



SWARNANDHRA

COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade – 3.32/4.00 CGPA

Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956

Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seethampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

Department of Electrical and Electronics Engineering

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods/ Week	Academic Year	Date of Commencement of Semester
20EE4T02	Hybrid Electric Vehicles	VII	EEE	5	2025-26	09/06/2025

Course Outcomes: After successful completion of this course, students should be able to:

1	Illustrate different types of electric vehicles (K2)
2	Select suitable power converters for EV applications (K3)
3	Design HEV configuration for a specific application (K4)
4	Choose an effective method for EV and HEV applications (K4)
5	Analyze a battery management system for EV and HEV (K4)

Unit	Outcome/Bloom's Level	Topics No.	Topics/Activity	Text Book/Reference	Contact Hour	Delivery Method
I	CO1: Illustrate different types of electric vehicles (K2)	INDUCTION				
		1.1	Fundamentals of vehicles	T1, T2, R1	1	Chalk & Talk, & Tutorial, PPT
		1.2	Components of conventional vehicles	R2.R3	1	
		1.3	drawbacks of conventional vehicles	R2.R3	1	
		1.4	Need for electric vehicles	R2.R3	1	
		1.5	History of Electric Vehicles	T1, T2, R1	1	
		1.6	Types of Electric Vehicles	R2.R3	1	
		1.7	Advantages of Electric Vehicles	T1	1	
		1.8	Applications of Electric Vehicles	T1, T2, R1	1	
Total					8	
II	CO2: Select suitable power converters for EV applications (K3)	COMPONENTS OF ELECTRIC VEHICLES				
		2.1	Main components of Electric Vehicles	T1, T2, R1	1	Chalk & Talk, & Tutorial, PPT
		2.2	Electric Vehicles	R2.R3	1	
		2.3	Power Converters	R2.R3	1	
		2.4	Controller	R2.R3	1	
		2.5	Electric Traction Motor	T1, T2, R1	1	
		2.6	Rectifiers used in EVs	R2.R3	1	
		2.7	Bidirectional DC	T1	1	
		2.8	DC Converters	T1, T2, R1	1	



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		2.9	Voltage Source Inverters	T1	1	
		2.10	PWM inverters used in EVs.	T1, T2, R1	1	
Total					10	
III	CO3: Design HEV configuration for a specific application (K4)	HYBRID ELECTRIC VEHICLES				Chalk & Talk, & Tutorial, PPT
		3.1	Evolution of Hybrid Electric Vehicles	T1, T2, R1	1	
		3.2	Advantages of Hybrid Electric Vehicles	R2.R3	1	
		3.3	Applications of Hybrid Electric Vehicles	R2.R3	1	
		3.4	Merits and Demerits.	R2.R3	1	
		3.5	Architecture of HEVs	T1, T2, R1	1	
		3.6	Series HEVs	R2.R3	1	
		3.7	Parallel HEVs	T1	1	
		3.8	Complex HEVs	T1, T2, R1	1	
		3.9	Range extended HEVs	T1	1	
	3.10	Examples	T1, T2, R1	1		
	Total					10
IV	CO4: Choose an effective method for EV and HEV applications (K4)	MOTORS FOR ELECTRIC VEHICLES				Chalk & Talk, & Tutorial, PPT
		4.1	Characteristics of traction drive	T1, T2, R1	1	
		4.2	Requirements of electric machines for EVs	R2.R3	1	
		4.3	Different motors suitable for Electric Vehicles	R2.R3	1	
		4.4	Different motors suitable for Hybrid Vehicles	R2.R3	1	
		4.5	Induction Motors	T1, T2, R1	1	
		4.6	Synchronous Motors	R2.R3	1	
		4.7	Permanent Magnetic Synchronous Motors	T1	1	
		4.8	Brushless DC Motors	T1, T2, R1	1	
	4.9	Switched Reluctance Motors (Construction details and working only)	T1	1		
Content beyond syllabus (if need)			PALS online series HEV			
Total					9	
V	CO5: Analyze a battery management system for EV and HEV (K4)	ENERGY SOURCES FOR ELECTRIC VEHICLES				Chalk & Talk, & Tutorial, PPT
		5.1	Batteries	T1, T2, R1	1	
		5.2	Types of Batteries	R2.R3	1	
		5.3	Lithium-ion	R2.R3	1	
		5.4	Nickel-metal hydride	R2.R3	1	
		5.5	Lead-acid	T1, T2, R1	1	
		5.6	Comparison of Batteries	R2.R3	1	
	5.7	Battery Management	T1	1		



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		System			
	5.8	Ultra capacitors	T1, T2, R1	1	
	5.9	Flywheels	T1	1	
	5.10	Fuel Cell – it's working	T1, T2, R1	1	
Total				10	
Cumulative Proposed Periods				47	

Text Books:

S. No.	Authors, Book Title, Edition, Publisher, Year of Publication
1	Iqbal Hussein . “ Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press - 2021.
2	Denton ,Tom, “ Electric and hybrid vehicles”, Routledge,2020.

Reference Books:

S. No	Authors, Book Title, Edition, Publisher, Year of Publication
1	Kumar L. Ashok and S. Albert Alexander, “ Power Converters for Electric Vehicles”, CRC Press -2020
2	Chau Kwok Tong, “ Electric vehicle machines and drives: design - analysis and application”, John Wiley & Sons, 2015.
3	Berg,Helena, “Batteries for electric vehicles: materials and electrochemistry”, Cambridge university press - 2015

Web Details:

1.	https://nptel.ac.in/courses/108106072/
2.	https://ieeexplore.ieee.org/document/7554961
3.	https://www.electrical4u.com/
4.	https://www.youtube.com/watch?v=XrrgsJ_xOLA

	Name	Signature with Date
1. Faculty	Mr.B.Subrahmanyam	
2. Module Coordinator	Mrs. N.Lavanya	
3. Programme Coordinator	Dr.A. Satyanarayana	

Principal