

Name :  
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Midterm 1 (23.03.2011)

**GBE302 – Biomedical Instrumentation**

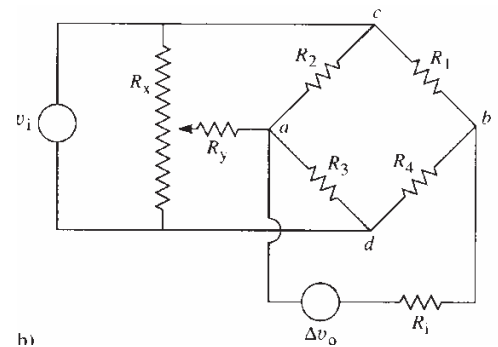
Q1 (10)	Q2 (10)	Q3 (10)	Q4 (20)	Q5 (20)	Q6 (15)	Q7 (15)	TOTAL

Q1. Group medical devices according to the areas of the medicine and state the objectives of each group of medical devices. (10)

Q2. What are “organs” and “organ systems”. List major organ systems. (10)

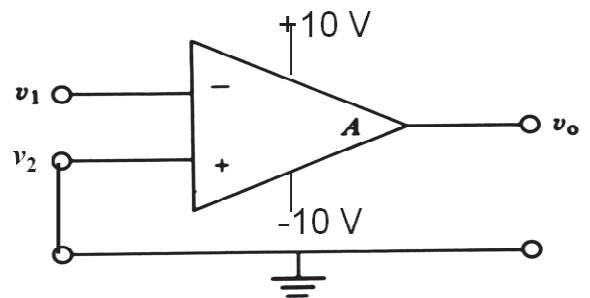
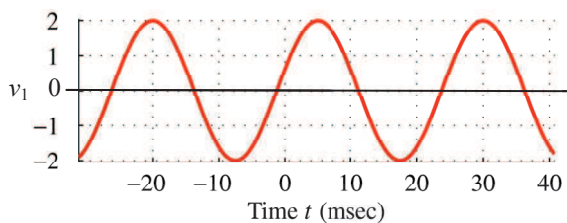
Q3. Draw block diagram of a general biomedical instrumentation system. State main responsibilities of each components that form the block diagram. (10)

Q4. In the following Wheatstone Bridge circuit, all resistors has initial value  $R_0$ . Show that  $\Delta v_o = (\Delta R/R_0)v_i$  when  $R_1$  and  $R_3$  increase by  $\Delta R$ , and  $R_2$  and  $R_4$  decrease by  $\Delta R$ . (20)



- Q5.
- Why the human body temperature measurement is important, explain. (10)
  - List the temperature sensor types. (05)
  - We want to measure core body temperature. Suggest a method and state why we should use the method you suggested. (05)

Q6. In the following Op-Amp circuit, find output for the given input waveform. (15)



Q7. A biosignal with a peak to peak maximum amplitude of  $\pm 100$  mV needs to be amplified. Design a non-inverting amplifier that produces a corresponding peak to peak maximum amplitude of  $\pm 10$  V (chose appropriate resistors if necessary). (15)