# به نام خدا


# پروژه فاز یک تئوری مدار الکتریکی


## دکتر فاطمی زاده

## زهرا مجتهدین

## ۹۹۱۰۲۱۶۷


*در سوالاتی که استفاده از MATLAB ذکر شده است، از آن برنامه استفاده نموده ام.

سوال 1)

الف)

$$KVL: -V_i + Ls\dot{i} + \frac{i}{Cs} + Ri = 0 \longrightarrow \left(Ls + \frac{1}{Cs} + R\right) i = V_i$$

$$H(s) = \frac{V_o}{V_i} \Longrightarrow \frac{R}{Ls + R + \frac{1}{Cs}} = \frac{RCs}{LCs + RCs + 1}$$

...

ب)

$$H(s) = \frac{1.12 \times 10^{-2}\, s}{5.6 \times 10^{-6}\, s^2 + 1.12 \times 10^{-2}\, s + 1} \Longrightarrow \text{صفر} = s = 0$$

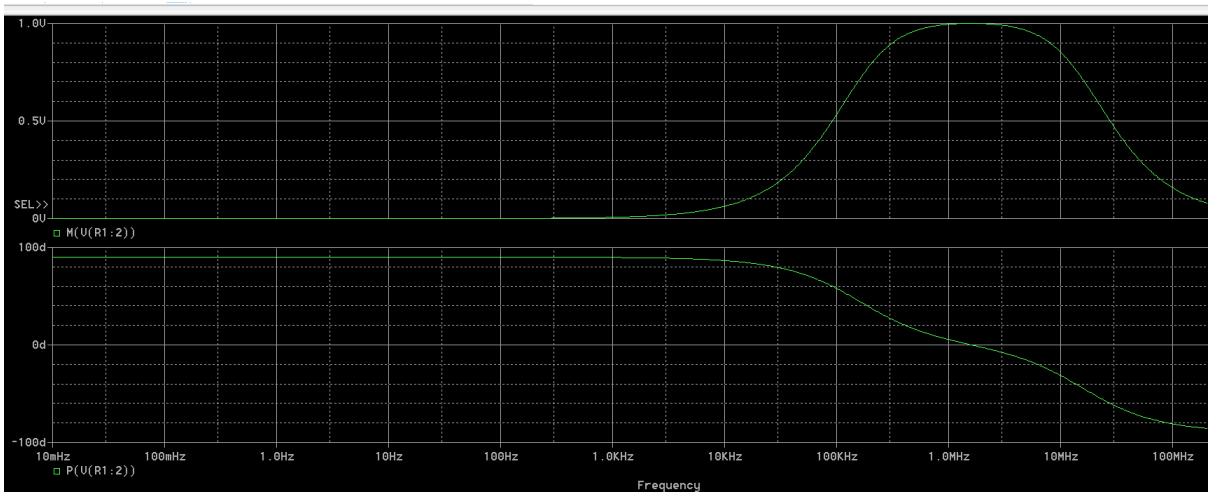
$$\text{قطب} = \begin{cases} s_1 = -86.9 \\ s_2 = -1906.3 \end{cases}$$

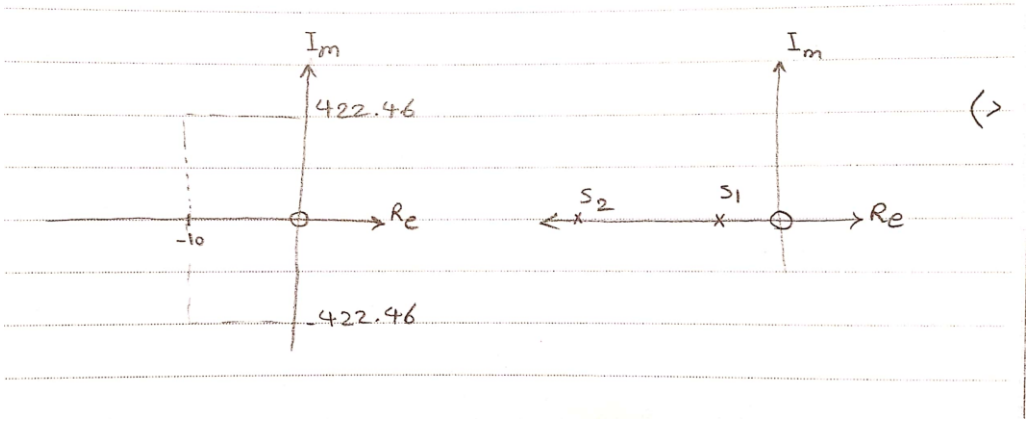
...

ج)

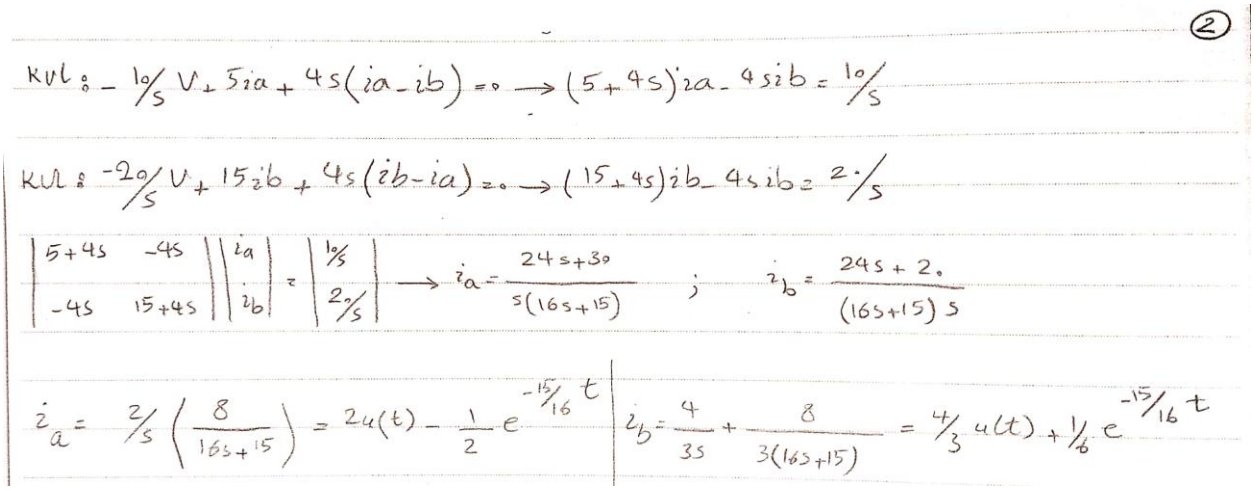
$$H(s) = \frac{1.12 \times 10^{-4}\, s}{5.6 \times 10^{-6}\, s^2 + 1.12 \times 10^{-4}\, s + 1} \Longrightarrow \text{صفر} = s = 0$$

$$\text{قطب} = \begin{cases} s_1 = -10 + j422.46 \\ s_2 = -10 - j422.46 \end{cases} \quad ; \quad R = 100\,\Omega$$






سوال 2) کد در فایل زیپ ضمیمه شده است.




Editor - C:\Users\Asus\Documents\Untitled2.m

Untitled2.m

```
1 -    syms a
2 -    syms b
3 -    syms s
4
5 -    e1= (5+ 4*s)*a - 4*s*b == 10/s
6
7 -    e2= (15+ 4*s)*b - 4*s*a == 20/s
8
9 -    [A,B] = equationsToMatrix([e1, e2], [a,b])
10 -   l = linsolve(A,B)
11 -   ilaplace(l(1))
12 -   ilaplace(l(2))
```

Command Window

```
l =

(6*(4*s + 5))/(s*(16*s + 15))
(4*(6*s + 5))/(s*(16*s + 15))


ans =

2 - exp(-(15*t)/16)/2


ans =

exp(-(15*t)/16)/6 + 4/3
```

منبع برای حل این سوال: https://youtu.be/Rec0qvbE2Eo

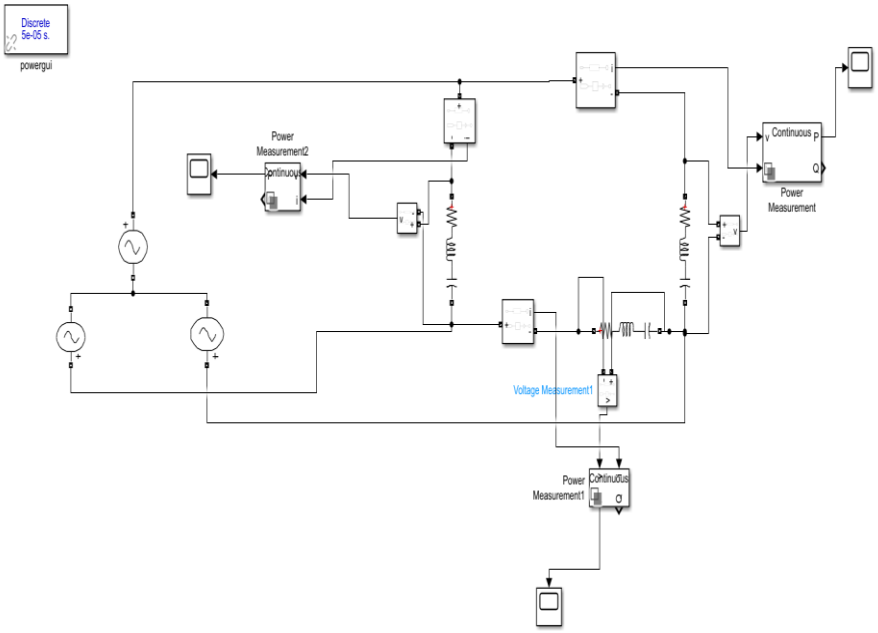
سوال 3)

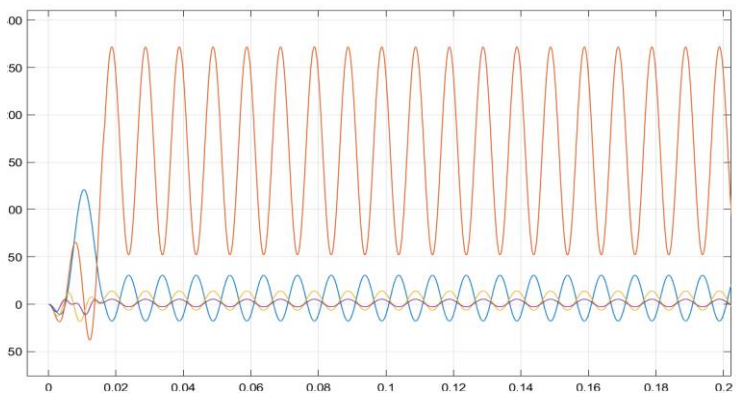
$$Z_1 = 10\angle 30^\circ \Rightarrow \left(10\times\frac{\sqrt{3}}{2}\right)+\left(\frac{1}{2}\times j10\right) \Rightarrow 5\sqrt{3}+j5 \quad ; Lw=5 \rightsquigarrow \begin{cases} L = 10^{-1}\,H \\ R = 8.7\,\Omega \end{cases}$$

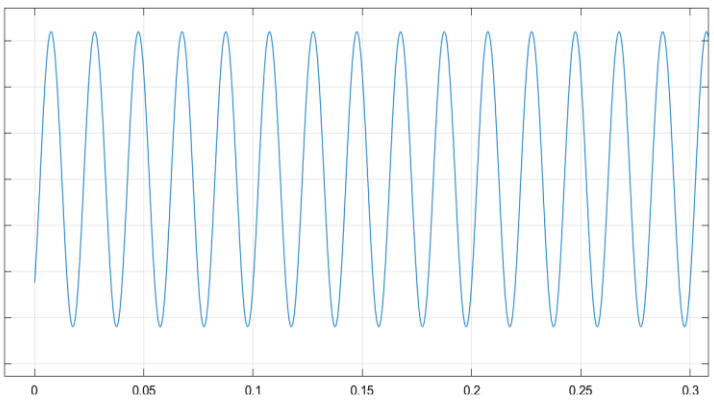
$$Z_2 = 15\angle -60^\circ \Rightarrow \left(\frac{1}{2}\times 15\right)+\left(\frac{1}{2}\times\frac{\sqrt{3}}{2}\times(-j15)\right) \Rightarrow 7.5 - j7.5\sqrt{3} \quad ; \frac{1}{cw} = 7.5\sqrt{3}$$

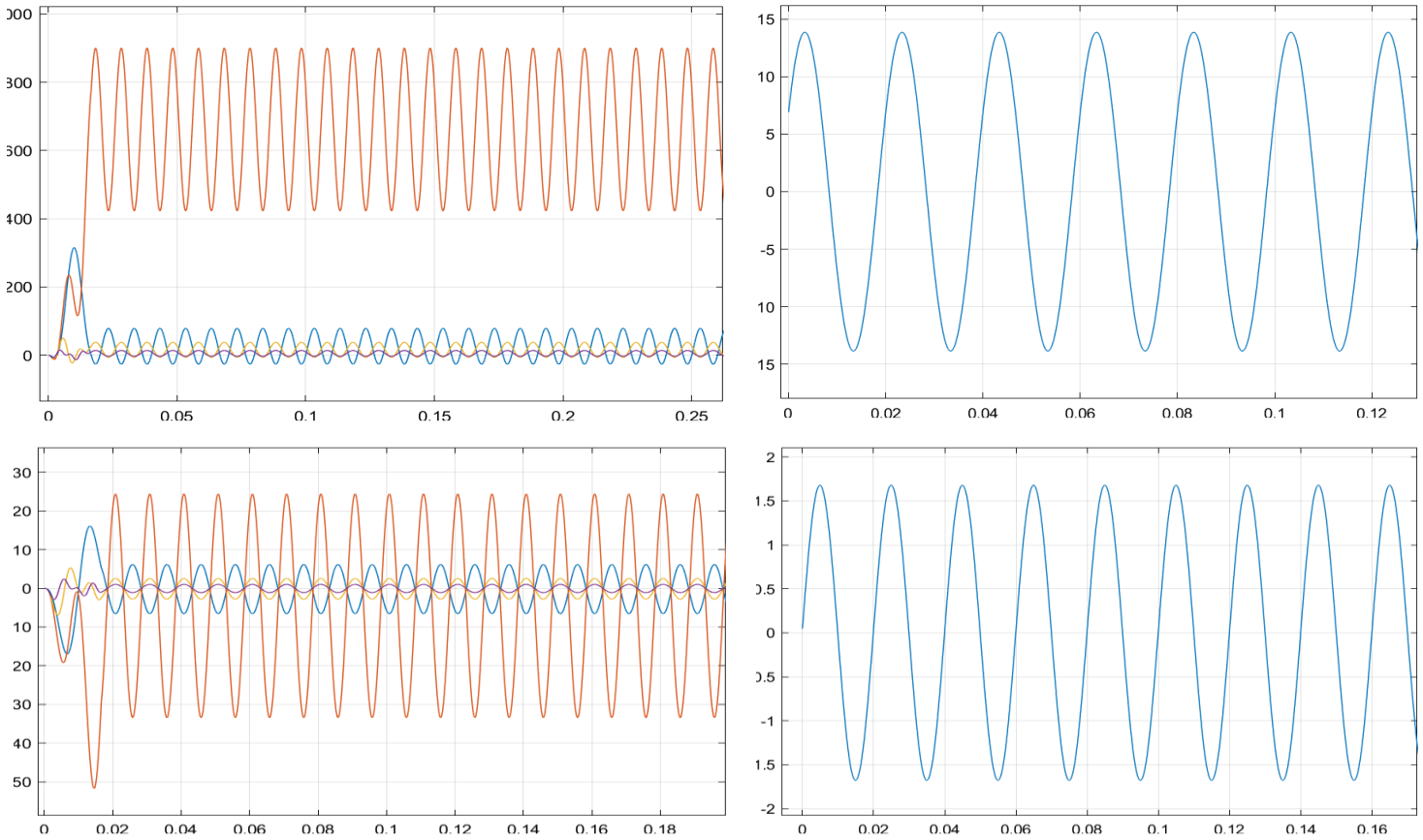
$$C = \frac{1}{100\pi + 7.5\sqrt{3}} = 2.4516\times10^{-4}\,F \qquad R = \frac{15}{2}\,\Omega$$

$$Z_3 = 20\angle 80^\circ \Rightarrow 3.5 + j19.7 \Rightarrow Lw = 19.7 \begin{cases} L = 0.3942\,H \\ R = 3.474\,\Omega \end{cases}$$



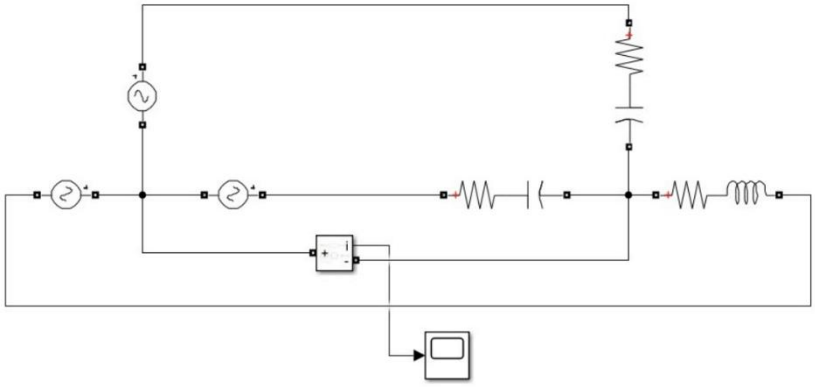



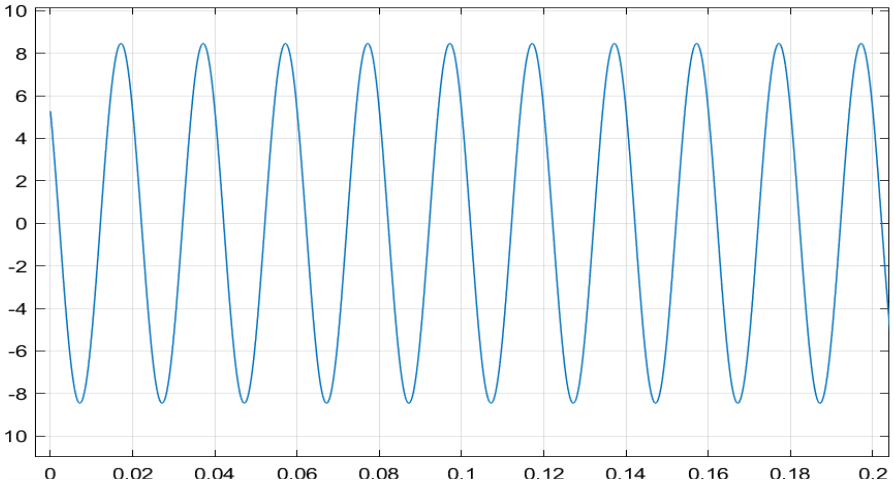





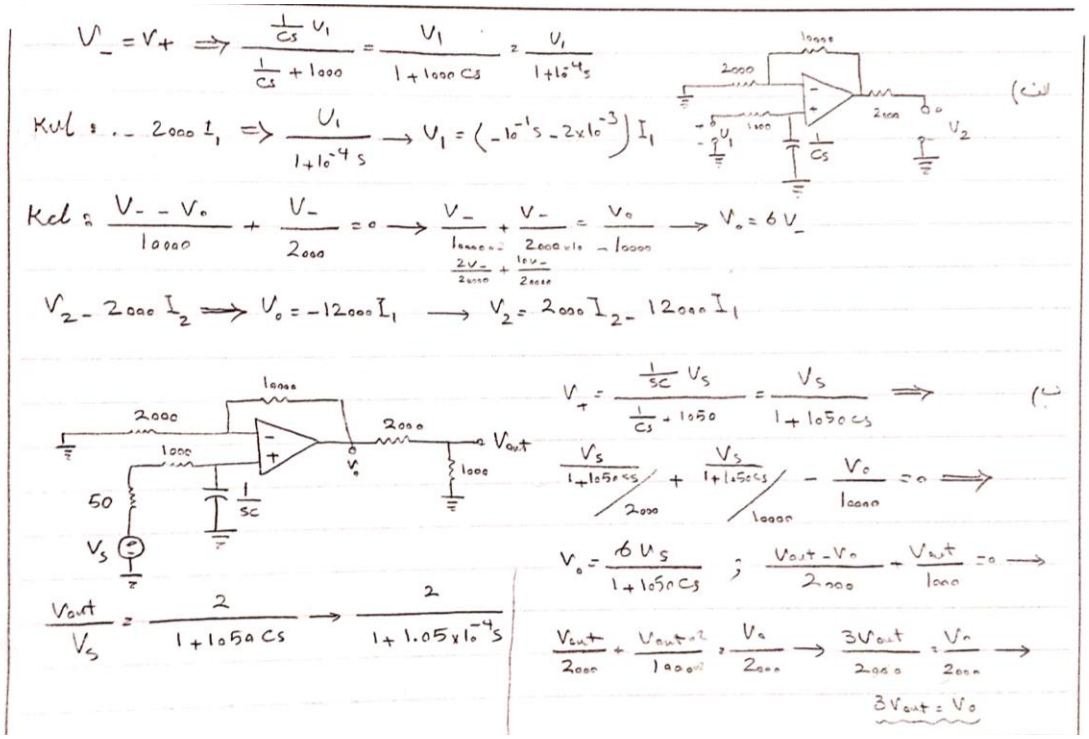
نمودار های بالا به ترتیب نشان دهنده جریان و توان لود های اول تا سوم را نشان می دهند.

ب)

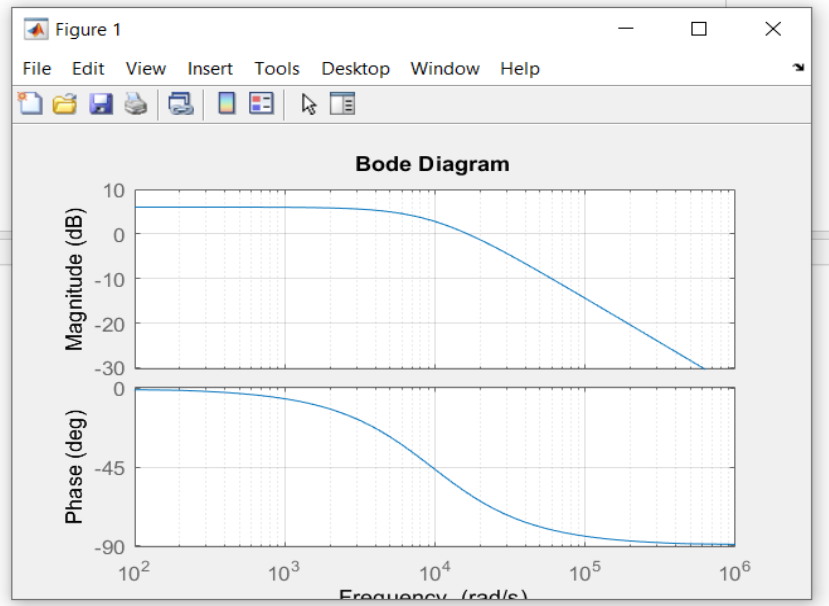




سوال 4)



```
Editor - C:\Users\Asus\Documents\Project-Phase 1\Q4\Untitled4.m
Untitled4.m
1 -    face = [2]
2
3 -    denominator = [1.050*10^(-4) 1]
4
5 -    find = tf(face,denominator)
6 -    bode(find),grid
7
```




```
Command Window
          2

denominator =

    0.0001    1.0000

find =

          2
  --------------
  0.000105 s + 1

Continuous-time transfer function.

fx >>
```

منبع برای حل این سوال:https://youtu.be/-HMhKVZ0EtQ