SEMESTER S6

MODERN AUTOMOTIVE TECHNOLOGIES

Course Code	OEMUT612	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To understand the modern technologies automotive technologies like Electric, hybrid and fuel cell vehicle technology, different components associated with these systems.
2. To understand the various ADAS technologies such as adaptive cruise control, lane-keeping assist, and automated parking systems.
3. To understand the automobile navigation systems, connected vehicles and autonomous driving cars.

KTU SPECIAL

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Electric and Hybrid Vehicle technology: Introduction, LEV, TLEV, ULV & ZEV, Basic components of Electric vehicles- Inverters, Battery packs and battery management system, motors, electronic power control unit, Electric wiring harness – CAN Bus, Multiplex wiring. regenerative braking, basic factors to be considered for converting automobiles to electric vehicle, hybrid electric vehicle, types - series and parallel hybrid, layouts, comparison, Power systems and control systems, Different modes of operation of hybrid vehicles for best performance.	9
2	Recent Trends in Automotive Power Plants: Stratified charged / lean burn engines – TSI engines, RCCI engines, Hydrogen Engines, Flex fuel vehicles. Vehicle Operation and engine Control: Application of sensors and actuators and microprocessors for operation of the vehicle to achieve best fuel economy, reduced emission and optimum road performance, Closed loop and open loop operation, electronic engine management systems, Electronic	9

	cruise control, chassis control system, Integrated systems.	
3	Principle of automobile navigation and controls in the new generation cars-capabilities of navigation and control of modern cars. Driver Assistance Systems in Automobiles: Vision in cars, A comprehensive driver assistance approach – Lane recognition, Traffic sign recognition, road recognition, Object recognition – Traffic lights and signals.	**9**
4	Fuel Cells and Alternative energy systems: Introduction to fuel cells, Operational fuel cell voltages, Proton Exchange membrane fuel cells, Alkaline Electrolyte fuel cells, Medium and high temperature fuel cells, fuel and fuel chose, fuel processing, fuel cell stacks, Delivering fuel cell power, Integrated Air supply and humidification concepts for fuel cell systems, Fuel cell Auxiliary systems.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

KTU SPECIAL

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Understand the construction and working of different electric and Hybrid Vehicle technology.	**K2**
CO2	Exemplify the significance of alternate power plants for automobiles and different modes of operation for optimum use.	**K2**
CO3	Understand the navigation and driver assistance systems used in modern vehicles.	**K2**
CO4	Understand the construction and working of different types of fuel cells and auxiliary systems.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	2	-	1	1	-	-	2	-	1
CO2	2	1	-	2	-	1	2	-	-	2	-	1
CO3	2	1	-	1	-	1	1	-	-	2	-	1
CO4	2	1	-	2	-	2	2	-	-	2	-	3

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

KTU SPECIAL

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Automotive Electricity, Electronics and Computer Controls	Barry Hollembeak	Delmer Publishers	1st edition, 1998
2	Build Your Own Electric Vehicle	Bob Brant	McGraw-Hill	2013
3	Bosch Hand Book, 3rd Edition	SAE	SAE international	1993

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Modern Electric and Hybrid Electric and Fuel Cell Vehicles	Mehrdad Ehsani, Yimin Gao, Stefano Longo, Kambiz Ebrahimi	CRC press, A Taylor and Francis group	2018
2	Autonomous driving and advanced driver-assistance systems (ADAS)	Lenin Joseph, Amit Kumar Mondal	CRC press, A Taylor and Francis group	2021
3	Fuel Cell Power for Transportation	Prodip K. Das, Kui Jiao, Yun Wang Barbir Frano	SAE International	2023
4	Modern Automotive Technology	James E Duffy	SAE International	2013
5	Noise Reduction	Beranek. L. L	McGraw-Hill Book Co, Inc, New York	1993

KTU SPECIAL