0]

d=[1 -0.5]

a=tf(n,d,1)

pzmap(a)

**FIGURE:**



**Frequency Response:**

n=[1 0]

d=[1 -0.5]

freqz(n,d)

**FIGURE:**

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1. **H(z)=1-0.5z^-1**

**Poles & Zeroes:**

n1=[1 0]

d1=[0 1]

b=tf(n1,d1,1)

pzmap(b)

**FIGURE:**

**Frequency Response:**

n1=[1 0]

d1=[0 1]

freqz(n1,d1)

**FIGURE:**



1. **H(z) = 0.5z^2 – 0.32/z^2-0.5z+0.25**

**Poles & Zeroes:**

n2=[0.5 0 -0.32]

d2=[1 -0.5 0.25]

c=tf(n2,d2,1)

pzmap(c)

**FIGURE:**

**Frequency Response:**

n2=[0.5 0 -0.32]

d2=[1 -0.5 0.25]

freqz(n2,d2)

**FIGURE:**

****

1. **H(z) = 1-0.9z^-1+0.81z^-2/1-0.6z^-1+0.36z^-2**

**Poles & Zeroes:**

n3=[1 -0.9 0.81]

d3=[1 -0.6 0.36]

d=tf(n3,d3,1)

pzmap(d)

**FIGURE:**

**Frequency Response:**

n3=[1 -0.9 0.81]

d3=[1 -0.6 0.36]

freqz(n3,d3)

**FIGURE:**

