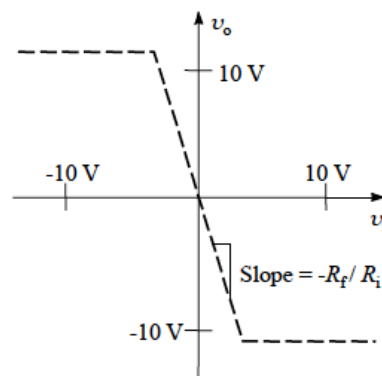


YILDIZ TECHNICAL UNIVERSITY

DEPARTMENT OF BIOMEDICAL ENGINEERING

BIOMEDICAL INSTRUMENTATION - MIDTERM I QUESTIONS -

1. **a. (3 points)** What is the difference between interfering and modifying input?
b. (5 points) Which compensation techniques can be used to remove interfering /modifying inputs from desired inputs? Give brief information about the techniques.
2. **(8 points)** What are the functional components of the generalized medical instrumentation system?
3. **(15 points)** Assume that you are working as a biomedical engineer in a hospital and you were asked to determine the performance factors of a medical instrument. How would you do that? Explain.
4. **(5 points)** What are the factors influencing the ion flow across the cell membrane?
5. **a) (5 points)** Give brief information about types and position of ECG leads on the body
b) (10 points) What is the reason of positive/negative peaks in ECG? Explain briefly.
6. **(10 points)** Define the motor unit and discuss the motor unit recruitment mechanism.
7. **(15 points)** Assume that you are performing an EEG experiment in the laboratory and trying to understand how the magnitude of alpha waves changes under different circumstances. These circumstances are given below. Discuss how and why alpha waves changes in each case.
 - a) Subject' eyes are closed and feels comfortable
 - b) Subject' eyes are open
 - c) Subject' eyes are closed and an easy mathematical question is asked.
 - d) Subject' eyes are closed and a moderately difficult mathematical question is asked.
 - e) Subject' eyes are closed and a too difficult mathematical question is asked.
8. Input-output plot of an amplifier circuit is shown in the Figure.
 - a. **(2 points)** Indicate the type of the amplifier circuit.
 - b. **(4 points)** Plot the amplifier circuit and calculate the gain.



9. **(3 points)** What is common mode rejection (CMRR) ratio? Explain.

10. **(8 points)** What are the basic requirements of bio potential amplifiers?
11. **(7 points)** What are the sources of electric interference in ECG? Explain.