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**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.

1. **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

1. **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 |

1. **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 |

1. **Consultation hour:** Every Tuesdays’: 4 PM to 5 PM
2. **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.
3. **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.
4. **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