22MEHO310	SMART MOBILITY AND INTELLIGENT VEHICLES				
PREREQUISITES	**CATEGORY**	**L**	**T**	**P**	**C**
	PE	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

1.	To introduce students to the various technologies and systems used to implement smart mobility and intelligent vehicles
2.	To learn Basics of Radar Technology and Systems, Ultrasonic Sonar Systems, LIDAR Sensor Technology and Systems and other sensors for automobile vision system
3.	To learn Basic Control System Theory applied to Autonomous Automobiles
4.	To produce overall impact of automating like various driving functions, connecting the automobile to sources of information that assist with a task
5.	To allow the automobile to make autonomous intelligent decisions concerning future actions of the vehicle that potentially impact the safety of the occupants through connected car & autonomous vehicle technology

UNIT I	**INTRODUCTION TO AUTOMATED, CONNECTED AND INTELLIGENT VEHICLES**	**9**	**0**	**0**	**9**

Concept of Automotive Electronics, Electronics Overview, History & Evolution, Infotainment, Body, Chassis, and Powertrain Electronics, Introduction to Automated, Connected, and Intelligent Vehicles. Case studies: Automated, Connected, and Intelligent Vehicles

UNIT II	**SENSOR TECHNOLOGY FOR SMART MOBILITY**	**9**	**0**	**0**	**9**

Basics of Radar Technology and Systems, Ultrasonic Sonar Systems, Lidar Sensor Technology and Systems, Camera Technology, Night Vision Technology, Other Sensors, Use of Sensor Data Fusion, Integration of Sensor Data to On-Board Control Systems

UNIT III	**CONNECTED AUTONOMOUS VEHICLE**	**9**	**0**	**0**	**9**

Basic Control System Theory applied to Automobiles, Overview of the Operation of ECUs, Basic Cyber-Physical System Theory and Autonomous Vehicles, Role of Surroundings Sensing Systems and Autonomy, Role of Wireless Data Networks and Autonomy.

UNIT IV	**VEHICLE WIRELESS TECHNOLOGY AND NETWORKING**	**9**	**0**	**0**	**9**

Wireless System Block Diagram and Overview of Components, Transmission Systems – Modulation/Encoding, Receiver System Concepts– Demodulation/Decoding, Wireless Networking and Applications to Vehicle Autonomy, Basics of Computer Networking – the Internet of Things, Wireless Networking Fundamentals, Integration of Wireless Networking and On-Board Vehicle Networks

UNIT V	**CONNECTED CAR AND AUTONOMOUS VEHICLE TECHNOLOGY**	**9**	**0**	**0**	**9**

Connectivity Fundamentals, Navigation and Other Applications, Vehicle-to-Vehicle Technology and Applications, Vehicle-to-Roadside and Vehicle-to-Infrastructure Applications, Autonomous Vehicles - Driverless Car Technology, Moral, Legal, Roadblock Issues, Technical Issues, Security Issues

TOTAL (45L): 45 PERIODS

TEXT BOOKS:

1.	"Intelligent Transportation Systems and Connected and Automated Vehicles", 2016, Transportation Research Board
2.	Radovan Miucic, "Connected Vehicles: Intelligent Transportation Systems", 2019, Springer

REFERENCES:

1.	Tom Denton, "Automobile Electrical and Electronic systems, Roultedge", Taylor & Francis Group, 5th Edition, 2018.

COURSE OUTCOMES: Upon completion of this course, the students will be able to:		Bloom Taxonomy Mapped
CO1	Recognize the concept of cyber-physical control systems and their application to collision avoidance and autonomous vehicles	
CO2	Select the concept of remote sensing and the types of sensor technology needed to implement remote sensing	
CO3	Familiar with the concept of fully autonomous vehicles	
CO4	Apply the basic concepts of wireless communications and wireless data networks	
CO5	Analyze the concept of the connected vehicle and its role in automated vehicles	

COURSE ARTICULATION MATRIX

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	0	2	1	0	0	0	0	1	2	2	2	0
CO2	2	2	2	0	2	1	0	0	0	0	1	2	2	2	0
CO3	2	2	2	0	2	1	0	0	0	0	1	2	2	2	0
CO4	2	2	2	0	2	1	0	0	0	0	1	2	2	2	0
CO5	2	2	2	0	2	1	0	0	0	0	1	2	2	2	0
Avg	**2**	**2**	**2**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**1**	**2**	**2**	**2**	**0**

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