

1) What is BMS & Types of BMS & differentiate the types of BMS.

→ i) A BMS (Battery management system) manages a battery pack by protecting the battery from operating outside its safe operating zone by monitoring its state, controlling its environment & balancing the Li-ion cells inside the battery pack.

ii) It can additionally calculate data and report data via various communication protocols.

iii) BMS is called the heart of the battery system.

Types of BMS &

There are 2 types of BMS mainly depending on architecture

i) Hardware BMS ii) software / smart BMS

Hardware BMS - A hardware BMS performs basic protection functions to keep the battery pack functioning as healthy as possible. The basic functions include

- overvoltage cut-off.
- undervoltage cut-off.
- continuous current.
- over current detection.
- over temperature cut-off.

software / smart BMS It has all the features of the hardware BMS but additionally can collect data, can have memory to store data and can transmit data via CAN, Bluetooth, IoT etc.

Q.2] What are the technical parameters to keep in mind while procuring a BMS for assembling a battery pack?

→ Every BMS is going to be used in a different battery architecture and diff. operating parameter. In order to achieve optimum battery performance and safety it is necessary to understand what needs to be controlled and why it needs controlling.

Hence, BMS is a customized according to the application after knowing the predefined operating condⁿ.

1) Over voltage cut-off
~~voltage~~ ~~cut~~ It is the maximum voltage of cell to which a cell should be charged. The over voltage cut-off for a LFP cell is 3.6 and for a NMC cell is 4.2 V. Cell in a battery pack must use a BMS that's cut-off cells once they are charged at voltage.

iii) Undervoltage cut off :-

Undervoltage cut off is the V_{th} at which a cell needs to stop discharging any further. Undervoltage cut off for a LFP cell is 2.5 V & for NMC cell is 2.75 V. But I highly discourage touching can lead to battery swelling.

iii) Continuous current :- It is the parameter setting in a BMS that make sure the BMS is functioning smoothly in all aspect when operated at a particular charge and discharge current.

iv) Over current detection :- It is the max current the BMS can allow for a very short period of time. The battery will cut-off after one second of achieving OCB.

v) Over temperature cut-off (OTC) :- Operating temp. of Li-ion cells affects its value its cycle life. A BMS enforces the max temp the battery can achieve during charging & during discharging.

Assignment no. 3

What is the purpose of BMS with communication & what are the various protocols of communication used in a BMS?

3) What is BMS & Types of BMS and differentiate the types of BMS.

→

BMS (Battery management system)

The main function of a BMS for electric vehicles are battery protection in order to prevent operations outside its safe operating area.

Battery monitoring by estimating the battery pack state of charge (SOC) & state of health (SOH) charging and discharging.

Types of BMS:

1) CAN (Controlled area network)

2) IoT Cloud Connectivity

3) Bluetooth.

- CAN (Controlled area network)

It is a robust vehicle bus standard to communication with each others application without a host computer.

It is can also be implemented for communication between the battery charger and BMS.

- Bluetooth :-

It is something that sends the data to end user on their cell phone app we saw the data as a screenshot on a cell phone in smart BMS topic.

- IoT :

It requires wireless network & can transmit to data cloud and it can be viewed remotely by anybody with an access.