

TECHNOLOGY CENTRE FOR ELECTRIC VEHICLE

SYLLABUS

INTRODUCTION TO ELECTRIC VEHICLES (6 Hours)

Introduction to electric vehicles, History of electric vehicles – social and environmental importance of electric vehicles, Electrical basics, Motor and Generator basics.

ELECTRIC PROPULSION (6 Hours)

Introduction to electric components used in electric vehicles - Motor and Engine rating - Requirements - DC machines - Three phase A/c machines - Induction machines - permanent magnet machines - switched reluctance machines – Brushed and Brushless DC Motors – Power Converters – Drive Controllers- Matching electric drive and ICE, sizing the propulsion motor, sizing power electronics.

ENERGY STORAGE TECHNOLOGY (6 Hours)

Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of Batteries, different types of batteries, Battery parameters, Battery based energy storage: Battery basics, Lead acid (Pb-Acid) battery, Nickel-Cadmium (NiCd) battery, Nickel-Metal-Hydride (NiMH) battery, Lithium-ion (Li-ion) battery, Lithium-polymer (Li-poly) battery, Ultra capacitors.

ELECTRIC DRIVE TRAINS (6 Hours)

Basic concept of electric traction, Introduction to various electric drive train topologies, Advantages and disadvantages. Power flow control in electric drive train topologies. Transmission configuration - Components – gears, differential, clutch, brakes - motor sizing -Types – series, parallel and series, parallel configuration – Design – Drive train, sizing of components.

FUEL CELLS & REGENERATIVE BRAKING SYSTEM (6 Hours)

Fuel cell characteristics- fuel cell types – alkaline fuel cell- proton exchange Membrane; direct methanol fuel cell- phosphoric acid fuel cell- molten carbonate fuel cell- solid oxide fuel cell- hydrogen storage systems- reformers- fuel cell EV- super and ultra capacitors- PEM fuel cell vehicles. Introduction and need of Regenerative Braking System, Advantages and disadvantages of RBS, Working of RBS, Concept of Regenerative Braking using Piezoelectric material, Using shock absorbers as vibration energy harvesters.

REFERENCE BOOKS:

1. Electric & Hybrid Vehicles, A.K. Babu, Khanna Publishing House
2. Automotive Fuel Technology-Electric, Hybrid and Fuel-Cell Vehicles: Jack Erjavec & Jeff Arias
3. Electric and Hybrid Vehicles: Design Fundamentals: Iqbal Husain
4. Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory and Design: Mehrdadsani, Yimingao, Ali Emadi

ELECTRIC VEHICLE LABORATORY

(15 HOURS)

1. Understand working of different configurations of electric vehicles
2. Understand the properties of batteries and its types
3. Understand of electric vehicle drive systems.
4. Understand Auxiliary systems including charging, starter motor, on board power supply, lighting and environmental sensing and conducting repairs. Repair & Replacement of Electric Vehicle body.
5. Repair & Replacement of Electric Vehicle Drive Train.
6. Fault diagnosis & repair / replacement of Battery, DC & AC Electrical Machines, Electric Vehicles

Resources From

1. Centre for University – Industry Collaboration, Anna University, Chennai.

2. All India Council for Technical Education , Nelson Mandela Marg, New Delhi

