**Question: 2**

# Transfer Function:

## Code:

syms x y z s F

eqn1=(8\*s^2+4\*s+16)\*x-(4\*s+1)\*y-15\*z==0;

eqn2=-(4\*s+1)\*x+(3\*s^2+20\*s+1)\*y-16\*s\*z==F;

eqn3=-(15)\*x-(16\*s)\*y+(16\*s+15)\*z==0;

[A,B] = equationsToMatrix([eqn1, eqn2, eqn3], [x, y, z]);

X = linsolve(A,B);

Answer=X(3)/F;

display(Answer);

num=[128 64 316 15];

dem=[384 1064 3476 165 0 0];

Transfer\_fucntion=tf(num,dem);

pzplot(Transfer\_fucntion);

step(Transfer\_fucntion);

## OUTPUT:

Transfer\_fucntion =

128 s^3 + 64 s^2 + 316 s + 15

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384 s^5 + 1064 s^4 + 3476 s^3 + 165 s^2

Continuous-time transfer function.

## Plot:

Pole zero plot:



Step Response:



# Question 2:

## Code:

syms x y z s T J1\_eq J2\_eq D Deq N1 N2 Theta\_1 Theta\_2 K

Theta\_2 = N1/N2 \* Theta\_1;

eqn1=(J1\_eq\*s^2+K)\*x-(K)\*y==T;

eqn2=-(K)\*x+(D\*s+K)\*y-(D\*s)\*z==0;

eqn3=-(D\*s)\*y+(J2\_eq\*s^2+(D+Deq)\*s)\*z==0;

[A,B] = equationsToMatrix([eqn1, eqn2, eqn3], [x, y, z]);

X = linsolve(A,B);

Answer=X(3)/T;

display(Answer);

## Transfer Function:

Transfer\_fucntion =

D\*K + Deq\*K + D\*Deq\*s + J2\_eq\*K\*s + D\*J2\_eq\*s^2)

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(s\*(D\*Deq\*K + D\*Deq\*J1\_eq\*s^2 + D\*J1\_eq\*J2\_eq\*s^3 + J1\_eq\*J2\_eq\*K\*s^2 + D\*J1\_eq\*K\*s + D\*J2\_eq\*K\*s + Deq\*J1\_eq\*K\*s))

Continuous-time transfer function.