Department of Electrical Engineering

Assignment

Date: 20/04/2020

Course Details

Course Title: Instrumentation and Measurement **Module:** 6th (BE)

Instructor: Sir waleed jaan **Total Marks:** 30

Student Details

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Q1.	**(a)**	A student mistakenly connects an ammeter in parallel in a circuit. What will happen? Explain briefly.	**Marks 05** **CLO 2**
	(b)	A student mistakenly connects a voltmeter in series in a circuit. What will happen? Explain briefly.	**Marks 05** **CLO 2**
Q2.	**(a)**	Random error cannot be easily reduced in measurements. Justify this statement.	**Marks 05** **CLO 1**
	(b)	What are the different reasons due to which gross error occurs in measurement? Explain briefly.	**Marks 05** **CLO 1**
Q3.	**(a)**	What will happen if a spring in not connected with the coil of a moving coil galvanometer? Explain briefly.	**Marks 05** **CLO 2**
	(b)	A student is performing an experiment in the laboratory during which he finds out that the measuring instrument is giving a Full Scale Deflection for a current of 10 μ A. He wants to measure a voltage of 20V with the help of this measuring instrument. Now, What should be the appropriate value of the resistor to be added with this instrument so that it can measure up to 20V? Moreover, should the resistor be connected in series or parallel with this instrument?	**Marks 05** **CLO 02**

Talha Khan (13845)

Q 1 (a) A student mistakenly connects an ammeter in parallel in a circuit. what will happen?

Ans:- Reason:- An ideal ammeter has zero or negligible resistance when it is connected in parallel as it has zero resistance, the resistor to which it is parallel connected gets shorted and due to his the effective resistance of the circuit is changed and so the effective current.

Due to this the w=value measured by the ammeter would be different (increased due to decrease in effective resistance).

Q 1 (6) A student mistakenly connect a voltmeter in series in a circuit. What will happen?

Ans:- Reason:- Voltmeter ideally have internal resistance, practically a large enough resistance. So if connected in series, a very small current will flow or no current will flow. The reading on the voltmeter will be more or less same as it was initially showing. Since no current flowing voltmeter will show the voltage of battery connected across.

Q 2 (a)

Random error cannot be easily reduced in measurement. Justify this statement.

Ans: A random error makes the measured value both smaller and larger then the true value, they are error of precision. Random errors occur by chance and cannot be avoided. Random error is due to factors which we do not or cannot, control.

* Random error be reduced:-

Random error can be evaluated through statistical analysis and can be

reduced by averaging over a large number of observations.

Systematic the cloth tape measure that you use to measure the length of an object had been stretched out from years of use. (As a result all of your length measurements were too long.)

* Random error Example:-

Example of causes of random error are:

Electronic noise in the circuit of an electrical instrument, irregular changes in the heat loss rate from a solar collector due to changes in the wind.

Q 2 (b) What are the different reasons due to which gross error occurs in measurement?

Ans:- Generally errors are classified into three tyes:

(i) systematic errors.
(ii) random errors
(iii) Gross errors are caused by mistake in using instruments or meters, calculating measurement and recording data result.

Reason:- for example conside the person using the instruments takes the wrong reading, or they can record the incorrect data. Such types of error comes under the gross error. The gross error can only be avoided by taking the reading carefully.

Two methods can remove the gross error:

(1) The reading should be taken very carefully.

(2) Two or more readings should be taken of the measurement quantity. The readings are taken by the differents experimenter and at a different points for removing the error.

Three main reason:

(a) Inherent shortcomings of Instruments.
(b) Misuse of Instrument.
(c) Loading Effect.

For example, when measuring a low resistance by the ammeter-voltmeter method; a voltmeter having a very high value of resistance should be used.

Q 3 (a)

what will happen if a spring in not connected with the coil of a moving coil galvanometer?

Ans:- There are normally two. They Provide the electrical connection to the coil on the armatur.

The fixed-to moving connection.

But that ins't why they are springs.

→ They are torsional springs providing the restoring force that pushes the pointer back to zero.

→ It is the hair spring that make the deflection proportional to the force. And since the force is proportional to the current, it permits us to draw an analogue scalevunder the pointer and measure the current.

Think Lenz's Law and Hooke's Law.

Q 3 (b)

Given data:

$$Ig = 10 \times 10^{-6}$$

$$v = 20\ v$$

Required:

$$R = ?$$

Solution:-

$$v = Ig\ (G + R)$$

$$V/Ig = G + R$$

$$R = V/Ig - G$$

$$R = 20/10 \times 10^{-6} - 0$$

$$R = 2 \times 10^{6} = 2\ \text{Mega}\ \Omega$$

So resistance 2 Mega Ω meaning 20v and connected in series.