BSP PRACTICAL EXAM

BM17040
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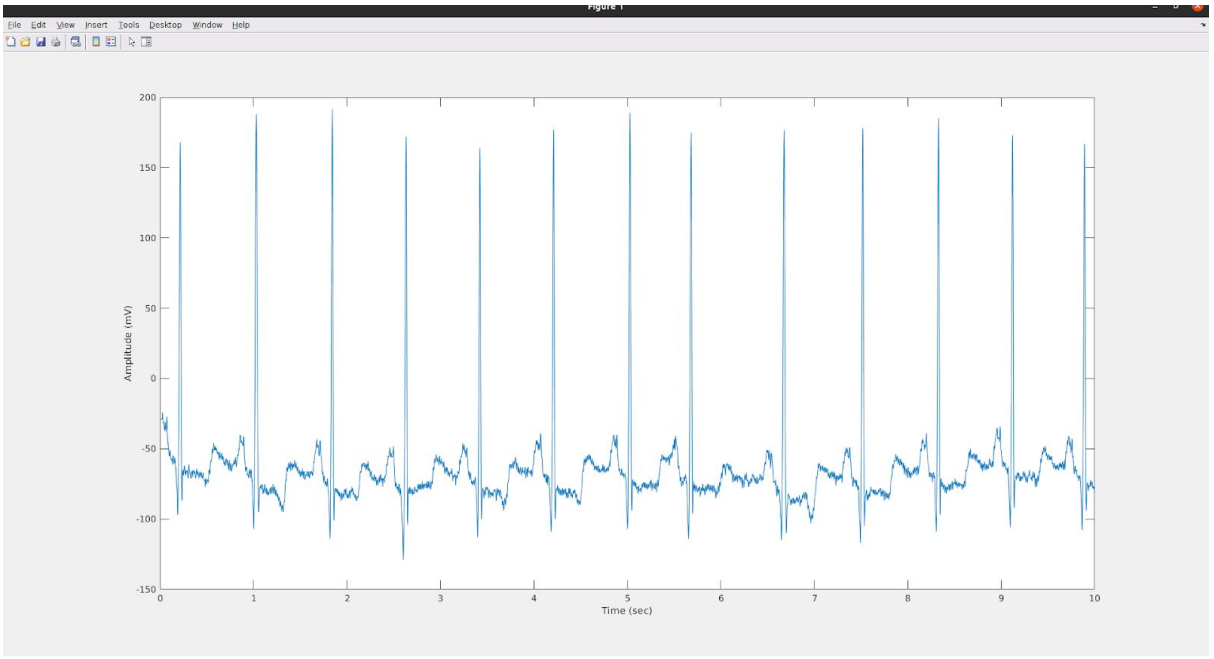
Objective # 1

```
% Source: record mitdb/100
% val has 2 rows (signals) and 3600 columns (samples/signal)
% Duration:     0:10
% Sampling frequency: 360 Hz  Sampling interval: 0.002777777778 sec
% Row Signal  Gain    Base    Units
% 1     MLII    200     0       mV
% 2     V5      200     0       mV

% To convert from raw units to the physical units shown
% above, call the 'rdmat.m' function from the wfdb-matlab
% toolbox: https://physionet.org/physiotools/matlab/wfdb-app-matlab/

clc;
clear all;
close all;
load("100m.mat");
fs = 360;
ts = 1/fs;
units = "mV";
N = 3600;
t = (1:N)/fs;

gain = 200;
figure(1)
plot(t,val(1,:));
xlabel("Time (sec)");
ylabel("Amplitude (mV)");
```



Objective # 2

```
clear all;
close all;
clc;

ecg = load("eeg1-c3.dat");

t = 0:length(ecg)-1;
figure(1);
plot(t, ecg);
xlabel("Samples");
ylabel("Amplitude");
title("ECG waveform");

M = 200; % window size
hamm_win = hamming(M);
ecg_hamm = ecg(1:M).*hamm_win'; % dot product
figure(2);
plot(ecg_hamm);
title("Hamming window applied on ECG");
xlabel("Time");
ylabel("Amplitude");

M = 200; % window size
rect_win = rectwin(M);
ecg_rect = ecg(1:M).*rect_win'; % dot product
figure(3);
```

```
plot(ecg_rect);
title("Rectangular window applied on ECG");
xlabel("Time");

YI_pre = ecg - mean(ecg); % heart rate - avg_HR
Y_freq_pre = fft(YI_pre); % step 1 for PSD
Y_mag_pre = abs(Y_freq_pre);
PSD_pre = (Y_mag_pre.^2); % step 2 for PSD
N_pre = length(PSD_pre); % used for plotting
freq_pre = (1:N_pre)*fs/N_pre;
figure(1);
plot(freq_pre, PSD_pre);
title("Heart Rate PSD pre state")
xlabel("Frequency");
ylabel("PSD");
```