

GUJARAT TECHNOLOGICAL UNIVERSITY
CIVIL (TRANSPORTATION ENGINEERING) (13)
 ADVANCES IN TRANSPORTATION ENGINEERING
SUBJECT CODE: 2721313
 M.E. 2nd SEMESTER

Type of course : Major Elective - II

Prerequisite : Nil

Rationale :

Transportation Engineering plays important role in development of nay nation. The transportation cost, travel time, delay due to congestion etc. can be reduced if implementation of Intelligent Transportation System (ITS) is done in transportation. It is necessary to understand the current ITS techniques used in the transportation engineering. The course also includes the study of various advanced materials used in the field to understand their property. It is necessary to understand the behavior of advanced transportation materials in the mix.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	PA (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2 [#]	2	5	70	30	20	10	10	10	150

Content:

Sr.No.	Topics	Teaching Hrs.	Module Weightage
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.	25	55%
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	20	45%

	Concrete: introduction, advantages, IS requirements, mineral admixtures, applications.		
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References Books:

1. Sumit Ghos and Tony Lee, Intelligent Transportation Systems, CRC Press, ISBN: 0849300673.
2. Chris Drane and C. 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.

Course Outcomes:

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.

Practical:

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

Open Ended Problems:

Field Visit:

1. 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.
2. 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.

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website