

### Answer on Question #51844-Physics-Other

13 In an experiment, potential difference is plotted on the ordinate (vertical axis) and current on the abscissa (horizontal axis). The slope of the graph represents

- (a) potential difference b) current remains constant c) resistance d) resistivity

#### Solution

Tangent of slope angle of the graph when potential difference is plotted against current is equal to the ratio:

$$\tan \phi = \frac{U}{I}.$$

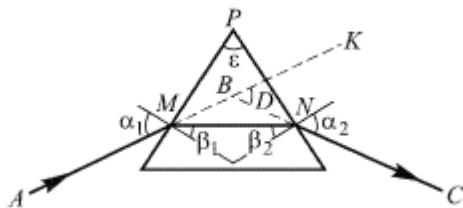
As we know from the Ohm's law,  $\frac{U}{I}$  is a resistance.

**Answer: c) resistance.**

16 A ray incident on a glass prism undergoes minimum deviation when the

- (a) incident angle is equal to the angle of refraction (b) refraction angle equals 90o (c) incident angle equals 90o (d) incident angle is equal to the angle of emergency

#### Solution



Let the refracting angle of a glass prism is equal  $\epsilon$ , the angle of deviation of a ray is equal  $\angle KBC=D$ . Consider triangle MBN, we have:

$$D = \alpha_1 - \beta_1 + \alpha_2 - \beta_2 = (\alpha_1 + \alpha_2) - (\beta_1 + \beta_2);$$

From consideration of triangle MPN we have:

$$\epsilon = \beta_1 + \beta_2;$$

Therefore we obtain:

$$D = (\alpha_1 + \alpha_2) - \epsilon;$$

From the last formula we can see that the angle of deviation of a ray has a minimum value when  $\alpha_1 = \alpha_2$ .

**Answer: (a) incident angle is equal to the angle of refraction.**

17 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

### **Solution**

(a) The wire of potentiometer should be of uniform cross sectional area, but it is precaution, not advantage of the potentiometer.

(b) A potentiometer is most commonly used as a variable (adjustable) resistor or voltage divider. As measuring instrument, potentiometers are used either as voltage dividers or in the bridge configuration, to compare the measured potential difference with a standard voltage (usually a standard chemical cell). The measurement is done by adjusting the potentiometer so that the drawn current is 0. Thus, it does not affect the measured circuit; the bridge configuration is extremely sensitive, and it can be used to measure extremely small potential differences.

Hence, potentiometer does not draw current from the circuit under test, and it is correct answer.

(c) The temperature of the wire must remain constant, but it is precaution, not advantage of the potentiometer.

(d) The weak point of potentiometers is the contact point of the adjustment, faults may arise due to breaks or wrong connections in the circuit, and it is disadvantage of potentiometer.

**Answer: (b) it does not draw current from the circuit under test.**

19 Which of the following is NOT true about a rheostat?

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

### **Solution**

Rheostat has varying resistance created by moving contact. Thus, rheostat can vary resistance and current. But it doesn't need to work at a constant current. It will work in a wide range of circuits.

**Answer: (a) It is a constant current instrument.**

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