

IV Year B.Tech. EEE – I Semester

23A02702b	ELECTRIC VEHICLE TECHNOLOGY (Professional Elective - IV)	L	T	P	C
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Course Outcomes: At the end of the course, the student will be able to:

CO1: Illustrate electric vehicles. **(L2)**

CO2: Understand drive-train topologies. **(L2)**

CO3: Classify various electrical drives **(L2)**

CO4: Classify energy storage technologies. **(L2)**

CO5: Classify different energy management strategies. **(L2)**

UNIT-I:**Introduction To Electric Vehicles:**

History of electric vehicles, social and environmental importance of electric vehicles, impact of modern drive-trains on energy supplies.

CASE STUDY

Comparison by efficiency of Conventional, Hybrid, Electric and Fuel cell Vehicles.

UNIT-II:**Electric Drive-Trains:**

Basic concept of electric traction, Introduction to various electric drive-train topologies, Power flow control in electric drive-train topologies.

UNIT-III**Electric Drives & Control:**

Introduction to electric components used in electric vehicles, Control of BLDC Motor, Control of Induction Motor Drive, Permanent Magnet (PM) motor Drive & Switched Reluctance Motor (SRM) Drive.

UNIT-IV:**Energy Storage:**

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its modeling, SOC, Different Types of Batteries, Super Capacitor based energy storage and its analysis, Fuel Cells, Hybridization of different energy storage devices.

UNIT-V:**Energy Management Strategies & Charging Infrastructure:**

Introduction to energy management strategies used in electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies, Types of EV charging Infrastructure & Standardized Communication protocols for EV charging.

CASE STUDIES

Current issues in electric Vehicles, Thermal Protection of Battery.

TEXT BOOKS:

1. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2nd Edition, 2017. (Unit-I, II)
2. Ali Emadi, “Advanced Electric Drive Vehicles (Energy, Power Electronics, and Machines)”, CRC Press, 2015. (Unit-III)
3. John G. Hayes and A. Goodarzi, “Electric Powertrain - Energy Systems, Power electronics and drives for Hybrid, electric and fuel cell vehicles”, Wiley, 2018. (Unit-IV & V)

REFERENCES:

1. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, Wiley, 2nd Edition 2012.

WEB RESOURCES:

1. <https://nptel.ac.in/courses/108106170>
2. https://onlinecourses.nptel.ac.in/noc22_ee53
3. https://onlinecourses.nptel.ac.in/noc21_ee112