Department of Electrical Engineering

Assignment

Date: 20/04/2020

Course Details

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

Instructor: Sir Waleed Jan **Total Marks:** 30

Student Details

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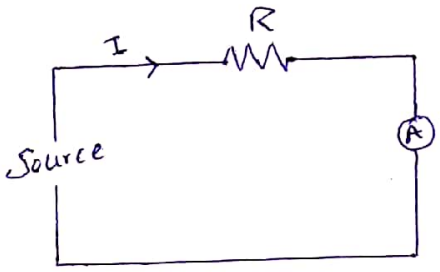
Q1.	(a)	A student mistakenly connects an ammeter in parallel in a circuit. What will happen? Explain briefly.	Marks 05 CLO 2
	(b)	A student mistakenly connects a voltmeter in series in a circuit. What will happen? Explain briefly.	Marks 05 CLO 2
Q2.	(a)	Random error cannot be easily reduced in measurements. 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

Adnan Shah
(13692)

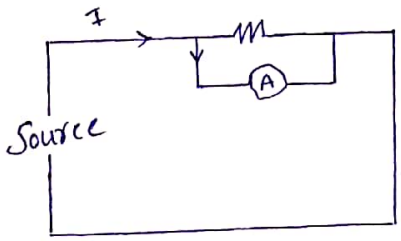
Ans (1) (a)

we always connect ammeter in Series because the purpose of an Ammeter is to measure current and current is same in Series circuit.

But if Some one connect it in parallel, (the Ammeter has very low internal resistance) So it will short the circuit. Due to its low internal resistance all the flow will pass from Ammeter and this can burn the Ammeter.



The internal resistance of an ammeter is very low So the value of current will be not affected.



Resistor R Bypasses by Low internal resistance of Ammeter

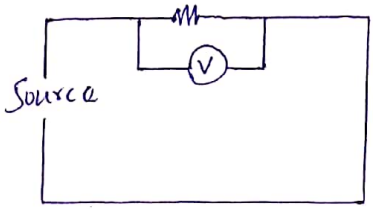
Ans (1)(6)

The voltmeter is used to measure the electrical potential difference between two points.

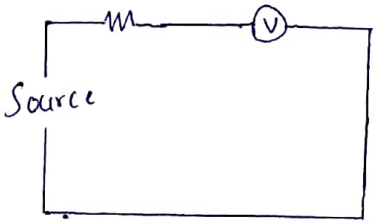
An ideal voltmeter has infinite resistance.

But if we connect it in series, So we have discussed that voltmeter has high internal resistance so it will be reducing the current to nearly Zero. In other words it will lead to an open circuit.

We connect voltmeter in parallel because in parallel circuit the voltage are same at all point.



In this case the voltmeter is in parallel so it will give the potential difference.



Now voltmeter is connected in series So it will not show value or give Zero or very low value due to its high internal resistance.

Ans (2) (a)

Random errors:

Random error in experimental measurements are caused by unknown and unpredictable changes in the experiment. These changes may occur in the measuring instruments or in the environmental conditions.

For example;

→ Electronic noise in the circuit of an electrical instrument.

→ Irregular changes in the heat loss from a Solar collector due to changes in the wind.

→ Sudden change in Room Temperature.

⇒ So as we have discussed the causes of random error and we can not overcome on these causes.

So we can say that random error can not be easily reduced.

Ans (2) (b)

Gross error:

Gross error can be defined as physical error in analysis apparatus or calculating and recording measurement outcomes.

We can also say that this type of error occur due to human negligences.

Reasons of Gross error:

(1) Carelessness:

Gross error occur due to carelessness. The experimentor do not write the correct reading or do not perform the experiment correctly.

(2) Equipment failure:

It also occurs if the equipments are not properly working.

(3) Tiredness:

When experimentor get tired and he can not give full attention so he make mistakes.

(4) Hurry | Rush:

Sometimes the experimentor do not write correct value or do not analyse correct reading due to less time or leaving the lab.

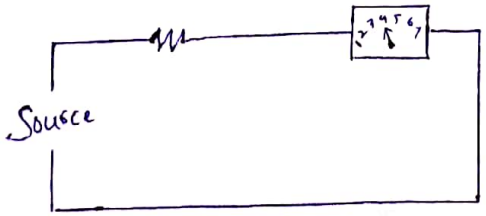
Ans (3) (a)

In a moving coil galvanometer there is a spring attached to the one end of coil.

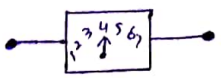
There are two purposes of this spring. One is when the current enters the coil through the fibre so the current leaves the coil through the spring.

The second and main function of that spring is to provide restoring force that pushes the pointer back to orignal position (Zero) when the flow of current stops.

→ So if that spring is not connected, when we connect galvanometer to supply ~~then~~ it will give any value but when we remove the supply it will not come back to Zero due to absence of the spring.



when galvonometer detect current



Source is removed but it still showing value due to the absence of the spring.

Ans (3) (b)

Given data:

$I_g = 10\,\mu A$

$V = 20V$

Required:

$R = ?$

Solution:

$V = i_g(G + R)$

$\frac{V}{i_g} = G + R$

$\frac{V}{i_g} - G = R$

As the value of G (Galvonometer resistance) is not given so we will neglect it and will take it Zero.

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

$R = 2 \times 10^6\ \Omega$

$R = 2M\Omega$ (mega)

⇒ The resistor R will be connected in series with instrument.