



Automotive Systems & Electric Vehicle Technology

Duration:- 3 Months

Course Content

◆ Module 1: Advanced Two Wheeler technology

- Ergonomics and Basics of Motorcycle
- Power Generating System
- Carburetor
- Transmission System
- Electrical Circuit
- Electronics and FI
- Periodic Maintenance and Service of bikes (Required for Maintenance-related jobs)

◆ Module 2: Advanced Four Wheeler technology

- Introduction/ History of the automobile, automobile terminologies
- Engine & its basic components
- Air induction & exhaust system
- Power flow system, AT
- The braking system, ABS/EBD/ESP
- Steering system
- Engine management system
- Lubrication and cooling system
- Axles & differentials
- Emission norms, bs-4, bs-6



→ Fuel system

→ Auto electrical

Module 3: Basic & Advanced Electric Vehicle Technology

► Introduction to EV

→ History of Automobile, History of EV, What is an EV?

→ Major EV Components, How EV works?, Types of EV.

► Indian EV Market

→ History, Current EV Market, Problems faced

► EV Battery

→ Battery Definition, Types of battery, Internals of battery

→ Working principle, EV Battery, Types of EVB, Lead-acid battery Working, Advantage/Disadvantage, Li-ion Battery

→ Types of Li-ion battery, Working principle, Internals of Li-ion battery, Advantage/Disadvantage

► Motors

→ Definition, Components of motors, Classification, AC Motor types, AC motor working, DC Motor types, DC motor working

► Controllers

→ Definition, Working, Function, Controller as an inverter/converter, Types of controllers

► Battery Management System

→ Definition, Types of BMS, Working of BMS

→ Functions of BMS (collaborative study), Battery Cooling system



► **EV Chargers**

- What is EV charger? Classification of EV chargers
- Methods of charging EVB, EVB Current Ratings
- Modern technologies for charging.

► **Introduction to Hybrid Electric Vehicles (HEV)**

- History of HEV, Modern day HEV, what are HEV?
- Working of HEV, Brief Description of Major components in an HEV, Degree of Hybridization in HEV
- Advantages/Disadvantages, HEV Power-train

► **Hybrid Electric Power train**

- Electro-mechanical Power-train in HEV
- Types of HEV power-train (collaborative study)
- Technologies used for Increasing Energy Efficiency in HEV
- Regenerative braking system/KERS (collaborative study)
- Start-Stop system (collaborative study)

► **Introduction to Fuel Cell EV**

- What is Fuel Cell EV's? History of FCEV
- Modern-day FCEV, Major components of FCEV
- Working of FCEV, Advantages/disadvantages

► **Types of Fuel Cells**

- Classification of fuel cells, Chemical reaction in fuel cells.
- Hydrogen charging infrastructure



► **Energy storage & BMS**

- Cell chemistry
- Cell combination/prismatic & cylindrical cell
- BMS & battery test parameters
- BMS design in Matlab
- Cell holders, Cooling jackets, & balancing
- Develop Battery cooling system in CATIA
- CFD for Battery cooling system using Ansys Fluent

► **Powertrain Development**

- Different powertrain combination
- Selection of transmission
- Motor selection
- Automated Gearbox
- Motor design using Ansys RMxpert

► **Vehicle Dynamics**

- Vehicle geometry
- Vehicle packing
- Calculate required Chassis stiffness
- Suspension system selection using MSC ADAMS
- Simulate full vehicle model



► **Component optimization**

- Suspension optimization using ADAMS and MATLAB
- Structural optimization using Ansys Mechanical & Matlab
- Introduction to single objective optimizers (Matlab or Python)

