17) Construction of lead acid cell:

1. Container: It is made of vulcanised hard rubber, glass (or) pvc. The vulcanised rubber is used for the car batteries. Glass is used for stationary batteries and pvc used for mobile batteries. The size of container depends on the no. of cell & capacity of battery

2. Plates: Usually, lattice type of grid of cast antimonial lead alloy sheets covered with lead peroxide and spongy lead forming positive & negative plates respectively are used as electrodes. To increase the capacity of battery, we use a large no. of thin plates in the cell instead of two plates.

3. separators:

These are non-conducting materials. It is placed between the positive & negative plates for preventing contact between them and thus avoiding the internal short circuiting of the battery. These are made of microporous plastics, treated cedar wood, glass wool mat, & pvc.

Cell cover:

Each cell compartment has a cover. It is made of moulded hard rubber. The joints b/w covers and containers are sealed with acid-resistance material.

Electrolyte:

Generally dilute sulphuric acid is used as electrolyte in lead-acid battery. The ratio of water to sulphuric acid for a specific gravity of about 1.2 is approximately 2.4 : 1.

vent caps:

Each cell cover has a hole into which is fitted the vent cap. This cap has a vent hole to allow the gases.

Terminals:

Each cell has two terminals. These are generally made of lead as it does not corrode due to electrolyte.

Chemical Reactions

During Discharging:

At cathode : $Pb + SO_4 \longrightarrow PbSO_4$

At Anode : $PbO_2 + 2H + H_2SO_4 \longrightarrow PbSO_4 + 2H_2O$

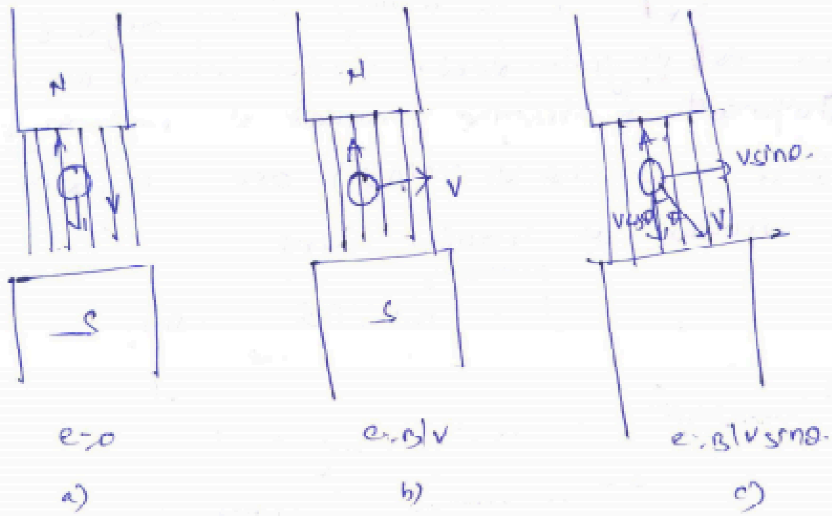
During charging :

At cathode : $PbSO_4 + 2H \longrightarrow Pb + H_2SO_4$

At Anode : $PbSO_4 + 2H_2O + SO_4 \longrightarrow PbO_2 + 2H_2SO_4$

Wm a

18)
a) Dynamically induced e.m.f



In fig (a) A is moving parallel with the magnetic field with velocity v m/sec. There is no flux cutting by the conductor, hence no e.m.f is induced in conductor.

In fig (b) A is moving in quadrature with the the flux and therefore cuts the line of force, hence emf is induced in the conductor.

dx = distance moved by conductor. (m)

dt = time taken to move (s)

B = flux density in which the conductor is placed

Area swept by the conductor = $l \times dx$ m^2

∴ Flux cut = $B \times (l \times dx)$ wb

According to faraday's 2nd law

$e = N\frac{d\phi}{dt} = Bl\frac{dx}{dt} = Blv$ volts

$\therefore \left(\frac{dx}{dt} = v\right)$

In fig(c) A is moving at an angle θ to the direction of magnetic field. If the conductor moves by dx, the component of distance travelled at right angles to the field is $dx \sin\theta$ (& $v\sin\theta$) and proceeding the above equation for induced emf

$$\boxed{e = Blv\sin\theta} \text{ volts.}$$

9/.

Given Data;

$V_c = 1.2V$ $\quad V_d = 1V$

$I_c = 50A$ $\quad I_d = 40A$

$t_c = 5h$ $\quad t_d = 6h$

$$\eta_{AH} = \frac{I_d t_d}{I_c t_c} = \frac{40 \times 6}{50 \times 5} = \frac{24}{25} = \underline{\underline{96\%}}$$

$$\eta_{WH} = \frac{V_d I_d t_d}{V_c I_c t_c} = \frac{1 \times 40 \times 6}{1.2 \times 50 \times 5} = \underline{\underline{80\%}}$$

Key prepared by
K. Nahesh (L/EE)
AANM & VVRSR Poly (030)
Gudlavalleru.