M.Sc. Sem III

MPHYCC - 12

electronics II

OP-amp

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MPHYCC-12

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Instrumentation Amplifier :-

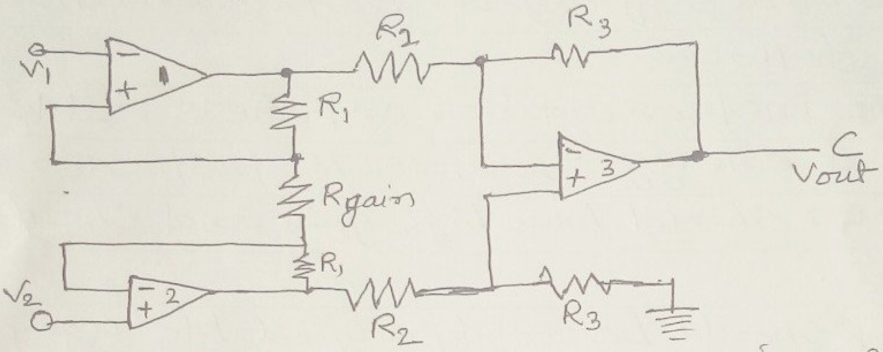
An instrumentation amplifier is used to amplify very low level signals, rejecting noice and interference signals. Examples can be heartbeats, blood pressure, Temperature, earthquakes and so on. Therefore, the essential characteristics of a good instrumentation amplifier are as follows.

* Inputs to the instrumentation amplifiers will have very low signal energy. Therefore the instrumentation amplifier should have high gain and should be accurate.
* The gain should be easily adjustable using a single control.
* It must have high input impedance and low output impedance to prevent loading.
* The instrumentation amplifier should have high CMRR since the transducer output will usually contain common mode signals such as noise when transmitted over long wires.
* It must also have a high slew Rate to handle sharp rise times of events and provide a maximum ~~under~~ undistorted output voltage swing.

Teacher's Signature:

Instrumentation Amplifier using op-Amp.

The instrumentation amplifier using op-amp Circuit is shown below. The op amps 1 & 2 are non-inverting amplifiers and op-amp 3 is a difference amplifier. These Three op-amps together, form an instrumentation amplifier. Instrumentation amplifiers final output Volt is The amplified difference of The input signals applied to The input terminals to op-amp 3. Let The outputs of op-amp 1 and op-amp 2 be V_{o1} and V_{o2} respectively.



Instrumentation Amplifier using op Amp

Then $V_{out} = (R_3/R_2)(V_{o1} - V_{o2})$

Look at The input stage of The instrumentation amplifier as shown in the figure below. The instrumentation amplifier derivation is discussed below.

The Potential at node A is the input Voltage V_1. Hence The Potential at node B is also V_1, from The virtual short concept. Thus, The potential at node G is also V_1.

The Potential at node D is The input voltage V_2. Hence The Potential at node C is also V_2, from The virtual Short. Thus The Potential at node H is also V_2.