Birla Institute of Technology & Science, Pilani
Hyderabad Campus

.

ACADEMIC – GRADUATE STUDIES AND RESEARCH DIVISION
BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI-HYDERABAD CAMPUS
FIRST SEMESTER 2021-2022
Course Handout Part II

Date: 12/08/2021

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

Course No. : CE G567
Course Title : Highway Design
Instructor-in-Charge : Sridhar Raju

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, importance of channelization and design of channelizing islands, intersection layouts; grade separated interchanges: types, layouts, suitability, advantages and limitations of different types of interchanges, performance based design, geometric design consistency; pedestrian-oriented development, livable streets, bicycle and pedestrian planning; on 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, Micro-station. Alignment design using MXROAD, AutoCAD Civil 3D, open road; 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 and B Kent Lall, "Transportation Engineering – An Introduction", Pearson India Education Services Pv. Ltd., Third Edition, First Impression, 2017
R4. Micholas J Garber and Lester A Hoel, "Traffic and Highway Engineering"M/s Cengage Learning, 5th Mindtap Edition, 2015
R3. Selected IRC codes like IRC 73-1980, IRC SP 73-2007, IRC SP99-2014, IRC SP65 – 1976, IRC 106 – 1990, IRC 86-1983, IRC 84-2014 and any other code as per the need
R4. Open Roads Software Manual

R5. IRC SP 099: 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 issues	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
40-41	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

42-43	Parking, truck terminals and bus bays	On street and off street parking layouts and design; layouts of truck terminals and bus bays	Different sources

4. **Evaluation Scheme:**

S. No.	Evaluation Component	Duration (min)	Weightage (%)	Date & Time	Remarks
1	Midsem Test	90	30	To be announced in the class	OB
2	Compre Exam	120	35	To be announced in the class	OB
3	Assignment		15	Continuous	OB
4	Open Roads Project and Presentations		10	To be announced in the class	OB
5	Quizzes		10	To be announced in the class	OB

5. **Consultation hour:** Every Tuesdays': 4 PM to 5 PM

6. **Notices:** Notices concerning this course will be displayed on CMS and Department Notice Board. If Google Classroom is followed, it shall be informed in advance accordingly.

7. **Make-up Policy:** Prior permission for all make ups are a must. For medical emergencies, requests have to be forwarded by the Chief Warden to the satisfaction of IC.

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

INSTRUCTOR-IN-CHARGE
CE G567