B. Tech. Civil Engineering				
Course code: Course Title	**Course Structure.**			**Pre-Requisite**
CE445: Integrated Intelligent Transportation System	L	T	P	Nil
	3	1	0	

Course Objective: To introduce the principles, architecture, and technologies of Intelligent Transportation Systems (ITS) and their role in enhancing traffic efficiency, safety, and sustainability. The course emphasizes real-time data, communication systems, and AI/ML applications for smart mobility solutions.

S. No	Course Outcomes (CO)
CO1	To understand the fundamentals and need for Intelligent Transportation System.
CO2	To explore technologies and applications in modern traffic and transportation systems.
CO3	To learn system architecture, data acquisition techniques, and communication protocols.
CO4	To understand transport demand management and public transport in ITS.
CO5	To understand the role of AI, ML, and IoT in Intelligent Transportation Systems and evaluate the effectiveness of ITS solutions in solving real-world transportation problems.

S. No	Contents	Contact hours
UNIT 1	Introduction to ITS: Definition, Scope, and need for ITS, Taxonomy, Historical Background, Urbanization and Motorization Trends, Characteristics of the Transport System, Transport Problems and Key Issues, Component and architecture, Global Implementation, Challenges in Deployment, Need for ITS in Urban Traffic Regulation, Technologies for Vulnerable Road Users	8
UNIT 2	Various Detection, Identification and Collection Method for ITS: Introduction, Sensing and Detection Technologies (Roadway, Environmental, Probe-based, magnetic, ultrasonic and infrared sensors), Bluetooth, Inductive loop detectors, Radar, LiDAR, Cameras, RFID Communication Technologies: Dedicated Short-Range Communication (DSRC), 5G, V2V, V2I, and VANETs, Data acquisition and traffic Monitoring: Mobile Reports, Real-time Using Cellular Network and GPS Probe, Smart Card- Based Data Collection	8
UNIT 3	Traffic Management System Component and ITS Applications: Introduction, Objective of Traffic Management, Traffic Management Measures, ITS for Traffic Management, Development of Traffic Management System, Traffic Management Centre Advanced Traffic Management Systems (ATMS), Advanced Traveller Information Systems (ATIS), Advanced Vehicle Control Systems (AVCS), Commercial Vehicle Operations (CVO), Advance Public Transportation Systems, Emergency Management Systems, Incident Management, Urban Road Safety, ITS for Intermodal Freight Transport	8

UNIT 4	Transport Demand Management and ITS for Public Transport: Introduction, Application of TDM, Use of GPS system, Automatic Passenger Count (APC), Automatic vehicle location (AVL) and Automatic Vehicle Identification (AVI) system, Traffic signal Priority, Real Time Passenger Information (RTPI), Fare Collection, Lane Control Technologies, Surveillance/CCTV/Security System, ITS operation Public Transport, Transport Integrated Management System, Electronic Toll Collection System	8
UNIT 5	Real world Problems; Use of ML and AI in ITS: Real-world case studies: India and global perspectives, Smart cities and ITS integration, Internet of Things (IoT) in ITS, Privacy and Security Concerns, Future Trends: Cooperative ITS (C-ITS), Edge Computing, Digital Twins, Role of AI and ML in Traffic Prediction, Vehicle classification and Detection, and Route Optimization, Deep learning Models for Traffic Video analytics, Intelligent Traffic Signal Control, Autonomous and Connected Vehicles, Use of big data and cloud computing in Transportation	10
	TOTAL	**42**

REFERENCES

S. No.	**Names of Books/Authors/Publishers**	**Year of Publication / Reprint**
1.	Intelligent Transport Systems: Technologies and Applications. Authors: Asier Perallos, Unai Hernandez-Jayo, Enrique Onieva, Ignacio Julio García Zuazola. Publisher: *Wiley*.	2015
2.	IRC SP:110-2017, Application of Intelligent Transport Systems for Urban Roads.	2017
3.	*Intelligent Transportation system: Editors:* Sarkar, P. K., & Jain, A. K. Publisher PHI Learning Pvt. Ltd.	2018
4.	Intelligent Transportation Systems: Concepts and Cases. Sundaravalli Narayanaswami. McGraw Hill Education India.	2022
5.	Introduction to intelligent transportation system and advanced technology. (pp. 3-6). Editors: Upadhyay, R. K., Sharma, S. K., & Kumar, V. Publisher: Springer Nature Singapore	2024