

Remote Laboratory – Electric Current Tasks

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Abstract

The use of Computer Based Laboratory (CBL) is very popular in secondary schools. Some of these schools have not measurement equipments. Remote laboratory is solution how is possible measure without equipments. User need only computer with internet connection. We can use two systems for measurements. The equipment ISES works with LabView control and we can carry out experiments with AC current and coils. The CMC-S3 system works with Delphi software and pupils can measure VI characteristics of electronic components, e.g. lamp, LED, the other types of diodes. The tasks for secondary schools pupils were prepared.

1 Introduction

Remote laboratory is possibility to improve experimental skills of pupils in secondary schools which have not measuring instrument. Remote experiment is placing in the university or other school with fast internet connection. Pupils can measure real data and calculate it without measuring equipment. Remote experiments are handless, work without operating personnel. This condition satisfied a lot of experiment of electricity.

We prepare measuring with coils with the Czech system ISES and LabView software. LabView works as server – client application and we need plug-in into Internet browser.

We prepare some experiments with CMC-S3 developed in Leonardo da Vinci project ComLabSciTech and we use Borland Delphi software. Borland works as server – client application, but it is independent application.

All software works in Microsoft operating system platform.

2 Tasks for pupils with measuring in a remote laboratory

Task on measuring inductance of coils:

1. Coil with an air core with 600 cl.
2. Coil with foliated core with 600 cl.

3. Coil with closed core with 600 cl.
4. Measuring of inductance through connection as a transformer

Examined dependences:

1. Dependence of the inductance on the core used (core-less, simple foliated core, closed core)
2. Frequency dependence of impedance
3. Frequency dependence of the voltage and current phase shift
4. Transformer measurement
 - Determination of the ratio of transformation
 - Determination of a loaded transformer efficiency
 - Frequency dependence of the loaded transformer efficiency

Possible tasks for pupils:

- To measure real coil resistance
- To measure coil impedance
- To calculate coil inductance (possibly coils inductance)
- To set average value of inductance
- To find out frequency dependence of inductance
- To determine phase shift between voltage and current

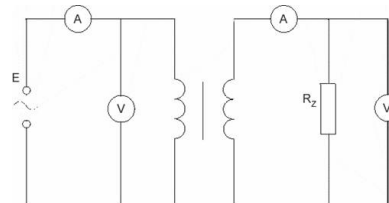


Fig. 1 Wiring diagram

We use only one wiring diagram for many tasks and questions for pupils.

Software is user friendly. Software makes possible a lot of changes as frequency, amplitude, output level of signal, and timing. The measured data are exported as a chart and in table format. Export data is possible to other programs as Excel.