

Answer on Question 61976, Physics, Electric Circuits

Question:

1) The potentiometer wire plays equivalent role of which of these devices in a circuit?

a) rheostat

b) thermostat

c) galvanometer

d) ammeter

Answer:

Since the rheostat is the type of the potentiometer, the correct answer is a) rheostat.

2) The advantage of potentiometer over voltmeter in measurements of emf is that:

a) the potentiometer wire is assumed to be uniform

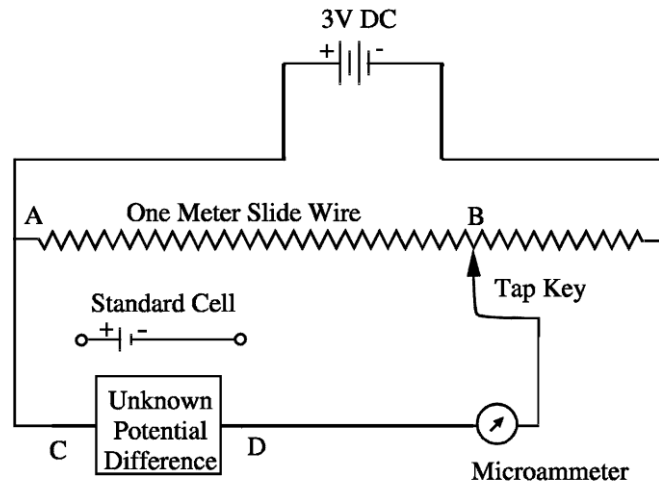
b) it does not draw current from the circuit under test

c) the temperature of the wire must remain constant

d) faults may arise due to breaks or wrong connections in the circuit

Answer:

One of the most useful null-comparator instruments is the potentiometer. The potentiometer not only permits measurements of high precision, but is also quite versatile, as it may be used to measure voltage, current, resistance, power, etc. Its great advantage over the usual voltmeter is that, in operation, it takes no current from the source whose voltage is being measured.



We can see in the figure a schematic drawing of a potentiometer. A current flows through the slide wire from the current source. Point B can be moved back and forth, until the potential drop V_{AB} is equal to the electromotive force \mathcal{E} of the unknown. When $V_{AB} = V_{AC}$, no current will flow through the galvanometer (or microammeter). The unknown potential difference can be furnished by any device, e.g. a battery, a changing magnetic field, or a complicated circuit. The standard cell is used in place of the unknown potential difference when calibrating the potentiometer.

Since the potentiometer at balance draws no current from the “unknown”, it is capable of measuring the emf \mathcal{E} , or a battery, in spite of a possible large internal resistance r , whereas a voltmeter would measure $\Delta V = \mathcal{E} - Ir$. Therefore, the correct answer is b) it does not draw current from the circuit under test.

3) Which of these is not a useful precaution in an electrical experiment:

- a) key should be removed between readings to avoid battery run-down
- b) jockeys should be dragged on resistance wires**
- c) the connections in the circuit should be tight
- d) readings should be recorded as soon as they are obtained

Answer:

According to an electrical experiment:

- key should be removed between readings to avoid battery run-down;

- all connections in the circuit should be tight enough;
- readings should be recorded as soon as they are obtained;

But jockeys should not be dragged on resistance wires. It means, that the contact point of the rheostats, for example, should be in initial position, not be dragged along the resistance wires. So, the correct answer is b) jockeys should be dragged on resistance wires.

4) Which of the following is not true about a rheostat?

- a) it is a constant current instrument
- b) it is a variable resistor with moving contact
- c) it is used for varying the current in a circuit
- d) it is used for varying the resistance in a circuit

Answer:

A rheostat is a variable resistor with moving contact. The basic principle that rheostats use is Ohm's law, which states that current is inversely proportional to the resistance for a given voltage. Therefore, it is used for varying the current and resistance in a circuit.

So, the answer is a) it is a constant current instrument.