

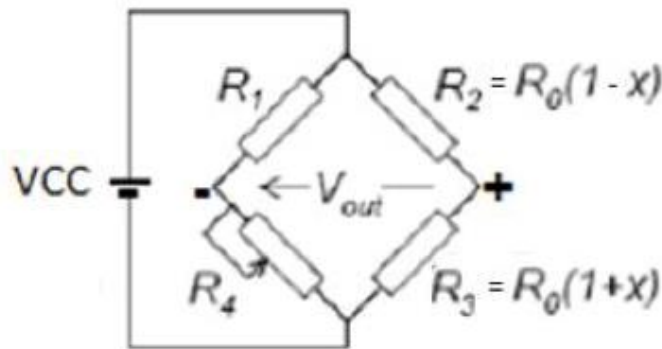
21.06.2021

YILDIZ TECHNICAL UNIVERSITY

DEPARTMENT OF BIOMEDICAL ENGINEERING

BIOMEDICAL INSTRUMENTATION – FINAL EXAM QUESTIONS-

1. **(10 points)** What are the steps in development of commercial medical instrumentation?
2. **(10 points)** What are the functions of the microcomputers in cardiac monitors?
3. **(15 points)** Wheatstone bridge circuit is a kind of resistive sensory system. In the following figure, a Wheatstone bridge configuration that consists of two sensory resistances was given (R_2 and R_3). Calculate the V_o of this sensory system when V_{cc} is applied to the measuring system as input (Assume that $R_1=R_4$).



4. **(10 points)** Which technique would you apply to measure changes in lung volumes. Explain your preferred technique.
5. **(20 points)** Assume that a patient applies to doctor. Doctor decides to make some clinical tests to check number of blood cells, glucose amount and expression level of protein A in the blood of patient and directs the patient to the laboratory. If you were a laborant, which technique/instrument you would apply/use for each analysis? Explain the working principle of your preferred technique or instrument.
6. **(10 points)** How x-rays are generated? Explain briefly.
7. **(10 points)** Explain what kinds of information can be obtained in A, B and M mode ultrasonography.
8. **(10 points)** Why do we use invasive blood pressure measurement techniques while we have also non-invasive techniques
9. **(5 points)** Define the Doppler shift and explain what kinds of information can be obtained about blood flow by using Doppler shift.