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Subject: Instrument and Measurement

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Sir Waleed Jan

Q) part A student mistakenly connects an ammeter in a circuit. What will happen? Explain briefly.

Answer:

When we connect an ammeter in parallel, as we know that current always follows low resistance path, maximum amount of current will flow through the ammeter which in turn will burn the fuse or can damage the ammeter.

(B) A student mistakenly connects a voltmeter in series in a circuit. What will happen? Explain briefly.

Answer:

Voltmeter ideally have infinite internal resistance, practically a large enough resistance, so if we connected in series, a very ~~big~~ small current will flow or no current will flow. Since no current flowing, voltmeter will show the voltage of battery connected across.

Q2 Random error cannot be easily reduced  
(a) in measurements justify this statement.  
Part

Answer → It comes from unpredictable changes during an experiment. Systematic error always affects measurements the same amount or by the same proportion, provided that a reading is taken the same way each time. It is ~~not~~ predictable. Random errors cannot be eliminated from an experiment, but most systematic errors can be reduced.

(B) ~~What~~ What are the different reasons due to which gross error occurs in measurement? Explain briefly.

Answer → The gross error occurs because of the human mistakes. It means a person using the instruments takes the wrong reading, or they can record the incorrect data.

Such type of error comes under the gross error. The gross error can only be avoided by taking the reading carefully.

Q3 What will happen if a spring is not connected with the coil of a moving coil galvanometer? Explain briefly.

Answer Spring providing the restoring force that pushes the pointer back to zero.

If spring is not connected with the coil then the ~~spring~~ <sup>pointer</sup> is not come to zero its move and go to the end point and the pointer is not come to its initial stage.

**B**  
Part

A student is performing an experiment in the laboratory during which he find out that the measuring instrument is giving a full scale deflection for a current of 10 mA. 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

instrument?

Answer

Given data:-

$$I = 10 \text{ mA} = 0.01 \text{ A}$$

$$V = 20 \text{ V}$$

Required:-

$$R = ?$$

Solution:

As we know that

$$V = IR$$

~~$$R = \frac{V}{I}$$~~

$$R = \frac{V}{I}$$

$$R = \frac{20 \text{ V}}{0.01 \text{ A}}$$

$$R = 2000 \Omega$$

$$R = 2 \text{ k}\Omega$$

Converting an ammeter to a voltmeter involves increasing the resistance of the ammeter. This is done by adding a high

resistance in series with the  
ammeter. Let the range of the  
ammeter be 0 - 10 Amp and  
we convert it to a voltmeter of  
range 0 - 10

END

