Q2)

TRANSFER FUNCTION OF FLYBACK CONVERTER

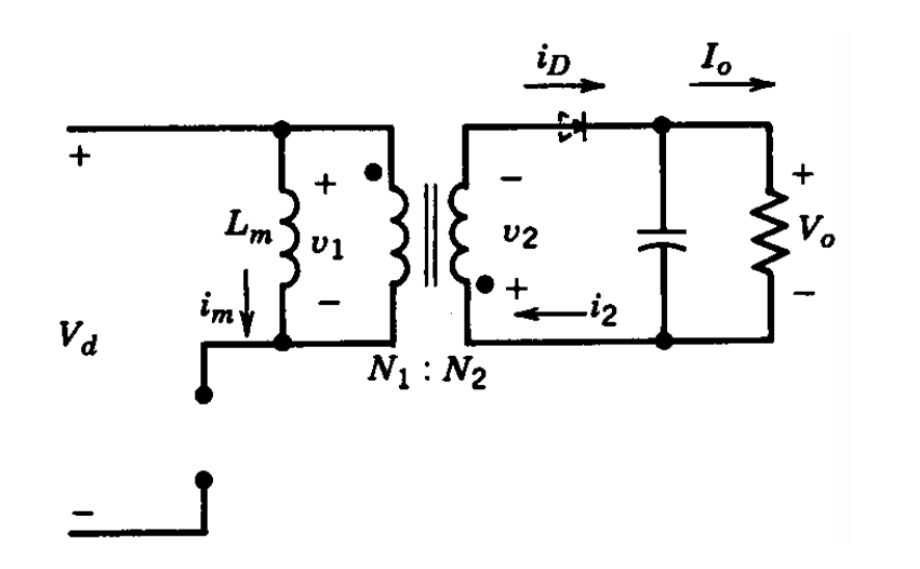


Figure 2.1: Flyback Converter Schematic

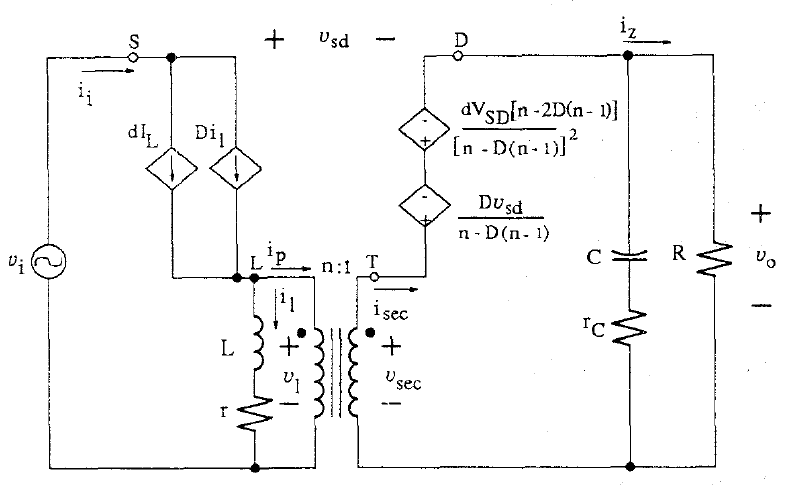


Figure 2.2: Small Signal Model of Flyback Converter

We choose n=1 and circuit schematic will be like that;

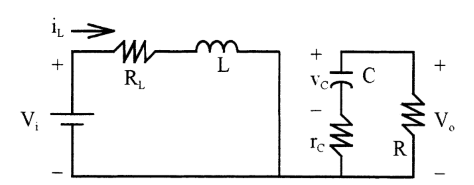


Figure 2.3: Switch ON State When n=1

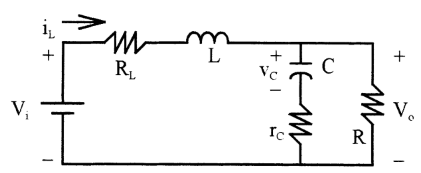


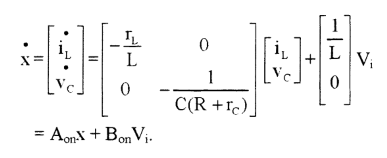
Figure 2.4: Switch OFF State When n=1

By looking ON state:

(1)

(2)

By using Eq. (1) and (2)

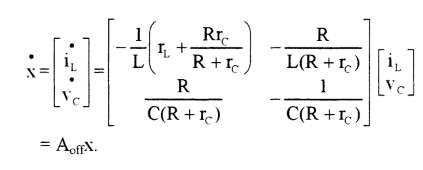


By looking OFF state:

(3)

(4)

By using Eq. (3) and (4)



(5)

V0 = [] (6)

A=AON\*D+AOFF\*(1-D) (7)

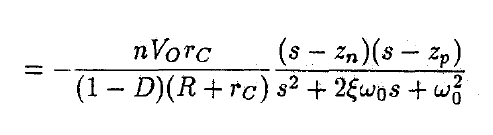
B=BON\*D+BOFF\*(1-D) (8)

C=CON\*D+COFF\*(1-D) = [ (10)

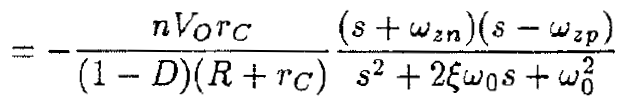
(11)

By using Eq. (7), (8), (9), (10) and (11),

T(s) is that form.

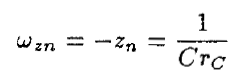
 (12)

(n=turn ratio)

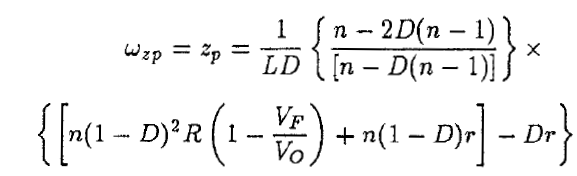


(13)

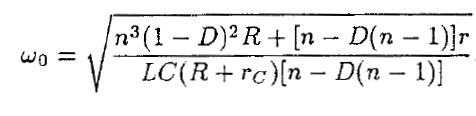
Where the frequency of negative pole:

 (14)

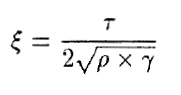
And the frequency of negative pole:

 (15)

Angular corner Frequency:

 (16)

Damping Ratio:

 (17)

Where,

 (18)

 (19)

 (20)

Where,

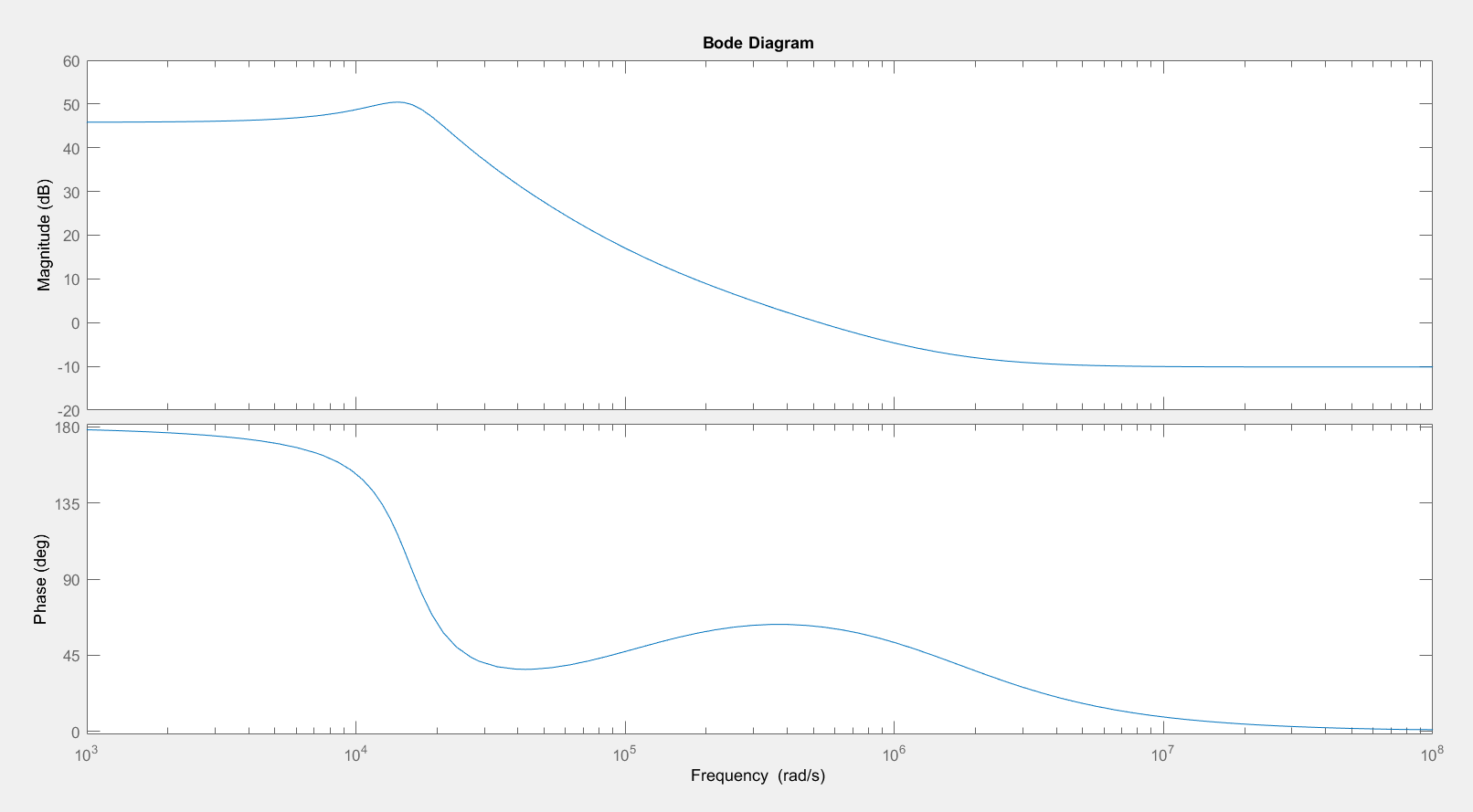
Wzn=105 rad/s,

Wzp=1580138.9 rad/s,

W0=15866 rad/s,

ξ= 0.3119,

Therefore,



Bode Plot for 1:1 Turn Ratio

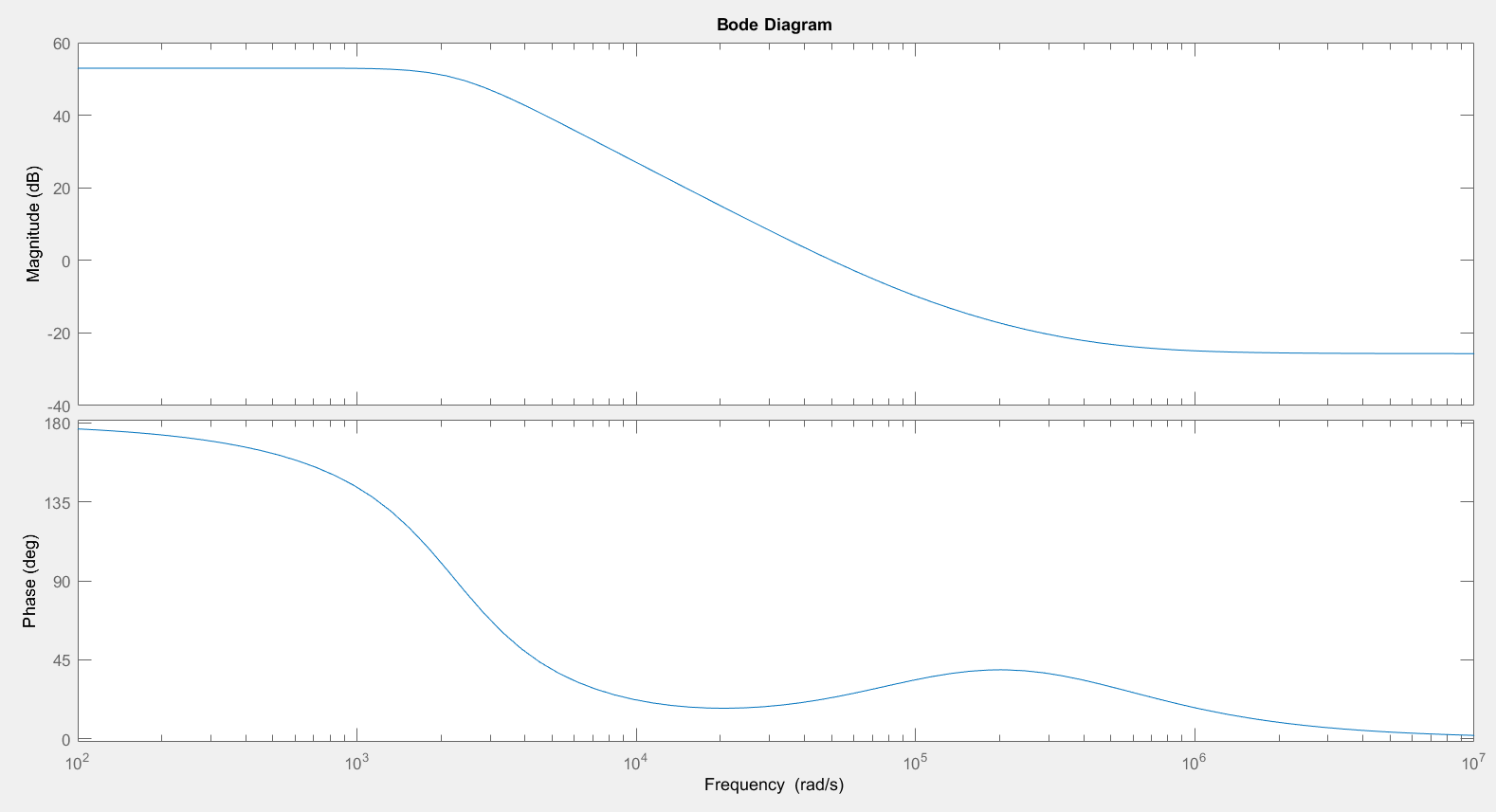
We will use 3:18 turn ratio so transfer function is modified for this turn ratio. Now, n=1/6 and

Wzn=105 rad/s,

Wzp=428317.9 rad/s,

W0=2237.84 rad/s,

ξ= 0.677,



Bode Plot for 3:18 Turn Ratio