Birla Institute of Technology & Science, Pilani
Hyderabad Campus

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ACADEMIC FOR GRADUATE STUDIES DIVISION
FIRST SEMESTER 2022-2023
Course Handout Part II

Date: 30-07-2023

In addition to Part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : CE G567
Course Title : Highway Design
Instructor-in-Charge : Dr. Akshay Gundla

1. Scope and Objective of the Course:

Highway functional classification; design controls and criteria: turning paths, traffic characteristics, highway capacity aspects, access control, safety, environment; sight distances; horizontal and vertical alignments; geometric design for expressways, at-grade intersections rotaries and mini roundabouts, the importance of channelization and design of channelizing islands, intersection layouts; grade-separated interchanges: types, layouts, suitability, advantages and limitations of different types of interchanges, geometric design consistency; pedestrian-oriented development, livable streets, bicycle and pedestrian planning; on the street and off street parking layouts and design; layouts of truck terminals and bus bays; introduction to geometric design software. Plan and profile preparation using drafting and visualization software such as AutoCAD, and Micro-station. Alignment design using MXROAD, AutoCAD Civil 3D, Open Roads; checking swept path of turning vehicles: AutoTrack, AutoTurn; Highway design manuals.

2. Textbooks:

T1. AASHTO, "A Policy on Geometric Design of Highways and Streets", AASHTO Press, Washington DC, 7th Edition, 2018
T2. Kadiyali L R and Lal N B, "Principles and Practices of Highway Engineering", Khanna Publishers, Delhi. 7th Edition, First Reprint, 2018

Reference books

R1. Khanna, S.K, Justo, A and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros. Revised Tenth Edition, 2014
R2. Papacoastas, C. S. and Prevedouros, "Transportation Engineering and Planning", Third Edition, Third impression; Pearson Education, 2018
R3. C. Jotin Khisty ad B Kent Lall, "Transportation Engineering – An Introduction", Pearson India Education Services Pv. Ltd., Third Edition, 2017
R4. Micholas J Garber and Lester A Hoel, "Traffic and Highway Engineering" M/s Cengage Learning, 5th Edition, 2015
R3. Selected IRC codes like IRC:73-1980, IRC:84-2014, IRC:86-1983, IRC:106:-1990, IRC:SP:73-2007, IRC:SP:99-2014, IRC:SP:65-1976, and any other codes as per the need
R4. Open Roads Software Manual
R5. IRC:SP:99-2013: Manual of Specification and Standards for Expressways

3. Course Plan: Lectures

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1	Functions of highways	Introduction to highway geometric design, need and objectives, scope, highway functional classification, functional system characteristics	Chapter 1/ T1
2-4	Design controls and criteria	Design vehicles, minimum turning path, driver performance	Chapter 2/ T1
5-7	Traffic characteristics	Volume, directional distribution, traffic composition, speed, highway capacity, levels of service	Chapter 2/T1
8-11	Sight distance	Stopping sight distance, intermediate sight distance and overtaking sight distance	Chapter 3/ T1
12-16	Horizontal alignment	Superelevation and its design considerations, methods of attaining superelevation in practice	Chapter 3/ T1
17-21	Transition curves design controls	Transition curve, off-tracking and widening of roads	Chapter 3/T1
22-26	Vertical alignment	Critical length of grades, climbing lanes, design controls of vertical curves: crest and sag curves	Chapter 3/T1
27-28	Combination of horizontal and vertical curves	Design controls, alignment coordination, erosion control	Chapter 3/T1
29-30	Cross section elements	Cross slope, lane widths, shoulders, horizontal clearance, kerbs	Chapter 4/T1
31-34	At grade intersections	Types, design of roundabouts (including the rotaries and mini roundabouts) and channelizing islands, use of vehicle turning templates for the design of intersections	Chapter 9/ T1, R5
35-36	Grade separations and interchanges	Types, overpass, and underpass; geometric design considerations for grade-separated interchanges	Chapter 9/ T1
37-39	Geometric Standards for expressways	Features of expressways, geometric design standards, and safety aspects	Chapter 8/ T1, R5
40	Facilities for developing pedestrian ways and bicycle lanes with special emphasis on geometric standards	Walking speed, walkway capacity, pedestrian precincts, liveable streets, bicycle planning, and design features	Chapter 2/T1
41	Parking, truck terminals and bus bays	On-street and off-street parking layouts and design; layouts of truck terminals and bus bays	Class Notes

4. **Evaluation Scheme:**

S. No	Evaluation Component	Duration (min)	Weightage (%)	Date & Time	Remarks
1	Midsem Exam	90	25	12/10 - 4.00 - 5.30PM	CB
2	Compre Exam	180	35	16/12/23 FN	OB
3	Assignments		15	Continuous	OB
4	Open Roads Project and Presentations		15	To be announced in the class	OB
5	Quizzes		10	To be announced in the class	OB

5. **Consultation hour:** Every Tuesdays': 5 PM to 6 PM, in addition to the consultation hour, you are free to meet the IC at any time.

6. **Notices:** Notices concerning this course will be displayed on CMS.

7. **Make-up Policy:** Prior permission for all make ups are a must. For medical emergencies, an email request has to be sent to the IC.

8. **Academic honesty and academic integrity Policy:** Academic honesty and integrity are to be maintained by all students throughout and no academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
CE G567