



University Open Elective – II

UOE021 Electric Vehicles

Teaching Scheme				Evaluation Scheme			
Lect.	Tut.	Pract.	Credits	Component	Exam	WT %	Pass %
2	-	-	2	Theory (100)	FA	100	40

Course Description

This course shall equip the students to avail emerging opportunities in the area of HEV & EV technology in automotive industry. This course goes deeper into the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used, energy storage devices, etc.

Course Objectives

- 1 To introduce the fundamental concepts, principles, analysis and design of hybrid and electric vehicles.
- 2 To study various energy sources and motor drives for Electric & Hybrid vehicle

Course Outcomes

Students will be able to

		Bloom's Level
CO1	Identify need of Electric & Hybrid vehicle	1
CO 2	Design Electric vehicle for given requirement	3
CO 3	Design Hybrid Electric vehicle for given requirement	3
CO 4	Elaborate different Energy sources for Electric & Hybrid vehicle	2
CO 5	Choose suitable motor drive for Electric & Hybrid vehicle	3

01 Hybrid Vehicles Technology

Hybrid electric drive-train, Classification, operating modes, Various architectures of HEVs, Parallel hybrid drive-train with torque coupling & speed coupling

02 Design of HEVs

Control strategies, Design principle for series hybrid electric drive train, Sizing of elements of series & parallel hybrid electric drive trains

03 Energy Sources and Propulsion

Batteries for EVs & HEVs, Battery Management, Ultra Capacitors, Mechanical flywheel, Electronic devices for EVs & HEVs, Fuel cell concept & characteristics, Fuel cell technology for EVs & HEVs, Hydrogen storage & reforming.



04 Electric Vehicle Motors

Types of Motors, DC Motors, Induction Motor, BLDC Motor, Permanent Magnet Motors – Principle, Construction, Selection & Sizing of motors, RPM and Torque calculation of motor, Motor Controller, Motor ratings

Reference Books				
Sr. No.	Name of Book	Author(s)	Publisher	Edition, Year of Publication, ISBN
01	Modern Electric, Hybrid Electric & Fuel cell Vehicles- Fundamentals, Theory & Design	Mehrdad Ehsani, Yimin Gao, Ali Emadi	CRC press, New York,	2010
02	Electric & Hybrid Vehicles- Design Fundamentals	Iqbal Hussain	CRC press, New York	2003
03	Electric & Hybrid Vehicles	Robin Hardy, Iqbal Hussain	CRC press	ISBN 0-8493-1466-6
04	Electric Vehicle Technology Explained	James Larminie, John Lowry,	John Wiley & Sons Ltd. England	2003
05	Electric Vehicle Battery Systems	Sandeep Dhameja	Newness, Massachusetts	2002
06	The electric car: Development & Future of Battery, Hybrid & Fuel- Cell Cars,	Dr Mike Westbrook, M H Westbrook	British library cataloguing in publication Data,	ISBN0852960131



Sanjay Ghodawat University, Kolhapur

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