20PE020 - ELECTRIC VEHICLES

UNIT - I **L - 9**

INTRODUCTION TO HYBRID ELECTRIC VEHICLES: History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drive-trains on energy supplies.

CONVENTIONAL VEHICLES: Basics of vehicle performance, Vehicle power source characterization, Transmission characteristics, Mathematical models to describe vehicle performance

UNIT - II **L - 9**

HYBRID ELECTRIC DRIVE-TRAINS: Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

ELECTRIC DRIVE-TRAINS: Basic concept of electric traction, Introduction to various electric drive-train topologies, Power flow control in electric drive-train topologies, Fuel efficiency analysis.

UNIT - III **L - 9**

ELECTRIC PROPULSION UNIT: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives.

ENERGY STORAGE: Introduction to energy storage requirements in hybrid and electric vehicles, battery based energy storage and its analysis, Fuel cell based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT - IV **L - 9**

SIZING THE DRIVE SYSTEM: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, Sizing the power electronics, Selecting the energy storage technology.

COMMUNICATIONS, SUPPORTING SUBSYSTEMS: In vehicle networks- CAN.

UNIT - V **L - 9**

ENERGY MANAGEMENT STRATEGIES: Introduction to energy management strategies used in hybrid and electric vehicles, Classification of different energy management strategies, Comparison of different energy management strategies.

TEXT BOOK:

1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press, 2003.

REFERENCE BOOKS:

1. James Larminie and John Lowry,“Electric Vehicle Technology Explained”, Wiley, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay and Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2004.