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**SECOND SEMESTER 2020-21**  
**COURSE HANDOUT**

**Date: 18.01.2021**

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

<b>Course No</b>	<b>: CE F244</b>
<b>Course Title</b>	<b>: Highway Engineering</b>
<b>Instructor-in-Charge</b>	<b>: Dr. B. S. Shashank</b>
<b>Lecture Instructor</b>	<b>: Dr. B. S. Shashank</b>
<b>Tutorial Instructors</b>	<b>: Dr. B. S. Shashank &amp; Dr. Sarah Abraham</b>
<b>Practical Instructors</b>	<b>: Dr. B. S. Shashank, Dr. Sarah Abraham, R. Manigandan, Farhan M. Khan, Anant Mishra, &amp; Patil Deshbhushan Savindra</b>

**1. Course Description:**

Overview of basic characteristics of Transportation systems, social factors and strategic consideration, Road development plans, Highway development projects in India, Road Development organizations, Stages in highway alignment and Detailed project Report preparation, Introduction to transportation planning, Geometric design Standards: Cross section elements, sight distances, horizontal and vertical alignments, Pavement Material Characterization: Aggregate testing and blending, Bitumen and Bituminous Concrete testing and mixture design protocols, introduction to Superpave Mixture Design protocols, IRC methods for the design of flexible and rigid highway pavements, Overview of different stages in flexible and rigid highway construction, Overview of Highway Evaluations and Maintenance, Traffic Engineering: Traffic Characteristics, Highway capacity and level of service concepts, Traffic measurement and analysis, Traffic signals, parking studies and analysis, traffic accidents, Introduction to Intelligent Transportation Systems. Exposure to relevant software.

**2. Scope and Objective of the Course:** The objective of the course is to introduce students to the transportation systems, with specific focus on the planning and design of highways.

**3. Text Books:**

- T1. Kadiyali L. R. and Lal, N. B. (2013): Principles and practices of Highway Engineering, Khanna Publishes, New Delhi  
T2. Khanna, S.K. and Justo A, and Veeraragavan, A. (2015): Highway Engineering, Nem Chand and Bros. Roorkee (U.P.)

**4. Reference Books:**

- R1. Kadiyali L R; Traffic Engineering and Transportation Planning; Khanna Publishers, New Delhi; 2003.  
R2. Papacoastas, C. S. and Prevedouros: Transportation Engineering and Planning, Third Edition; Pearson Education, 2008  
R3. Chakroborty, P. and Das, A., Principles of Transportation Engineering, PHI, New Delhi, 2003.  
R4. Garber, Nicholas J., and Lester A. Hoel. Traffic and Highway Engineering. Cengage Learning, 2014.  
R5. Relevant standards (IS, IRC, ASTM)



## 5. Course Plan:

Module No.	Description	No. of Lectures	Reference	Learning Objective
1	Overview of basic characteristics of Transportation systems, social factors and strategic consideration	1	T1, T2	Understanding transportation engineering and its needs.
2	Road development plans, Highway development projects in India, Road Development organizations,	1	T1, T2	Understand the highway development in India.
3	Stages in highway alignment and Detailed project Report preparation	1	T1, T2	Understand the highway project and planning
4	Introduction to transportation planning	1	T1, T2	
5	Aggregate testing and blending	3	T1, T2, R5	To learn aggregate's characterization for highway
6	Bitumen	4	T1, T2,	To learn bitumen's characterization for highway
7	Mixture design protocols	2	T1, T2, R5	Asphalt mix design Mixture performance testing
8	Bituminous Concrete testing	1	T1, T2, R5	
9	Introduction to Superpave Mixture Design protocols	1	T1	
10	IRC methods for the design of flexible	2	T1, T2 R5	Understand the concepts of pavement design and learn to design flexible and concrete pavement



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11	Rigid highway pavements	2	T1, T2	To learn rigid pavement structural design
12	Overview of different stages in flexible and rigid highway construction	2	T1, T2, R5	To learn highway construction
13	Overview of Highway Evaluations and Maintenance	2	T1, T2, R5	To understand different failures and their maintenance
14	Cross section elements, ,	1	T1, T2	To learn highway geometric elements and their design
15	Sight distances	2	T1, T2	
16	horizontal and vertical alignments	5	T1, T2	
17	Traffic Characteristics,	1	T1, T2	To learn traffic flow parameters and their design
18	Highway capacity and level of service concepts,	2	T1, T2	
19	Traffic measurement and analysis,	2	T1, T2	
20	Traffic signals	1	T1, T2	To understand traffic management and safety
21	Parking studies and analysis,	1	T1, T2	
22	Traffic accidents,	1	T1, T2	
23	Introduction to Intelligent Transportation Systems.	1	T1, T2	Overview of ITS

**6. Evaluation Scheme:**

Component	Duration	Weightage (%)	Date & Time	Nature of component (Close Book/ Open Book)
Mid-Semester Test	90 Min.	30	<TEST_1>	CB
Comprehensive Examination	3 h	45	<TEST_C>	CB
Tutorials/ project/ quiz		15		OB and CB
Laboratory (Quiz)		10		OB and CB



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**7. Chamber Consultation Hour:** Sat 10:00 AM to 11:00 AM

**8. Notices:** Notices, if any, will be communicated through E-mail or in the class

**9. Make-up Policy:**

- Make up will be granted only on genuine reasons and will be considered on a case by case basis. However, prior permission is a must.
- For medical cases, a certificate must be produced.
- No makeups will be offered for tutorial and practical sessions.

**10. Note (if any):** Course related instructions will be given in the class throughout the semester.

**Laboratory Components:**

S. No.	Name of Experiments	Reference
1	Proctor Density	IS 2720-7
2	CBR	IS 2720-16
3	Penetration Test	IS 1203
4	Ductility Test	IS 1208
5	Flash and Fire Point Test	IS 1209
6	Softening Point Test	IS 1205
7	Absolute Viscosity of Binder	IS 1206 (Part II)
8	Aggregate Abrasion test	IS 2386 (Part IV)
9	Impact Test	IS 2386 (Part IV)
10	Specific Gravity of Coarse, fine and filler aggregate	IS 2386 (Part III)
11	Angularity Number	IS 2386 (Part II)
12	Shape Test	IS 2386 (Part I)
13	Spot Speed	T1, R1
14	MERLIN	T1; R3
15	Marshall Mixture Design	T1; R3, R5 (MS 2)

**Instructor-in-charge**  
**Course No. CE F244**