

CONSTRUCTION OF A DUAL PURPOSE DIGITAL METER TO USE  
IN  
PHYSICS EXPERIMENTS

A PROJECT REPORT PRESENTED BY

LALITH RANJITH PREMALAR

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**Lalith Ranjith Premalal**

Panadura Balika Maha Vidyalaya

Panadura

**Abstract**

In the majority of applications in the experiments of Physics, analog meters; such as volt meters and Galvanometers; which consist pointers and moving coils or other measuring instruments such as Hg/glass thermometers or chemical balances, are used. There are many errors and difficulties occur in our experiments, when such equipment are used and also there are some limiting factors for some experiments such as in light and sound related experiments.

In the experimental section, the newly built digital meter which was assembled for this project was used in Physics experiments, to measure, temperature and light intensity. Meanwhile analog to digital converters and the theory behind the digital meters are discussed in a separate chapter, under Theoretical Background.

Digital meters are used to measure temperature, current, wind speed, resistance or light intensity etc., but the actual property that being measured is the voltage. After calibrating the meter for its particular purpose the voltage measured will give an accurate digital reading of the analog quantity being measured.

Therefore some transducers such as light depending resistors (LDR), and diodes are used as sensors to convert the amount of light or heat into the relevant voltage.

After the construction of the above mentioned digital meter, it was introduced in to two groups of students of Panadura Balika Maha Vidyalaya.

In the first experiment (Experiment No.1), the digital meter was used by the 1<sup>st</sup> group as the thermometer, to measure the temperature in the experiment of Newton's cooling law, while a Hg/glass thermometer was used by the other group.

In the following experiments, as there were no suitable analog meter to measure the light intensity, the digital meter was used to investigate the variation of light intensity against the distance (Experiment No.4), to determine the Turbidity of water sample (Experiment No.2), and to compare the wattage and efficacy of a CFL bulb and a normal filament bulb, (Experiment No.3), by group A( the experimental group) while the group B( the control group ) continued their lessons without any experiments.

The main steps and objectives of this project were to,

1. Discuss analog to digital converters.
2. Select a suitable circuit for a digital meter.
3. Investigate the availability and the cost of necessary component for the digital meter.
4. Build a digital meter.
5. Alter the meter to measure other quantities such as light intensity and temperature.
6. Allow the students to use the newly buildup digital meter in some practical experiments of G.C.E (A/L).
7. Motivate the student towards the subject, Electronics through practical experiments.

