AUTONOMOUS VEHICLES

CourseCode	20ME5605	**Year**	III	**Semester**	II
Course Category	Minor in AE	**Branch**	ME	**Course Type**	Theory
Credits	4	**L – T – P**	3 – 1 – 0	**Prerequisites**	Automobile Engineering
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	BTL	Units
CO1	Understand technology and advancements applied in and connected, Automated and intelligent Cars	Understand	L2	1,2,3,4,5
CO2	Apply knowledge of sensor and wireless technology to execute systems in connected and autonomous cars	Apply	L3	2,3,5
CO3	Analyze and critically evaluate the safety challenges associated with future vehicles to rate the ethical implications of alternative automotive technologies	Analyze	L4	1,4,5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3		3	1	2	2		2		2	3	2
CO2	3		3		3	1	2			2		2	3	2
CO3	3		3		2	1	2	3		2		2	3	2

Syllabus

UNIT	Contents	Mapped COs
I	**Introduction To Connected, Automated And Intelligent Cars** Introduction to Connected, automated and Intelligent cars- Automotive Electronics Overview, Advanced Driver Assistance Electronic Systems, Connected Car Technology- Connectivity Fundamentals, Navigation and Other Applications, **Connected and Autonomous Vehicle Technology** Basic Control System Theory applied to Automobiles, Overview of the Operation of ECUs, Basic Cyber-Physical System Theory.	**CO1 CO3**
II	**Sensor Technology** Sensor Technology for Advanced Driver Assistance Systems- Basics of Radar Technology and Systems, Ultrasonic Sonar Systems, Lidar Sensor Technology and Systems, Camera Technology, Night Vision Technology, **Impaired Driver Technology** Driver Impairment Sensor Technology, Sensor Technology for Driver Impairment Detection, Transfer of Control Technology	**CO1 CO2**
III	**Introduction to Self-Driving Vehicle Technology**	**CO1**

	Fundamentals of state-of-the-art SLAM, multi-sensor data fusion, and other SDV algorithms. Robot Operating System (ROS) and Open Source Car Control (OSCC). **Wireless System Standards and Standards Organizations** 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	**CO2**
IV	**Acceptance, Security And Ethics Of Autonomous Driving** Why Ethics Matters for Autonomous Driving, Opportunities and Risks Associated with Autonomous Driving, User / public Acceptance of Autonomous Driving **Regulations, Policies And Standards Of Autonomous Driving** Regulatory bodies for highly automated and autonomous driving, Policies and policy making in autonomous driving, Autonomous driving, standardization bodies and standards	**CO1** **CO3**
V	**Recent Driver Assistance System And Vehicles** Recent Driver Assistance System Technology- Basics of Theory of Operation, Applications – Legacy, Applications – New **Future Applications** Integration of ADAS Technology into Vehicle Electronics, System Examples, Role of Sensor Data Fusion, Recent Driver Assistance System Technology applied in various automobile companies dealing with Non-Passenger Car	**CO1** **CO2** **CO3**

Learning Resources

Text books

1.George Dimitrakopoulos, Aggelos Tsakanikas, Elias Panagiotopoulos, "Autonomous Vehicles Technologies, Regulations, and Societal Impacts", Elsevier Publications, 2021.

2.Dietmar P.F. Möller, Roland E. Haas, Guide to Automotive Connectivity and Cybersecurity: Trends, Technologies, 2019, Springer Publications.

3.Hanky Sjafrie, "Introduction to Self-Driving Vehicle Technology", 1st Edition, Published December 11, 2019 by Chapman and Hall/CRC

Reference books

1.G. Mullett, Wireless Telecommunications Systems and Networks, Thomson – Delmar Learning, ISNB#1-4018-8659-0, 2006

2. G. Mullett, Basic Telecommunications: The Physical Layer, Thomson – Delmar Learning, ISBN#1-4018-4339-5, 2003

3.Tom Denton, Automobile Electrical and Electronic Systems, 3rd Edition Elsevier Publications 2004.