

EM 503: Energy Storage & Conversion

Course Content/ Syllabus

Theory:

Selected energy storage devices and connect with their electric power applications in electric vehicles, energy requirement of vehicles, power requirement of vehicles, sizing of energy storage ratings; Energy storage types, Batteries, fuel cells, supercapacitors, Hydrogen energy storage; Battery Module & Pack Design, BMS Hardware and Software, Thermal Management d. Safety; Power electronics for electric vehicle charging; Hybridization of different energy sources; Different topologies of hybrid energy sources; Energy management systems (EMS); Charging infrastructure, types of chargers, standards used for chargers, grid interaction of chargers; Difference between charging station and charging point; Inductive charging, Flash Charging; Charger protocols, OCPP, V2G, CHADEMO, Bharat Charger; Impact of charging on grid; Renewable energy integration to chargers; Application of IoT to charging infrastructure.

Experiments:

Measuring charging and discharging characteristics of Lead-acid batteries at different C-rates; Measuring charging and discharging characteristics of Li batteries at different C-rates; Measuring discharging characteristics of fuel cells at different C-rates; Interfacing batteries with power electronics converters and feeding R-L loads; Experiments on induction motor drives fed by batteries