Semester: VII						
ARTIFICIAL INTELLIGENCE IN AUTONOMOUS VEHICLES **Category: Professional Core Elective – IV (Group F)** **(Theory)**						
Course Code	**:**	**AI374TFA**		**CIE**	**:**	**100Marks**
Credits: L: T: P	**:**	**3:0:0**		**SEE**	**:**	**100 Marks**
Total Hours	**:**	**45T**		**SEE Duration**	**:**	**3.00 Hours**

Unit-I	**09 Hrs.**
Introduction to Autonomous Driving: Autonomous Driving Technologies Overview, Autonomous Driving Algorithms, Autonomous Driving Client System, Autonomous Driving Cloud Platform **Autonomous Vehicle Localization:** Localization with GNSS, Localization with LiDAR and High-Definition Maps, Visual Odometry, Dead Reckoning and Wheel Odometry, Sensor Fusion	
Unit – II	**09 Hrs.**
Perception in Autonomous Driving: Introduction, Datasets, Detection, Segmentation, Stereo, Optical Flow, and Scene Flow, Tracking **Deep Learning in Autonomous Driving Perception:** Convolutional Neural Networks., Detection, Semantic Segmentation, Stereo and Optical Flow	
Unit –III	**09 Hrs.**
Prediction and Routing: Planning and Control Overview, Traffic Prediction, Lane Level Routing **Decision, Planning, and Control:** Behavioral Decisions, Motion Planning, Feedback Control	
Unit –IV	**09 Hrs.**
Reinforcement Learning-Based Planning and Control: Introduction, Reinforcement Learning, Learning-Based Planning and Control in Autonomous Driving **Client Systems for Autonomous Driving:** Autonomous Driving: A Complex System, Operating System for Autonomous Driving, Computing Platform	
Unit –V	**09 Hrs**
Cloud Platform for Autonomous Driving: Infrastructure, Simulation, Model Training, HD Map Generation **Autonomous Last-Mile Delivery Vehicles in Complex Traffic Environments:** Autonomous Delivery Technologies in Complex Traffic Conditions, Safety and Security Strategies, Production Deployments	

Course Outcomes: After completing the course, the students will be able to:-	
CO1	Analyse the various driving conditions for autonomous cars and apply AI techniques
CO2	Identify various problems involved in developing Autonomous Driving cars and suggest the appropriate solutions
CO3	Integration of advanced driver assistance system with cloud infrastructure for training and modelling
CO4	Development of Deep learning techniques to analyse the data for decision making.
CO5	Demonstrate the use of modern tools by exhibiting teamwork and effective communication skills

Reference Books	
1.	Creating Autonomous Vehicle Systems, Second Edition Shaoshan Liu, Liyun Li, Jie Tang, Shuang Wu, and Jean-Luc Gaudiot ,2nd Edition, September 2020, ISBN: ISBN: 9781681739366
2.	George Dimitrakopoulos, Aggelos Tsakanikas, Elias Panagiotopoulos, Autonomous Vehicles Technologies, Regulations, and Societal Impacts, 1st Edition,Elsevier Publications, 2021 , ISBN-10 1681730073
3.	Hanky Sjafrie, "Introduction to Self-Driving Vehicle Technology", 1st Edition, Published December 11, 2019 by Chapman and Hall/CRC, ISBN: 978-0-323-90137-6
4	Creating Autonomous Vehicle Systems Shaoshan Liu, Liyun Li, Jie Tang, Shuang Wu, and Jean-Luc Gaudiot October 2017, ISBN-10 1681730073

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	**COMPONENTS**	**MARKS**
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. TWO QUIZZES will be conducted & Each Quiz will be evaluated for 10 Marks. **THE SUM OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**20**
2.	**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. **FINAL TEST MARKS WILL BE REDUCED TO 40 MARKS.**	**40**
3.	**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning (10), Program specific requirements (10), Video based seminar/presentation/demonstration (20) **ADDING UPTO 40 MARKS**.	**40**
	MAXIMUM MARKS FOR THE CIE THEORY	**100**

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q.NO.	**CONTENTS**	**MARKS**
	PART A	
1	Objective type of questions covering entire syllabus	20
	PART B (Maximum of THREE Sub-divisions only)	
2	Unit 1 : (Compulsory)	16
3 & 4	Unit 2 : Question 3 or 4	16
5 & 6	Unit 3 : Question 5 or 6	16
7 & 8	Unit 4 : Question 7 or 8	16
9 & 10	Unit 5: Question 9 or 10	16
	TOTAL	**100**