Use of internet resources via smart phones or laptops is illegal during this exam. Please do NOT force me to penalize any of you. Use the precious organ inside your skull to analyze problems ….

BYM 501E FUNDAMENTALS OF BIOMEDICAL ENGINEERING (14463)
Inci ÇILESIZ
Midterm Examination 23 November 2015 13.30-15.30

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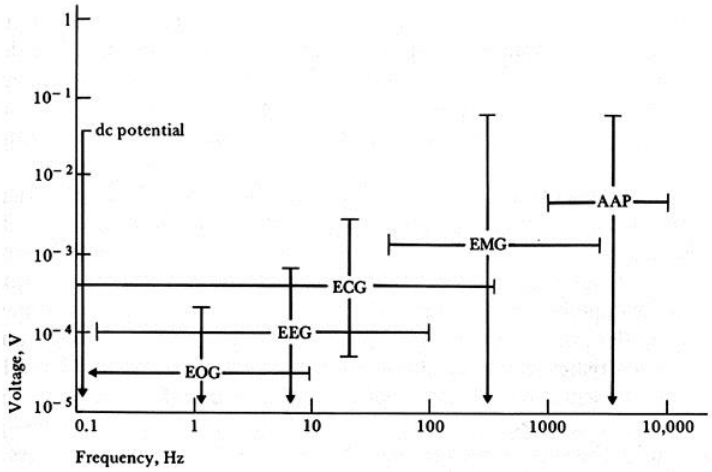
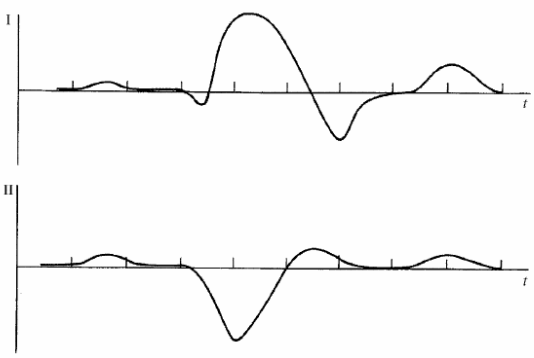
1. What are the differences between and significance of static and dynamic characteristics of a biomedical measurement system? Explain within a few sentences. (20 p)
2. Assume you have a frequency modulated bioelectric signal with an amplitude of approx. 50 µV embedded in a wide band noise of at least 10 mV. How would you amplify and recover your original signal? (10 p)
3. Why are instrumentation amplifiers used for amplification of most bioelectric signals? (10 p)
4. What is an action potential? How do membrane characteristics change during an action potential? (10 p)
5. Why is it necessary for the ventricular action potential to have a relatively long refractory period? (10 p)
6. What is half-cell potential? How is it measured? (10 p)
7. In the figure to the right you see voltage and frequency ranges of some common biopotential signals.
   a. Analyze sensitivity and specificity for biopotential measurements. Compare and contrast EKG and EMG. (10 p)
   b. What parameters affect response time? What maximum response time should your amplifier have to amplify EKG and/or EMG? (10 p)





8. In the figure to the left you see EKG from leads I and II. Sketch approximately the corresponding cardiac vector loop in the frontal plane. (10 p)

GOOD LUCK