

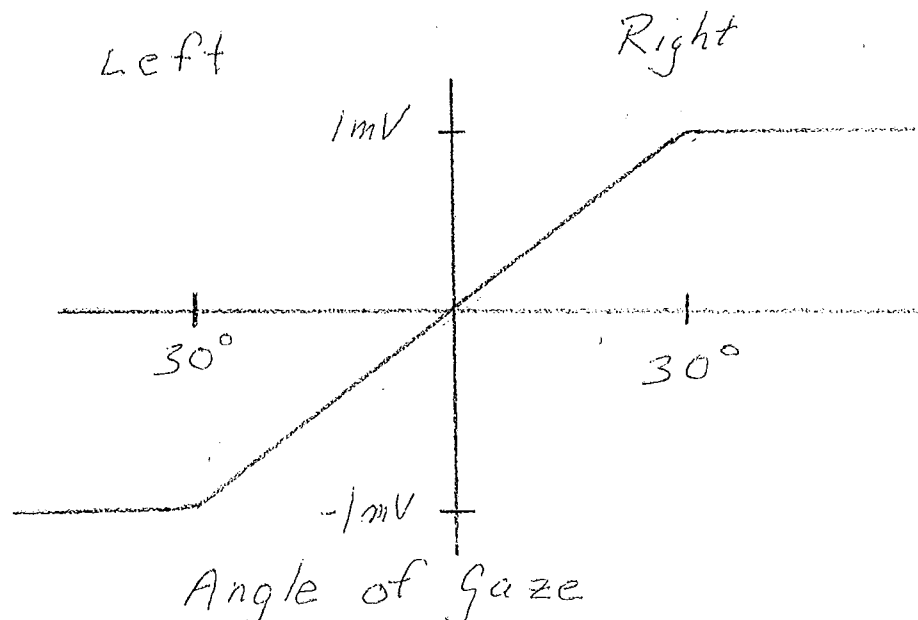
ECE 4BD4
Midterm Test

Fall 2017

October 4, 2017 5:30 – 7:00 pm

Each question is worth 15.

1. You are recording an electrical signal from the body using surface electrodes. The signal has a maximum amplitude of $100\ \mu\text{V}$ and a bandwidth of 50 Hz-3KHz. Briefly describe the origin and characteristics of three different noises that could contaminate your signal and how to effectively remove each one. **(15 marks)**
2. Describe the electrical activity of the heart and how the electrical events are related to the mechanical activity (i.e. generation of blood pressures and flow). Your explanation should include how the heart's electrical events are related to the Lead I ECG signal. **(10 marks)**
3. The electro-ocularogram (EOG) is recorded from the temples (skin between the eye and ear of a subject and has the characteristics shown in the following figure. Design an instrumentation system to record this signal and turn a green light on when the eyes look to the right and a red light on when looking to the left. Use a block diagram to describe your instrument from electrodes to the light display with specifications for each block. Detailed electrical/electronic circuits are not necessary but could be useful. Consider subject comfort and safety and reliability. **(20 marks)**



The End