

Lab Report

IA 3203 – DIGITAL SIGNAL PROCESSING

*Department of Instrumentation and Automation Technology
University of Colombo*

DSP 302 – Analog Filters using Octave

Registration No: 2021t01108

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Exercise:

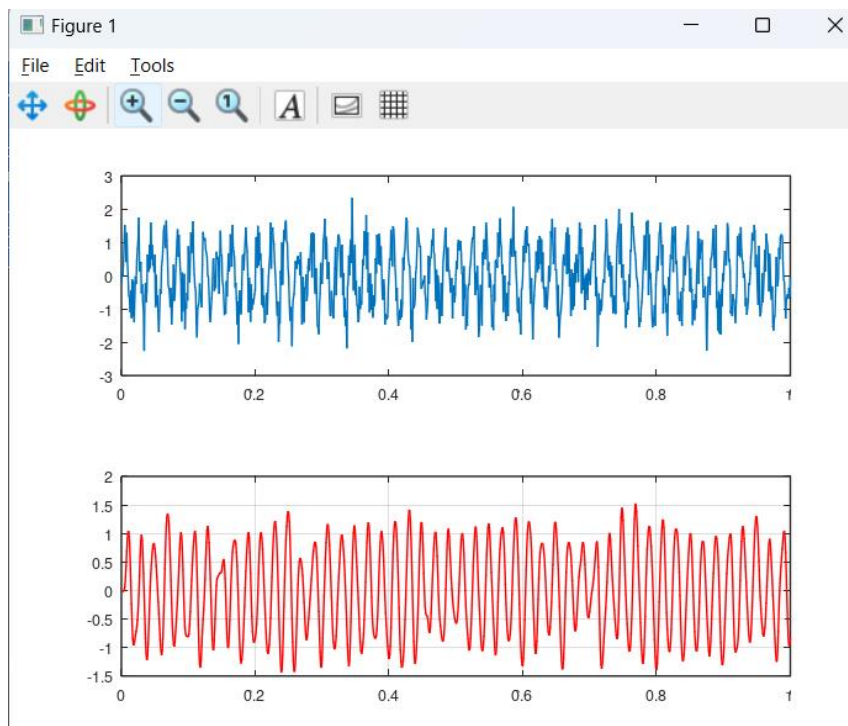
Question 01:

Answer:

Octave code:

```
Editor
File Edit View Debug Run Help
lab_2.m
1 clear all;
2 close all;
3 clc;
4
5 n = 4;
6 cutoff = 100;
7 sampling_freq = 1000;
8
9 wc = cutoff/(sampling_freq/2);
10 [b, a] = butter (n, wc, "low");
11
12 t = 0:1/sampling_freq:1;
13 signal = sin(2*pi*50*t)+0.5*randn(size(t));
14
15
16 subplot(2,1,1)
17 plot(t,signal)
18
19 subplot(2,1,2)
20 y = filter (b, a, signal)
21 plot(t,y,'r')
22 grid on;
```

Figures:



Results/Answers in Command Window:

```
line: 9 col: 32 encoding: UTF-8 eol: CRLF
Command Window
5.7728e-01 7.3332e-01 8.9222e-01 1.0167e+00 1.0458e+00 9.3175e-01 6.6773e-01
Columns 995 through 1001:
2.8618e-01 -1.4917e-01 -5.5100e-01 -8.3722e-01 -9.6716e-01 -9.5164e-01 -8.3586e-01
>> |
```

Question 02:

- Smooth response at all frequencies.
- Monotonic decrease from the specified cut-off frequencies.
- Maximal flatness, with the ideal response of unity in the passband and zero in the stopband.
- Half-power frequency, or 3 dB down frequency, that corresponds to the specified cut-off frequencies

Question 03:

- In equalizers
- In crossovers
- In signal processing applications
- In control systems for feedback control