GUJARAT TECHNOLOGICAL UNIVERSITY

Civil (Transportation Engineering)

M.E. Semester: IV

Subject Code: 741301

Subject Name: **Advances in Transportation Engineering**

Course Objectives:

1. To make the students aware of advanced techniques applied in Transportation Engineering.
2. To give idea of Intelligent Transportation System and its various applications, logic/algorithms behind it.
3. To provide knowledge of high performance bituminous mixes and concrete mixes.

Sr. No.	Course Content
1.	**Intelligent Transportation System (ITS):** Introduction, Advanced Traveler Information Systems; Advanced Traffic Management System, Transportation Network Operations; Commercial Vehicle Operations and Inter-modal Freight; Public Transportation Applications; Smart vehicles, Smart highways, Adaptive Traffic Control System, Incident management, Automatic Vehicle Identification and Classification, Vehicle Positioning System, Collision Warning System, Driverless vehicles, Electronic Toll Collection, ITS and road-pricing. ITS and regional strategic transportation planning, including regional architectures: ITS and safety, ITS and security, ITS as a technology deployment program, research, development and business models, ITS and sustainable mobility, travel demand management.
2.	**High Performance Highway Construction Materials:** Introduction, Use of waste materials: Fly ash, Slag, Recyclable waste, Other waste materials. Modified bituminous materials: PMB, EMB, NRMB, CRMB, IS requirements and testing procedures. Modified Bitumen Emulsion and tests, Multi grade bitumen, Anti stripping additives, Microsurfacing: procedure, testing. Superpave: Binder specifications, Aggregates and testing, mixing, Gyratory Compactor. High performance mixes: Stone Matrix Asphalt (SMA), fibers, mix design. Porous Asphalt: mix, advantages. Fiber Reinforced Concrete: Steel, asbestos, glass, polymer, carbon, natural fibers, applications. High Performance Concrete: introduction, advantages, IS requirements, mineral admixtures, applications.

Practical:

Practical based on:

1. Development of logic/algorithms for different ITS applications.
2. Tests on modified bituminous materials
3. Tests on modified bituminous mixes
4. Tests on fiber reinforced concrete

Field Visit:

Visit to BRTS and any other places where ITS is applied. Visit to Hot mix plant where modified bituminous materials or mixes are used. Visit to Microsurfacing application. Visit to road construction site where Fly ash is used. Visit to road construction site where Fiber Reinforced Concrete or High Performance Concrete is used.

References Books:

1. Sumit Ghos and Tony Lee, *Intelligent Transportation Systems*, CRC Press, ISBN: 0849300673.
2. Chris Drane andC. R. Drane, *Positioning Systems in Intelligent Transportation Systems*, Artech House Publishers, ISBN: 0890065365.
3. Judy Mc Queen and Bob Mc Queen, *Intelligent Transportation System and Architecture*, Artech House Publishers, ISBN: 089006525X
4. Various IS and IRC codes for construction of Bituminous & Concrete Roads.
5. S. Shah and S. Ahmad, *High Performance Concretes and Applications*, Butterworth-Heinemann Publishers, ISBN: 0340589221
6. Wayne Lee and Kamyar Mahboub, *Asphalt Mix Design and Construction: Past, Present, and Future State of the Practice:* A Special Publication on the 150th Anniversary of ASCE, Publishers: ASCE, ISBN: 0784408424.