

**Department of Electrical Engineering**  
**Assignment**  
**Date: 20/04/2020**

**Course Details**

**Course Title:** Instrumentation and Measurement  
**Instructor:** \_\_\_\_\_

**Module:** 6<sup>th</sup> (BE)  
**Total Marks:** 30

**Student Details**

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**Student ID:** \_\_\_\_\_

<b>Q1.</b>	<b>(a)</b>	A student mistakenly connects an ammeter in parallel in a circuit. What will happen? Explain briefly.	<b>Marks 05</b>
			<b>CLO 2</b>
	<b>(b)</b>	A student mistakenly connects a voltmeter in series in a circuit. What will happen? Explain briefly.	<b>Marks 05</b>
			<b>CLO 2</b>
<b>Q2.</b>	<b>(a)</b>	Random error cannot be easily reduced in measurements. Justify this statement.	<b>Marks 05</b>
			<b>CLO 1</b>
	<b>(b)</b>	What are the different reasons due to which gross error occurs in measurement? Explain briefly.	<b>Marks 05</b>
			<b>CLO 1</b>
<b>Q3.</b>	<b>(a)</b>	What will happen if a spring is not connected with the coil of a moving coil galvanometer? Explain briefly.	<b>Marks 05</b>
			<b>CLO 2</b>
	<b>(b)</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?	<b>Marks 05</b>
			<b>CLO 02</b>

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①

Q<sub>1</sub>  
Part(a)

Ammeter in parallel in a circuit?

Ans:

An ammeter is used to measure current in a circuit and current constant in series circuit. if ammeter is connected in parallel than because of its low resistance large amount of current will flow through it instead of the original circuit.

Explanation :-

Since the ammeter is a low impedance device, connecting it in a parallel with circuit will cause a short circuit, damaging the ammeter or circuit. It should be connected always in series so that maximum current can pass through it.

Part (b) Voltmeter connects in series in a circuit, explain?

Ans: A voltmeter measures the potential difference b/w two points in a circuit. In parallel connection the voltage in the branches remains same and the resistance of the voltmeter is very high so very less amount of current flows through it and thus it doesn't disturb the original circuit.

⇒ Explanation:-

If it is connected in series then it will get measure just the potential difference b/w two points of a single stand of wire, which is obviously 0 zero. Hence voltmeter is connected in parallel to measure voltage.

Q No 2 (a) Random error cannot be easily reduced in measurement. Justify this?

Ans: A random error makes the measured value both smaller and larger than the actual value. These are errors of precision. Random errors occur by chance and can't be avoided. Random error is due to factors which we don't or cannot control. Random errors cause one measurement to slightly differ from the other.

The main reason for random errors are limitations of instrument, Environmental factors and slight variations for example.

⇒ When weighing yourself on a scale, you position yourself slightly different each time.

⇒ Measuring your height is affected by minor posture changes.

As it occurs every time so take several readings and get its average value.

② (B)

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

Ans: The gross error occurs due to human mistakes. e.g. consider the during experiment takes the wrong reading or they can record the incorrect data.

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

⇒ Example :-

The experimenter reads the  $31.5^{\circ}\text{C}$  reading while actual reading is  $21.5^{\circ}\text{C}$ .

This happen because of the oversight. By taking this wrong reading the error occurs in experiment. Complete elimination of such types of error are not possible.

Two methods can overcome this error

- ① Taking reading carefully.
- ② Taking reading several times.

Q3 (a) 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 horse shoe Magnet
- (2) Iron Core
- (3) Rivoled spring
- (4) Non-Metallic frame scale and pointer.

The spring play very vital role in function of Galvanometer. Without spring following functions may be affected.

(i) There will be no restoring force to pushback the pointer to zero and deflection measurement is disturbed.

(ii) If spring is not connected the current can't be passed to ammeter.

(iii) Without spring we can't measure the current.

Q. 3 (b) sol<sup>no</sup>

Data Given:

$$V = 20 \text{ V} , I = 10 \mu\text{A} \Rightarrow 10 \times 10^{-6} \text{ A}$$

To find  $R = ?$

sol<sup>no</sup>

$$V = IR$$

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

$$\Rightarrow \frac{20 \text{ V}}{10 \times 10^{-6} \text{ A}}$$

$$\Rightarrow R = 2 \text{ Mn}$$

Resistor is connected in series with instrument.

