Automotive Systems & Electric Vehicle Technology

Duration:- 6 Weeks

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 RMxprt

► **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)