
Student Details

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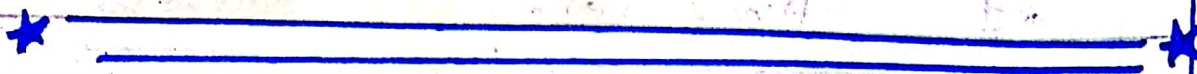
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Q1.	(a)	A student mistakenly connects an ammeter in parallel in a circuit. What will happen? Explain briefly.	Marks 05
			CLO 2
	(b)	A student mistakenly connects a voltmeter in series in a circuit. What will happen? Explain briefly.	Marks 05
			CLO 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 is 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 $10 \mu A$. 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

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Subject : EMI



Question No 1:

Part (A)

Answer: An ammeter is always connected in series. Because the purpose of the ammeter is to measure the current through the circuit. If it is connected in parallel, it will result into following consequences.

(i) Damage to the ammeter.

As an ammeter is a low impedance device, by connecting it in parallel would result in a short circuit and burn damage to the ammeter and circuit.

(ii) Inaccurate measurement of current.

It is a very low resistance device and if connected in parallel, it will be the

Current and current cannot be measured accurately because it will shunt the load and current will take the low resistance path of Ammeter.

Question No 1:
Part (B)

Answer: A Voltmeter measures potential difference across two points in circuit it should be always connected in parallel because the voltage across the branches remains the same and due to high resistance current flow through Voltmeter is very low and it does not disturb the original circuit. If it is connected in series by mistake...

(i) As Voltmeter have high resistance so no current will flow through the circuit.

(ii) It will only measures potential difference between two points which is obviously zero.

there will be No voltage drop because voltage in same line is zero.

★ Question No. 2: ★
Part (A)

Answer: A Random error makes the measured value both smaller and larger than the true value. They are errors 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 causes one measurement to differ slightly from the next. It comes from unpredictable changes during an experiment. The main reasons for random error are limitations of instruments, environmental factors, and slight variations in procedure. For example.

(i) When weighing yourself on a scale you position yourself slightly differently each time.

(ii) measuring the mass of a sample on an analytical balance may produce different value as air currents affects the balance or as water enters and leaves the specimen.

(iii) measuring your height is affected by minor posture changes.

(iv) Random error in experimental measurements are caused by unknown and unpredictable changes in the experiment.

(v) 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.

→ Because random ^{error} always occurs and cannot be predicted, it's important to take multiple data points and average them to get a sense of the amount of variation and estimate the true value.

Question No 2:
Part (B)

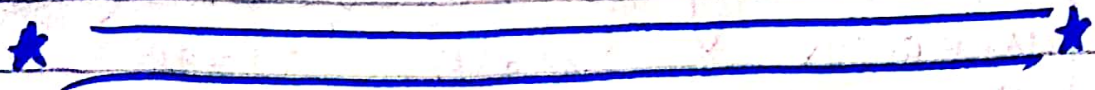
Answer: Gross error

It is called manual error and it occurs in reading, recording or calculating measurement result. It may occur during the experiment due to experiment fault. He may read or record value different than actual value.

(i) It may be due to poor sight of the observer.

(ii) It may be due to reading the instrument without setting properly.

(iii) It may be taking observation in wrong measure without bothering about the source of error.



Question No 3:

Part (A)

Answer: A Galvanometer is an instrument use for detecting and measuring current. moving coil galvanometer can measure smallest amount of current. it consists of.

- 1) Permanent horseshoe magnet.
- 2) Iron Core.
- 3) Pivoted Spring.
- 4) Non metallic frame Scale and Pointer.

The Spring play very important role in the function of galvanometer. without Spring the following function of galvanometer may be effected.

(i) there will be no steady angular deflection. with Spring. because there will be no counter torque for balancing magnetic Torque.

(ii) there will be no restoring force. To pushback the pointer to zero and the deflection measurement is disturbed.

③ If the Spring is not connected to the moving coil galvanometer the current cannot be passed to the ammeter.

④ without spring we cannot measure the current because it is spring that makes deflection proportional to the force and proportional to the current.



Question No 3:
Part (B)

Solution:

Given $V = 20V$

$I = 10 \mu A = 10 \times 10^{-6} A$

Required $R = ?$

We know that

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

Putting value $R = \frac{20}{10 \times 10^{-6}}$

$R = 2 \text{ m. } \Omega$

$$V = I_g (G + R)$$

$$\frac{V}{I} = G + R \Rightarrow R = \frac{V}{I} - G$$

and G is 0

$$R = \frac{V}{I_g} - 0$$

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

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

The resistor is connected in series with the instrument.

