



**Electrical Engineering Department**

**Course Outcomes : M. Tech Ist sem (Electrical Vehicle Dynamics)**

**MEV21101:Power Electronic Converters**

CO1	Interpret the role of battery management system
CO2	Identify the requirements of Battery Management System
CO3	Interpret the concept associated with battery charging / discharging process
CO4	Analyze the various parameters of battery and battery pack
CO5	Design the model of battery pack

**MEV21102:Vehicle Dynamics**

CO1	Analyze the dynamics of vehicle under different riding condition..
CO2	Analyze acceleration and braking performance in electric vehicle to understand the vehicle dynamics under these conditions
CO3	Articulate road loads and tyre dynamics in electric vehicles
CO4	Interpret riding comfort & vibrations, cornering and roll over in electric vehicles to understand the vehicular dynamics
CO5	Infer on the suspension kinematics and controllable suspension elements used in electric vehicles

**MEV21103:Motor Drives and Control EV**

CO1	Describe the characteristics of the motors use in EV.
CO2	Analyze dynamics of DC motor and different controllers used in their control.
CO3	Describe the speed control and PWM techniques used in the control of Induction motor.
CO4	Analyze the operation and control of permanent magnet ac motors.
CO5	Analyze sensor-less control of 3-phase ac motors.

### MEV21104:EV Laboratory-I

CO1	Analyze the effect ESR of filter capacitor on the performance of the buck converter.
CO2	Compare the performance of synchronous buck converter with buck converter.
CO3	Design rectifier operated on universal mains with the feature of PFC.
CO4	Design flyback and forward converter
CO5	Analyze non-isolated bidirectional onboard charger and inverter.

### MEV21105:Programme Elective – I:EVs in Smart Grid

CO1	Understand power system operations, issues with existing system and capabilities of Smart Grid (SG).
CO2	Analyze the scope of distributed generation and Demand side management in SG
CO3	Describe the PEV Load and Its Impact on Static Voltage Stability
CO4	Illustrate the cyber security of Plug in Electric Vehicle technologies in Smart Grid.
CO5	Describe the PEV Load and Its Impact on Static Voltage Stability

### MEV21106:Programme Elective – I:Energy Storage Systems

CO1	Discuss the basic understanding of batteries.
CO2	Analyse the battery parameters and their variations during charge and discharge cycles.
CO3	List different types of batteries and analyse their performance parameters.
CO4	Examine the battery charging requirements and develop the complete battery model.
CO5	Identify novel and alternate energy sources which could be used in EVs.

### MEV21107:Programme Elective – I: EV Standards & Testing

CO1	Illustrate different standards related construction and safety in electric vehicles.
CO2	Describe central motor vehicles rules (CMVR) type of standards for electric and hybrid electric vehicles.
CO3	Describe CMVR types of standards for retro fitment of existing IC engine driven vehicles.
CO4	Illustrate safety standards of traction batteries
CO5	Describe government policies like national electronic mobility plan related to EVs.

### MEV21108:Programme Elective – II: Artificial Intelligence for EV

CO1	Apply Knowledge Representation and Inference Strategies.
CO2	Integrate Advanced Logic Systems.
CO3	Understand and Apply Fuzzy Logic Concepts
CO4	Understand Neural Network Fundamentals
CO5	Implement Genetic Algorithms and Evolutionary Programming

### **MEV21109:Programme Elective – II: IoT in EV Applications**

CO1	Illustrate how IoT promises can be applied in a specific industry or application.
CO2	Explain the basic function and typical applications of industrial sensors in IoT systems.
CO3	Describe the function and significance of each component within the wireless sensor structure.
CO4	Explain the purpose and functionality of the ACOEM Eagle in IoT applications.
CO5	Analyze how sensor values are internally represented and how data is persisted and externalized.

### **MEV211010:Programme Elective – II: Automotive Safety**

CO1	Comprehend application of passive and active safety for vehicle.
CO2	Describe importance of ergonomics in automotive safety and human response to impact.
CO3	Design the vehicle safety system.
CO4	Describe various regulations of vehicle safety and safety testing methods.
CO5	Design the locking and safety system for vehicles.