Faculty of Information Technology

Electrical and Computer Engineering Department

CIRCUITS AND ELECTRONICS LABORATORY (ENEE2103)

Prelab Experiment#5

"Filters"

Instructor: Dr. Wael Hashlamoun

Teacher: Eng. Mostafa Helal

Student Name: Mays Sbaih

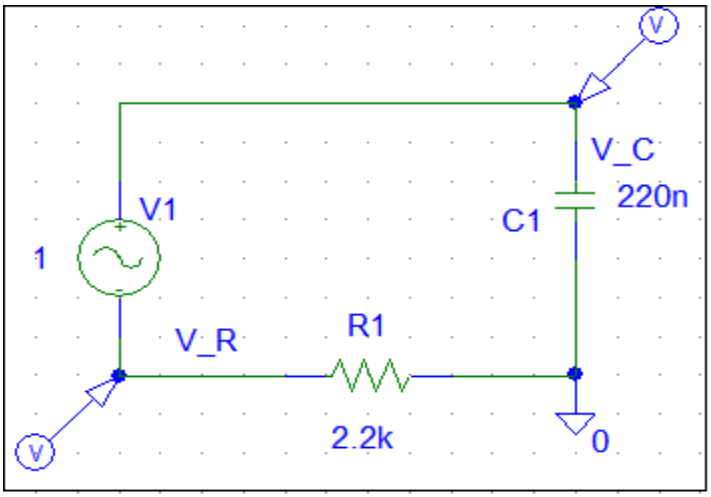
Student Number:1160006

Section 3

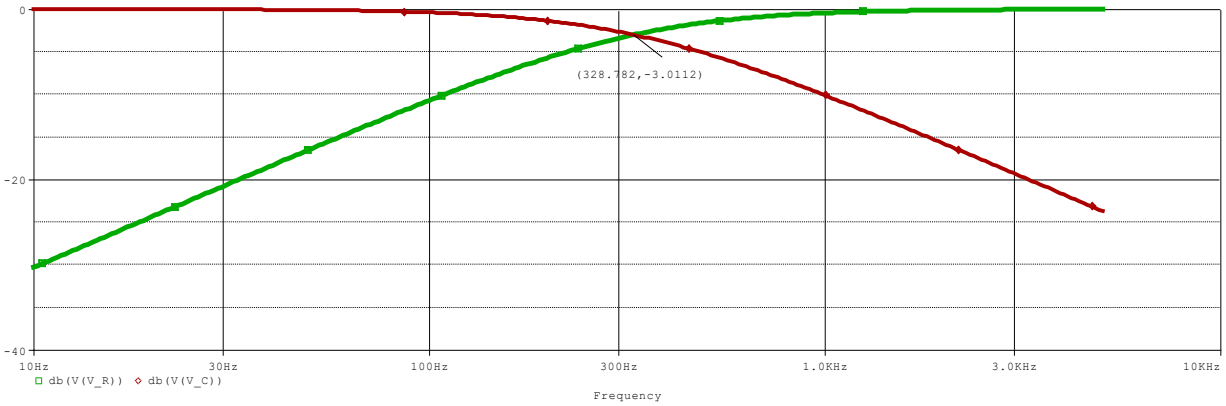
Due to:11-3-2019

A. ***Passive filters:***

I. First order circuits:

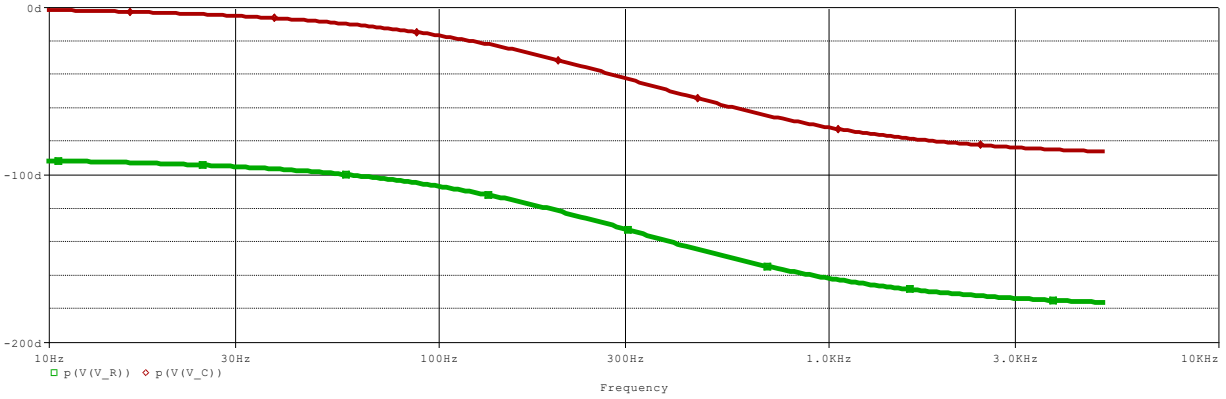


- Magnitude of VR and Vc in decibels:

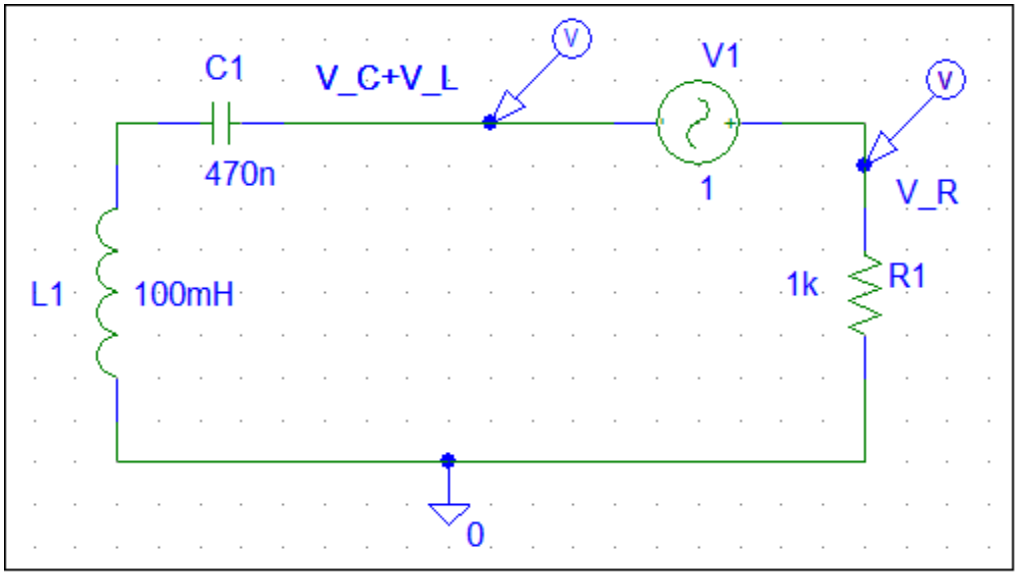


➢ From the above plot, 3db cut-off frequency =~ 328.782 Hz.
Theoretically, 3db cut-off frequency = 1/ (2πRC) = 1/ (2π*2.2k * 220n) = 328.833 Hz.

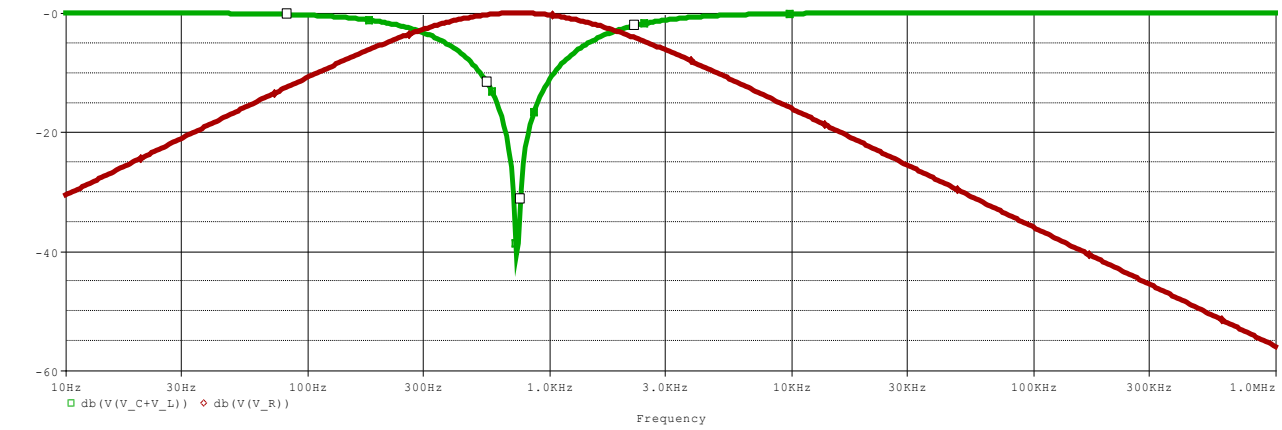
- Phase of VR and VC in decibels:



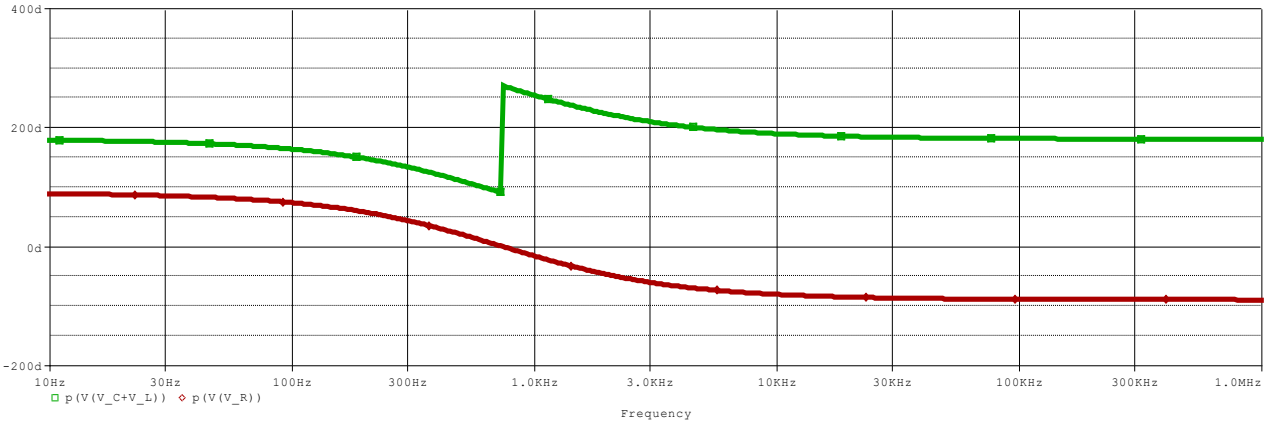
II. Second Order Filters:



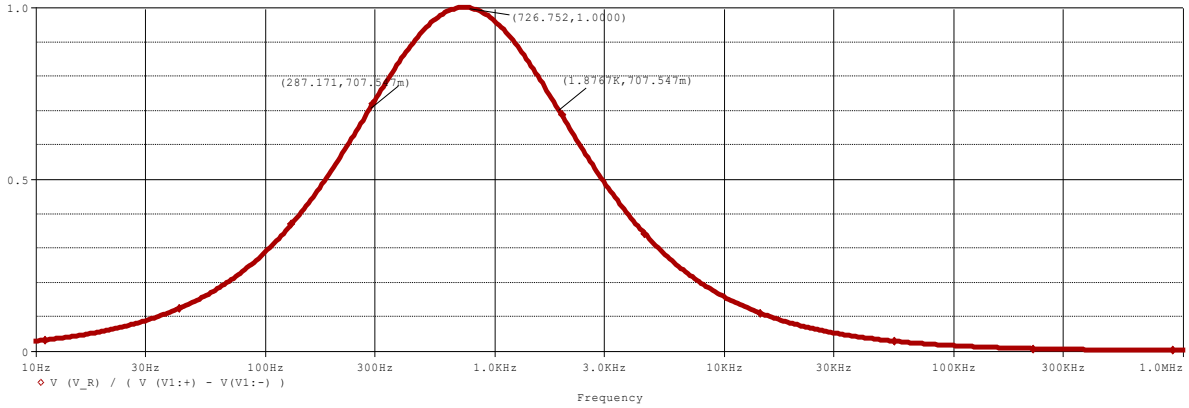
- Magnitude of V_R and (V_C + V_L) in decibels.



- Phase of VR and (Vc + VL).



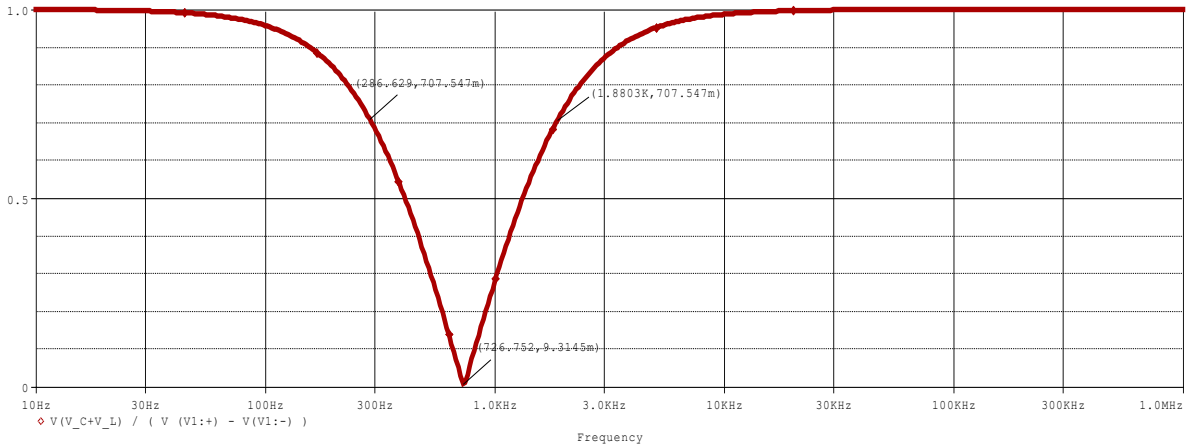
- Plot of (VR/VI).



From plot above:

- Filter type is band-pass filter.
- fc1 = 287.171 Hz
- fc2= 1876.7 Hz
- fo = 726.752 Hz.

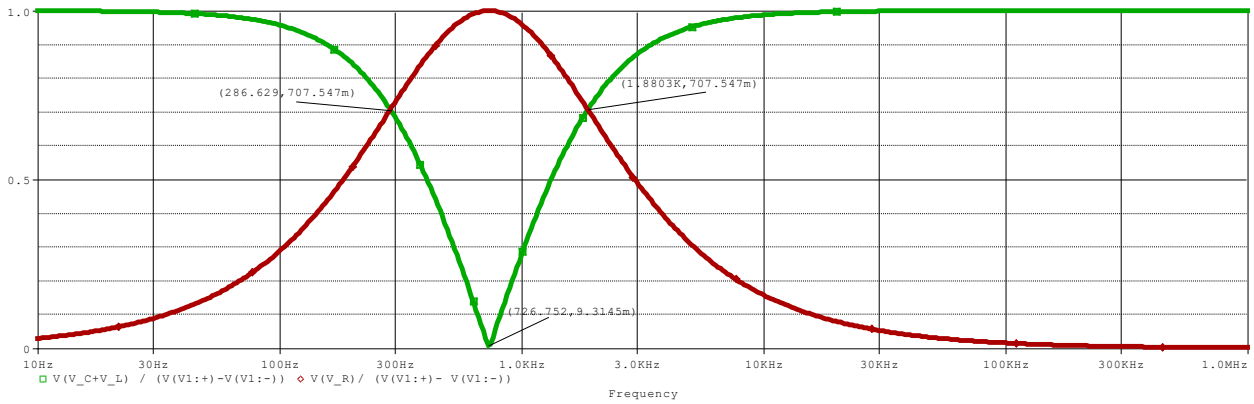
- Plot of ((V_C +V_L)/ Vi).



From plot above:

- Filter type is band-reject filter.
- fc1 = 286.629 Hz
- fc2= 1880.3 Hz
- fo = 726.752 Hz.

- Both plots of (VR / Vi) and ((VC + VL)/ Vi).



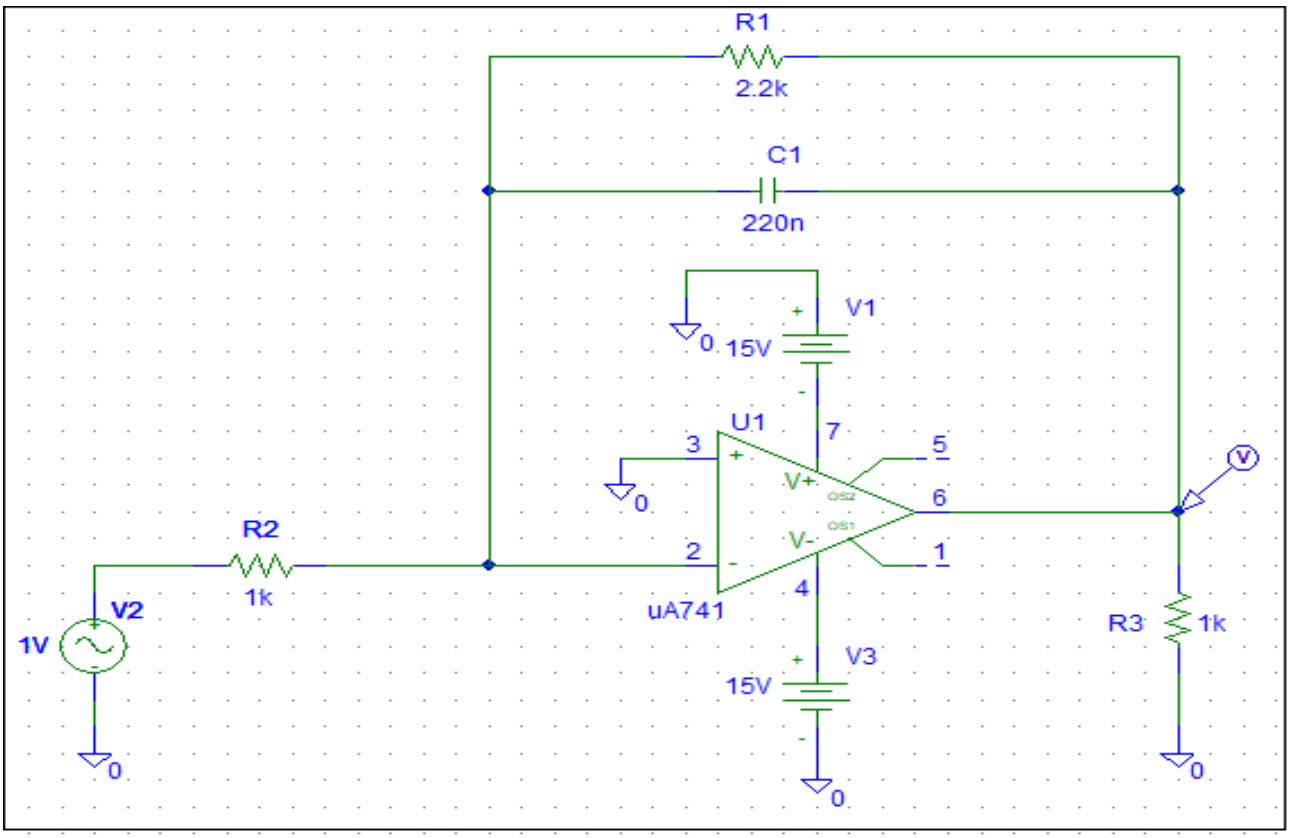
- Theoretically:

$$f_0 = \frac{1}{2\Pi\sqrt{LC}} = \frac{1}{2\Pi\sqrt{100\ mH\ x\ 470\ nF}} = 734.13 \text{ Hz.}$$

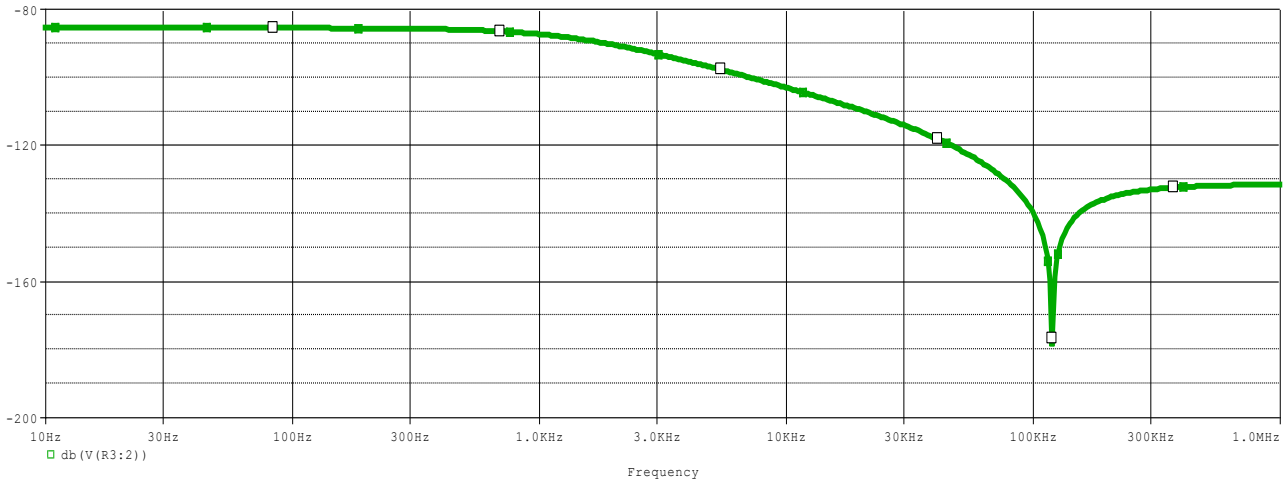
$$f_{c1} = \frac{-\frac{R}{2L} + \sqrt{\left(\frac{R}{2L}\right)^2 + \frac{1}{LC}}}{2\Pi} = 286.907 \text{ Hz.}$$

$$f_{c2} = \frac{\frac{R}{2L} + \sqrt{\left(\frac{R}{2L}\right)^2 + \frac{1}{LC}}}{2\Pi} = 1878.456\text{Hz.}$$

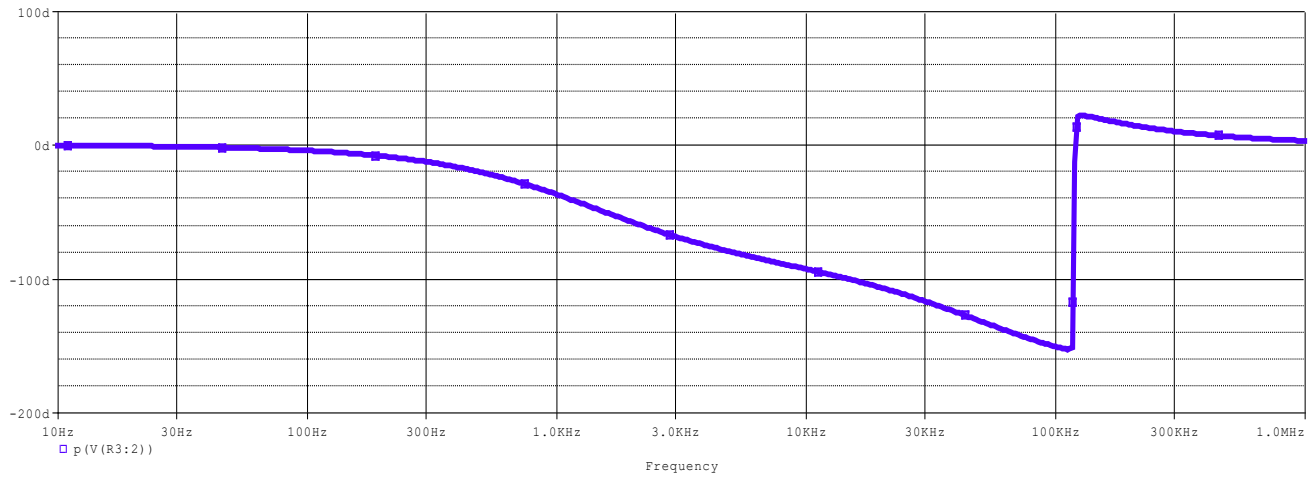
B. Passive filters:



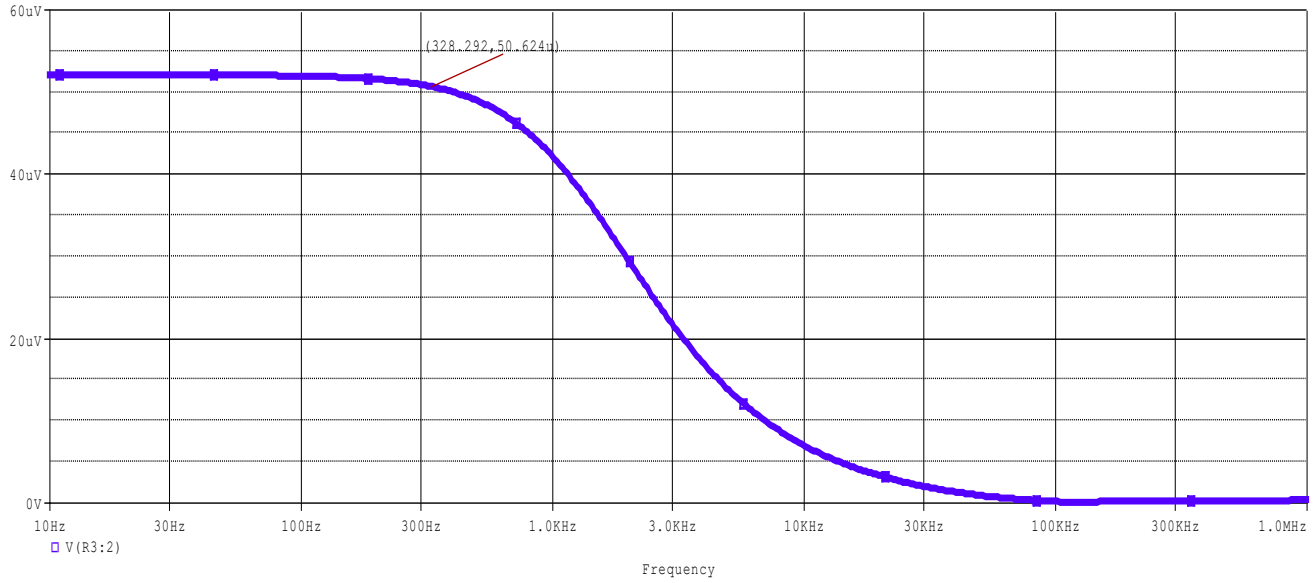
- Magnitude of Vo in decibels.



- Phase of Vo.



- Magnitude-frequency Plot.



o From plot above:

- Filter type is low-pass filter.
- 3db cut-off (fc)= 328.292 Hz.

o Theoretically:

fc = 1/2πRC= 328.833Hz.