BATTERY & BATTERY CAPACITY

A battery is an important source of power in modern electric and electrical equipment.
Batteries are made up of cells. Each celle provides 2.1 volt.
The no. of cells in a battery is related to the desired voltage & required current.

Common Terminology

The open circuit emf of a battery is the battery voltage with no load.
Terminal voltage when battery is supplying power of load is called output voltage or load voltage.
The lowest voltage that a coil can tolerate and still be functional is called its **end point voltage.**

BATTERY CAPACITY

The single characteristic of a battery in which everyone is interested its current capacity unfortunately there is no simple way for a precise calculation or determination of current capacity of a battery.

The capacity of a battery is defined by Ampere Hour (AH) which is the product of current in ampere and time in hours. E.g. A60 AH battery will supply 3 amp. For 20 hours. Normally battery capacity is defined at 20 hour discharge & knows as C20 rating i.e. the capacity will hold good if the battery is discharged in 20 hours. Capacity will reduce if battery is to be discharged at less than 20 hours & will increase if it is discharged at more than 20 hours. Industrial batteries are rated at 10 hour discharge & capacity is known as C 10 rating. A 120 AH battery of C10 rating will deliver 135 AH at 20 hour discharge & 100 AH at 5 hour discharge.

TYPICAL VALUE OF BATTERY RATING AT DIFFERENT DISCHARGE RATE					
Battery Capacity	**C20**	**C10**	**C5**	**C3**	**C1**
135 AH	135	120	100	86	60
150 AH	150	125	104	90	62.5
180 AH	180	160	133	115	80
225 AH	225	200	167	143	100

CALCULATION OF BACK UP TIME

Suppose we want to find out back up time of our inverter or UPS for following
Inverter or UPS is of 800 VA capacity & size of battery is 12 volt 150 AH
Back up time depends on actual consumption of load, say load consumption is 300 VA

$$\text{Backup time H in Hour} = \frac{\text{Battery capacity in AH}}{\text{A in amp.}}$$

$$\text{Where A} = \frac{\text{Load consumed}}{\text{Eff. X Battery Volt}}$$ (A = Amp. Delivered to load by the battery)

$$\text{Hence A} = \frac{300\text{VA}}{07 \times 12\text{V}} = 35.7 \text{ or } 36 \text{ Amp. (Efficiency is taken to be .7)}$$

$$\text{Backup time H in Hour} = \frac{150 \text{ AH}}{36 \text{ Amp.}} = 4 \text{ hours.}$$

So back up time will be 4 hour.

Similarly using the above mentioned formula battery capacity for required back up time may be calculated,

Battery capacity in AH = Required back up hour x Amp. Consumed by load

Or Battery capacity in AH = $\frac{\text{Required back up hour x Load consumed in VA}}{\text{Eff. X battery Volt}}$