## 3.9 BATTERY OPERATED VEHICLES

- **Definition:** The vehicles which get powered through a self-controlled battery for converting fuel into electricity, such type of vehicles are called battery powered vehicles or electrical vehicles. The lead acid battery is mostly used for powering the vehicles because of their low cost. The various types of DC and induction motors are used in battery powered vehicles.

**Advantages of the battery powered vehicles:**

It causes less pollution, It reduces noise pollution.

- The battery powered vehicles required less maintenance because it has no water cooling system to maintain, no filters, belts, or hoses to replace, or no oil to change.
- It is more reliable because of the presence of fuel injectors, compressors, pumps and valve.

**Disadvantage** of battery powered vehicles

- The battery powered vehicles are more expensive as compared to internal combustion vehicles.
- The battery powered vehicles cannot go far on a single charge.
- Much longer time is required to charge a battery of battery powered vehicles.

- Let us consider a permanent magnet DC drive as shown in the figure below. The drive has chopper control and DC drive facility. The Lf and Cf are the filters which are used to filter the harmonics which is generated by the chopper. MS is the manual switch and RS is the reversal switch. The inductance L keep the ripple in motor current low.

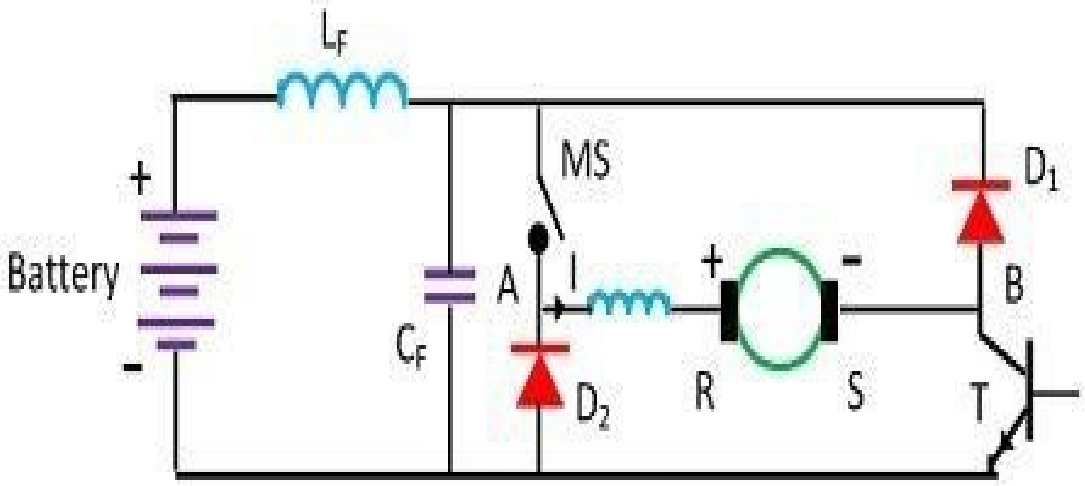


**Figure 3.9.1 Dc Drive with Chopper Control for EV**

*[Source:* "Power Electronics" *by* P.S.Bimbra, Khanna Publishers *Page: 295]*

## Motoring Operation

For motoring operation, the manual switch is kept close. The transistor switch operates at a constant frequency to obtaining variable DC voltage for starting and speed control. When the transistor is on the current flows through the source to $L_f$, MS, L, R, armature S and T. When the transistor is closed the current flows through S, $D_1$, MS, L and R.

## Regenerative Braking Operation

For regenerative braking operation, the manual switch is kept open.The motor armature is reversed by the help of reversal switch which makes the B positive with respect to A. When the transistor is on the current flows through T, $D_2$ and L. When the transistor is closed the current flow through $D_1$, $L_f$ and battery, $D_2$ and L and hence charge the battery.