EMECVAC03 - Fundamentals of Electric Vehicles

Course objective:

- Understanding of basic principles, operation, performance of Electric vehicles
- Understand the Indian and Global scenario
- Understand the fundamentals of electric vehicles and MEMS

Course Contents:

Unit I: INDIAN and GLOBAL Scenario **(4 hours)**

Technology Scenario, Market Scenario, Policies and Regulations, Payback and commercial model , Payback and commercial model, Polices in India.

Unit II: Electric Vehicles **(4 hours)**

History, Components of Electric Vehicle, General Layout of EV, EV classification Comparison with Internal combustion Engine: Technology, Advantages & Disadvantages of EV.

Unit III: Hybrid Electric Vehicles **(4 hours)**

History, Components of Hybrid Electric Vehicle , General Layout of Hybrid EV, Comparison with Electric Vehicles, Advantages & Disadvantages of Hybrid EV.

Unit IV: Vehicle Fundamentals **(6 hours)**

Vehicle resistance, Types: Rolling Resistance, grading resistance, Aerodynamic drag vehicle performance, Principle and working of DC motor, Characteristics and Types of DC Motors-Overview (Speed torque characteristics) of Permanent Magnet motor, BLDC Motor, Induction motor. Comparison of all motors.

Unit V: MEMS Lab **(12 hours)**

Introduction to MEMS and sensors, actuators, noise sensors, capacitive accelerometer, piezoresistive pressure sensor.

References:

John Lowry and James Larminie, Electric Vehicle Technology Explained, Wiley Publication second edition.

Mehrdad Ehsani and Yimin Gao, Modem Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Power Electronics and Applications Series, Second Edition.

Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, CRC Publication, Second Edition.

Seth Leitman arid Bob Brant, Build Your Own Electric Vehicle, McGraw Hill TAB; 3rd edition.

WeiLiu, Introduction to Hybrid Vehicle System Modeling and Control, Wiley Publication second edition.

Course Outcomes:

On completion of the course, learner will be able to

- Acquire knowledge and information about Indian and international regulations.
- Acquire basic knowledge on electric vehicles.
- Gain knowledge about the fundamentals of hybrid electric vehicles.
- Develop a better understanding on the principles of electric vehicle dynamics.
- Gain knowledge how to use MEMS personally.