22MEHO103	ELECTRIC AND HYBRID VEHICLE TECHNOLOGY				
	CATEGORY	L	T	P	C
	PE	3	0	0	3

COURSE OBJECTIVES

1	To introduce the concept of hybrid and electric drive trains
2	To elaborate on the types and utilization of hybrid and electric drive trains
3	To expose on different types of AC and DC drives for electric vehicles
4	To understand and utilize different types of energy storage systems
5	To introduce concept of energy management strategies and drive sizing

UNIT I	INTRODUCTION	9	0	0	9

Basics of vehicle performance, vehicle power source characterization, transmission characteristics , History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles

UNIT II	HYBRID ELECTRIC DRIVE TRAINS	9	0	0	9

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 electrictraction, introduction to various electric drive-train topologies, power flow control in electric drive-train.

UNIT III	CONTROLOFAC&DCDRIVES	9	0	0	9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control – DC Motor drives, Induction Motor drives, Permanent Magnet Motor drive, and Switch Reluctance Motor drives, drive system efficiency

UNIT IV	ENERGYSTORAGE AND DRIVE SIZING	9	0	0	9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Energy storage and its analysis, Hybridization of different energy storage devices, Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selection of appropriate energy storage technology

UNIT V	ENERGY MANAGEMENTSTRATEGIES	9	0	0	9

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification and comparison of energy management strategies, implementation issues

TOTAL(45L) : 45 PERIODS

REFERENCE BOOKS:

1	Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, crcpress, 2003
2	James Larminie, johnlowry, Electric Vehicle Technology Explained, Wiley, 2003
3	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric andfuelcellvehicles:Fundamentals,theoryanddesign,crcpress,2004
4	Randd.A.J,Woods,R&dellrmbatteriesforelectricvehicles,johnwiley&Sons,1998

COURSE OUTCOMES: Upon completion of this course, the students will be able to:		Bloom Taxonomy Mapped
CO1	Characterize and configure hybrid drive trains requirement for a vehicle	Understand
CO2	Design and apply appropriate hybrid and electric drive trains in a vehicle	Create
CO3	Design and install suitable AC and DC drives for electric vehicles	Create
CO4	Arrive at a suitable energy storage system for a hybrid/ electric vehicle	Understand
CO5	Apply energy management strategies to ensure better economy and efficiency	Apply

COURSE ARTICULATION MATRIX

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	0	1	1	1	0	0	0	0	0	0	0	1
CO2	3	2	2	0	1	1	0	1	1	0	0	0	0	0	2
CO3	3	1	3	1	2	1	1	2	0	1	0	0	0	0	2
CO4	2	3	1	1	1	1	1	1	0	1	2	0	0	1	1
CO5	3	2	0	0	1	1	1	0	0	2	1	2	0	1	1
Avg	**2.8**	**2**	**1.6**	**0.4**	**1.2**	**1**	**1**	**0.8**	**0.2**	**0.8**	**0.6**	**0.4**	**0.0**	**0.4**	**1.4**

3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)