

Course Number and Name												
BEE033 & Electric and Hybrid Vehicles												
Credits and Contact Hours												
3 & 45												
Course Coordinator's Name												
Mr.P.Kathiravan												
Text Books and References												
Text Books:												
1. Iqbal Hussain, "Electric & Hybrid Vehicles – Design Fundamentals", Second Edition, CRC Press, 2011.												
2. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, 2003.												
References:												
1. MehrdadEhsani, YiminGao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals", CRC Press, 2010.												
2. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, 2000												
3. http://nptel.ac.in/courses/108103009/												
Course Description												
This course introduces the fundamental concepts, principles, analysis and design of hybrid, electric and fuel cell vehicles.												
Prerequisites						Co-requisites						
Renewable Energy Resources						Nil						
required, elective, or selected elective (as per Table 5-1)												
Required												
Course Outcomes (COs)												
CO1: Understand working of different configurations of electric vehicles,												
CO2: Understand hybrid vehicle configuration and its components, performance analysis.												
CO3: Understand the properties of batteries and its types												
CO4: Understand of electric vehicle drive systems.												
CO5: Understand of hybrid electric vehicles.												
Student Outcomes (SOs) from Criterion 3 covered by this Course												
COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
CO1		M	M	H	M	L	M	L	H	M	L	M
CO2	H	H	H	H	H	L	M	L	H	M	L	M
CO3	H	H	H	H	H	L	M	M	H	M	L	M
CO4	M	M	H	H	H	L	M	M	H	M	L	M
CO5	H	H	H	H	H	L	M	M	H	M	L	M
List of Topics Covered												
UNIT I ELECTRIC VEHICLES											9	
Introduction, Components, vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design.												
UNIT II BATTERY											9	
Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge,												

Depth of Discharge, Technical characteristics, Battery pack Design, Properties of Batteries.

UNIT III DC & AC ELECTRICAL MACHINES 9

Motor and Engine rating, Requirements, DC machines, Three phase A/c machines, Induction machines, permanent magnet machines, switched reluctance machines.

UNIT IV ELECTRIC VEHICLE DRIVE TRAIN 9

Transmission configuration, Components – gears, differential, clutch, brakes regenerative braking, motor sizing.

UNIT V HYBRID ELECTRIC VEHICLES 9

Types – series, parallel and series, parallel configuration – Design – Drive train, sizing of components.