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Course Code: CE 326 Name: Transportation Engineering-I 3 - 0 - 0 : 3 Credits: 3 Hours

1. ABSTRACT

Transportation engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods (transport). Transportation engineering, as practiced by civil engineers, primarily involves planning, design, construction, maintenance, and operation of transportation facilities. The facilities support air, highway, railroad, pipeline, water, and even space transportation. The design aspects of transport engineering include the sizing of transportation facilities (how many lanes or how much capacity the facility has), determining the materials and thickness used in pavement, designing the geometry (vertical and horizontal alignment) of the roadway (or track).

2. OBJECTIVE

- I. Planning of highway network
- II. Understand the principles and practices of transportation engineering and planning.
- III. Design geometric elements of highways
- IV. Understand basic traffic engineering and management
- V. Understand the basics of design of flexible and rigid pavements

3. PREREQUISITES OF THE COURSE: None

4. COURSE SYLLABUS

Introduction - Highway development and planning in India; Current road projects in India; Classification of roads. Highway alignment and project preparation

Geometric design of highways: Introduction; highway cross section elements; sight distances; design of horizontal alignment; design of vertical alignment; Problems.

Introduction to Traffic engineering & control; Traffic characteristics, traffic engineering studies; traffic flow and capacity; Principles of design of road intersections - Simple layouts; design of Parking facilities; Objectives, classification and uses of traffic signs and markings; Problems.

Desirable properties and testing of highway materials: Soil, stone aggregates, bituminous materials and mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements; Problems.

Factors influencing the design and performance of pavements, Design of flexible & rigid pavements as per IRC. Causes of failures in flexible & rigid pavements, Construction & Management of various roads, Problems

5. COURSE OUTLINE AND TENTATIVE SCHEDULE

Module No.	Торіс	No. of Lectures			
1	Highway development and planning in India; Current road projects in India; Classification of roads. Highway alignment and project preparation.	2			
2	Geometric design of highways: Introduction; highway cross section elements; sight distances; design of horizontal alignment; design of vertical alignment; Problems.				
3	Introduction to Traffic engineering & control; Traffic characteristics, traffic engineering studies; traffic flow and capacity; Principles of design of road intersections - Simple layouts; design of Parking facilities; Objectives, classification and uses of traffic signs and markings; Problems.	10			
4	Desirable properties and testing of highway materials: Soil, stone aggregates, bituminous materials and mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements; Problems.	8			
5	Factors influencing the design and performance of pavements, Design of flexible & rigid pavements as per IRC. Causes of failures in flexible & rigid pavements, Construction & Management of various roads, Problems	6			
	Total lectures	36			

6. GRADING POLICY

The assessment of is based on revised guidelines on continuous evaluation with relative grading. The break-up of the scheme is as follows,

SI.	Mode of assessment	Туре	Marks	Duration	Syllabus
1	Test 1	MCQ/Descriptive	20	45 mins	From beginning
2	Test 2	MCQ/Descriptive/Viva	20	45 mins*	From beginning
3	Test 3	Assignment/Descriptive	20	45 mins*	From Test-II till Test-III
4	End Semester	Descriptive	40	120 mins	All
Grand total		100 mar	ks		

* Time duration only for descriptive mode of test

7. REFERENCES

Text Books:

- 1. Khanna, S.K. & Justo, C.E.G. Highway Engineering, Nem Chand & Bros, Roorkee, 1997.
- 2. Chakroborty, P. and Das, A., *Principles of Transportation Engineering*, PHI Learning Pvt Ltd, New Delhi, 2017.

Reference Books

- 1. Huang Y.H., Pavement Analysis and Design, Pearson Prentice Hall, 2004.
- 2. Kandhal P. S., Bituminous Road Construction in India, PHI Learning Pvt. Ltd, 2017

8. PEDAGOGY: Lecture and Discussion; Tutorial; Assignment; Quiz.

7. EXPECTED OUTCOME: Towards the end of the course the students are expected to

- 1. Classify the different types of road networks in India and describe the highway planning and development process.
- 2. Explain geometric design concepts using engineering and mathematics skills, and then apply those principles to the design of highways and other roads.
- 3. Analyze basic traffic theory principles and explain traffic management techniques.
- 4. Develop the ability to understand the properties of various pavement materials and explain the basics of design of flexible and rigid pavements.

Linkage:

CO'S	Description	PO linkage		
		Н	М	L
CO1	Classify the different types of road networks in India and describe the highway planning and development process.	PO2	PO6	-
CO2	Explain geometric design concepts using engineering and mathematics skills, and then apply those principles to the design of highways and other roads.	PO1	PO2	PO5
CO3	Analyze basic traffic theory principles and explain traffic management techniques.	PO2	PO6	PO1
CO4	Develop the ability to understand the properties of various pavement materials and explain the basics of design of flexible and rigid pavements.	PO3	PO1	PO2