



**Q8.** The emf of a cell is always greater than its terminal voltage. Why? Give reason.

**Answer:** emf is the potential difference of the cell terminal when no current is drawn from the cell. If current drawn from the cell say  $I$  and internal resistance of the cell be  $r$  then because of this internal resistance of the cell there will be a potential drop of  $Ir$ , hence terminal voltage will be reduced by  $Ir$ .  
I.e.  $V = E - Ir$  therefore  $E > V$ .

**Q9.** (a) Write the necessary conditions for the phenomenon of total internal reflections to occur.

**Answer:**

1. Light must travel from denser medium to rarer medium
2. Angle of incidence must be more than critical angle.

(b) Write the relation between the refractive index and critical angle for a given pair of optical media.

**Answer:**

	<p>We know that product of Refractive index and sine of angle of incidence is constant. Therefore</p> $\mu_d \sin \theta_c = \mu_r \sin 90^\circ \quad \text{or} \quad \sin \theta_c = \frac{\mu_r}{\mu_d}$
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**Q10.** State Lenz's Law. A metallic rod held horizontally along east-west direction, is allowed to fall under gravity, will there be an emf induced at its ends? Justify your answer.

**Answer:** Lenz's Law

**Statement:** "The direction of induced current or emf in a circuit is always such that it opposes the cause which produces it."

It gives the direction of current or emf induced in a circuit.

We know that earth's magnetic field along N-S direction, velocity of the rod is along downward direction, magnetic field is cutting the plane of the metallic rod hence because of em induction emf will be induced.