

Department of Electrical Engineering

Assignment

Date: 20/04/2020

Course Details

Course Title: Instrumentation and Measurement
 Instructor: _____

Module: 6th (BE)
 Total Marks: 30

Student Details

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Student ID: 13854

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

Answers

Question No 1

Part (a)

~~Ex~~ Explanation:

Ammeter has a very low resistance. If it is connected in parallel in circuit, the circuit will short and large amount of current will flow ~~the~~ from the ammeter causing it to damage due to its low resistance. It can be considered as a short circuit.

Part (b)

Voltmeter has a very high resistance. If it is connected in series with the circuit, very small amount of

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Current will flow through the circuit and voltmeter will show the potential drop between its two terminals. It can be considered as an open circuit.

Question No 2

Part (a)

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.

Part (b)

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The gross error occurs because of the human mistakes. For example consider the 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.

Example:

The actual reading is 21.5°C and the person reads it as 31.5°C . This happens because of the oversight.

Question No 3
Part (a)

(4)

Spring providing restoring force that pushes the pointer back to zero. So, if the spring is not connected with the coil of a moving coil galvanometer, there will be no restoring force and the pointer will not come back to zero.

Part (b)

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Given data:

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

$$V = 20 V$$

Required:

$$R = ?$$

Solution

we know, $V = i_g (G + R)$

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

Here we will neglect $G = 0 \Omega$
because it will be in series

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

$$\begin{aligned} R &= 2000000 R \\ &\text{or} \\ &2 \times 10^6 R \\ &\text{or} \\ &2 \text{ MR} \end{aligned}$$

The resistor will
be connected in
series.