Daffodil International University (DIU)
Department of Electrical and Electronic Engineering

EEE 422: Measurement and Instrumentation Lab

EXPERIMENT NO: 06

NAME OF THE EXPERIMENT: **STUDY OF INSTRUMENTATION AMPLIFIER**

Theory:

The instrumentation is one of the most useful, precise, versatile amplifiers available today. It is made from three Op-Amps and seven resistors. It is actually made by connecting buffer amplifier to differential amplifier. Op-Amp A3 and its four equal resistors R from a differential amplifier with gain 1. Only the A3 resistor have to be matched. The primed resistor R` can be made variable to balance out any common mode voltage as shown in figure. The resistor aR is used to set the gain according to the following equation where a=aR/R.

$$V0 / (E1-E2) = 1 + (2/a)$$
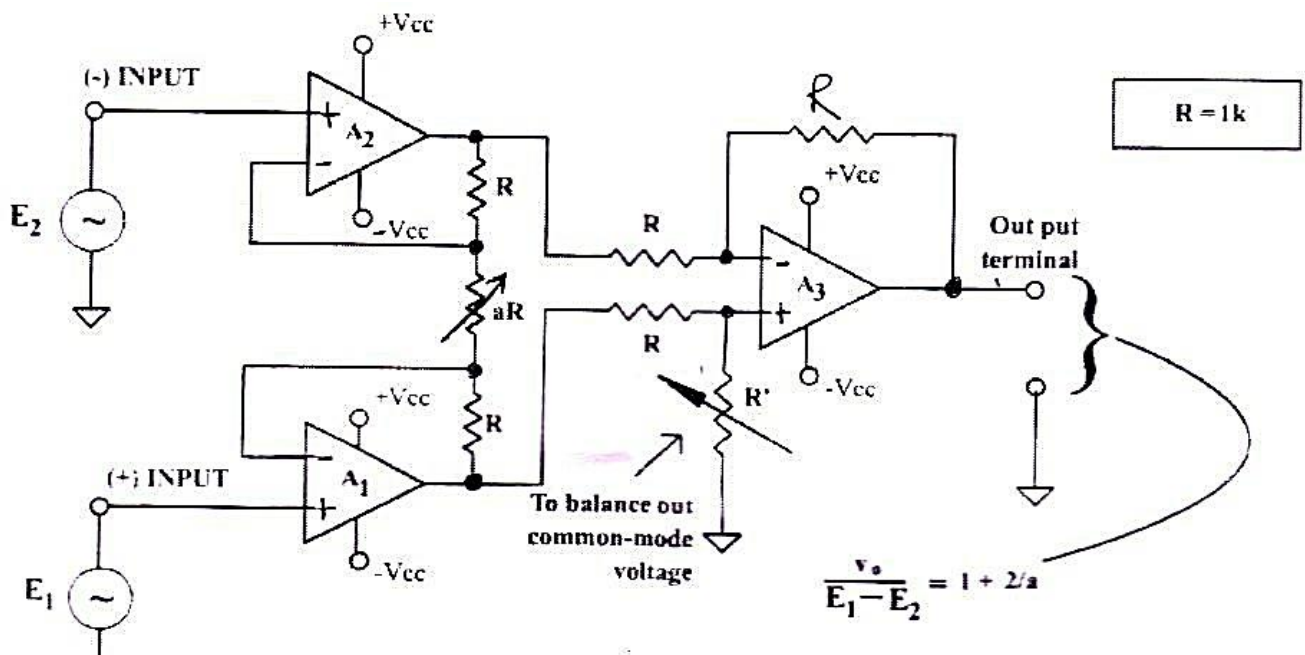
Circuit Diagram:

Fig.1: Instrumentation Amplifier

Apparatus:

1. IC 741 3 pcs
2. Resistors 1k-5 pcs
3. Pot 1k- 2 pcs
4. Trainer Board
5. Oscilloscope
6. Signal Generator

Procedure:

1. Connect the circuit as above. Use R=1K
2. Connect E2 to ground and provide a 5v P-P voltage at E1.
3. Calculate *a* for a gain of 2.
4. Operate the *a*R pot again to get a gain of 2.
5. Draw the voltage wave shape at the output of the three Op-amps.
6. Compare the two values of *a*.

Report:

1. Describe the operation of the circuit and theoretically prove the equation of the instrumentation amplifier as given in the instruction.
2. Why it is a kind of a differential amplifier and how could we use it as an amplifier?
3. What is the advantage of instrumentation amplifier?