DEPARTMENT OF CIVIL ENGINEERING

UNIVERSITY OF ENGINEERING AND TECHNOLOGY TAXILA

"OBE" DOCUMENT

CE-310 TRANSPORTATION ENGINEERING-I

COURSE CONTENTS:

Introduction

- Highway Planning
- An Approach to Urban Highway Planning
- Location Survey in Rural & Urban Areas, Location Controls Elements of a Typical Cross-Section of Road
- Types of Cross-Section
- Classification of Highways
- Highway Materials, Types & Characteristics, Specification & tests.
- Highway Drainage
- Geometric Design

- Horizontal Curves
- Vertical Curves
- Grade Line
- Super Elevation
- Transition Curve
- Curve Widening
- Sight Distance Requirements

Traffic Engineering

- Design Speed
- Traffic Estimates
- Traffic Lane Capacity
- Traffic Survey
- Road Signs & Signals
- Channelization
- Design of Intersection at Grade & Grade Separated Intersections
- Drivers Characteristics
- Traffic Control devices
- Parking and Accident Studies
- Traffic Management
- Highway Safety

Railway Engineering

- Elements of Track. Types of Gauges
- Types of Rail Sections. Rail Joints. Creep and Wear of Rail
- Fish Plate, Bearing Plates and Check Rails.
- Types of Sleepers, their Merits and Demerits, Sleeper Density,
- Spacing and Stiffness of Track
- Types of Ballast. Requirements for Good Ballast, Renewal of Ballast. Formation of Single and Double Track.
- Selection of Site for a Railway Station. Layout of Stations and Yards.
- Points and Crossings. Various Layouts for Signaling and Inter-Locking.
- Modem Methods for Construction of Tracks. Maintenance, Tools and Organization.

LIST OF PRACTICALS:

Tests on Aggregates

- To determine the Impact Value of a given sample of aggregates.
- To perform Los-Angeles Abrasion Test on a given sample of aggregates.
- To perform Shape Test on a given sample of aggregates.
- To determine Specific Gravity and Water Absorption of a given sample of aggregates.

Tests on Bitumen (Asphalt)

- To perform Penetration Test on a given sample of bitumen.
- To determine Softening Point of a given sample of bitumen.
- To find out Ductility of a given sample of bitumen.
- To determine Flash & Fire Point of a given sample of bitumen.

COURSE LEARNING OUTCOMES (CLOs):

At the end of this course, the student will:

CLO 1: Obtain an understanding of the fundamentals of Transportation Engineering.

CLO 2: Learn both quantitative and computerized techniques for solving problems related to geometric design of a roadway.

CLO 3: Apply principles of Traffic Engineering and Railway Engineering for evaluation and analysis of relevant characteristics and parameters in both the fields.

CLO 4: Demonstrate the capability to write a technical report and communicate the results to other Engineering professionals

WEEKLY LESSON PLAN

Course Contents	Week No.
• Highway Planning • An Approach to Urban Highway Planning	**1**
• Location Survey in Rural & Urban Areas, Location Controls Elements of a Typical Cross-Section of Road • Types of Cross-Section	**2**
• Classification of Highways • Highway Materials, Types & Characteristics, Specification & tests. • Highway Drainage	**3**
• Geometric Design o Horizontal Curves o Super Elevation	**4**
• Geometric Design o Vertical Curves o Grade Line	**5**
• Geometric Design o Transition Curve o Curve Widening o Sight Distance Requirements	**6**
• Design Speed • Traffic Estimates	**7**
• Traffic Lane Capacity • Traffic Survey	**8**
• Road Signs & Signals • Channelization	**9**
• Design of Intersection at Grade & Grade Separated Intersections • Drivers Characteristics	**10**
• Traffic Control devices • Parking and Accident Studies	**11**

• Traffic Management • Highway Safety	**12**
• Elements of Track. Types of Gauges • Types of Rail Sections. Rail Joints. Creep and Wear of Rail	**13**
• Fish Plate, Bearing Plates and Check Rails. • Types of Sleepers, their Merits and Demerits, Sleeper Density,	**14**
• Spacing and Stiffness of Track • Types of Ballast. Requirements for Good Ballast, Renewal of Ballast. Formation of Single and Double Track.	**15**
• Selection of Site for a Railway Station. Layout of Stations and Yards. • Points and Crossings. Various Layouts for Signaling and Inter-Locking. • Modem Methods for Construction of Tracks. Maintenance, Tools and Organization.	**16**

MAPPING FOR COURSE WORK

CLO's / **Course Contents**	**CLO 1**	**CLO 2**	**CLO 3**	**CLO 4**
Transportation Engineering				
Highway Planning	×			
An Approach to Urban Highway Planning	×			
Location Survey in Rural & Urban Areas, Location Controls Elements of a Typical Cross-Section of Road	×			
Types of Cross-Sections	×			
Classification of Highways	×			
Highway Materials, Types & Characteristics, Specification & tests.	×			
Highway Drainage	×			
Geometric Design o Horizontal Curves o Vertical Curves o Grade Line o Super Elevation o Transition Curve o Curve Widening o Sight Distance Requirements		×	×	

Traffic Engineering				
Design Speed	×		×	
Traffic Estimates	×		×	
Traffic Lane Capacity	×		×	
Traffic Survey	×		×	
Road Signs & Signals	×		×	
Channelization	×		×	
Design of Intersection at Grade & Grade Separated Intersections	×		×	
Drivers Characteristics	×		×	
Traffic Control devices	×		×	
Parking and Accident Studies	×		×	
Traffic Management	×		×	
Highway Safety	×		×	
Railway Engineering				
Elements of Track. Types of Gauges	×		×	
Types of Rail Sections. Rail Joints. Creep and Wear of Rail	×		×	
Fish Plate, Bearing Plates and Check Rails.	×		×	
Types of Sleepers, their Merits and Demerits, Sleeper Density,	×		×	
Spacing and Stiffness of Track	×		×	
Types of Ballast. Requirements for Good Ballast, Renewal of Ballast. Formation of Single and Double Track.	×		×	
Selection of Site for a Railway Station. Layout of Stations and Yards.	×		×	
Points and Crossings. Various Layouts for Signaling and Inter-Locking.	×		×	
Modem Methods for Construction of Tracks. Maintenance, Tools and Organization.	×		×	

CLO's / **PLO's**	**CLO 1**	**CLO 2**	**CLO 3**	**CLO 4**
PLO 1 (Engineering Knowledge)	×	×	×	×
PLO 2 (Problem Analysis)	×	×	×	
PLO 3 (Design/Development of Solutions)	×	×	×	
PLO 4 (Investigation)	×		×	

PLO 5 (Modern Tool Usage)		×		×
PLO 6 (The Engineer and Society)	×		×	
PLO 7 (Environment and Sustainability)	×			
PLO 8 (Ethics)	×		×	×
PLO 9 (Individual and Team work)	×	×	×	×
PLO 10 (Communication)	×	×	×	×
PLO 11 (Project Management)	×			
PLO 12 (Lifelong Learning)	×			

CLOs / Assessment Modules	CLO 1	CLO 2	CLO 3	CLO 4
Assignments	×	×	×	×
Quizzes	×	×	×	
Midterm Exam	×	×	×	
Final Exam	×	×	×	

WEEKLY PLAN FOR PRACTICALS

Sr. No.	Practical Topic	Week No.
1	To determine the Impact Value of a given sample of aggregates	**1, 2**
2	To perform Los-Angeles Abrasion Test on a given sample of aggregates	**3, 4**
3	To perform Shape Test on a given sample of aggregates	**5, 6**
4	To determine Specific Gravity and Water Absorption of a given sample of aggregates	**7, 8**
5	To perform Penetration Test on a given sample of bitumen	**9, 10**
6	To determine Softening Point of a given sample of bitumen	**11,12**
7	To find out Ductility of a given sample of bitumen	**13, 14**
8	To determine Flash & Fire Point of a given sample of bitumen	**15**
9	Viva of Practicals	**16**

MAPPING FOR PRACTICALS

CLO's / Course Contents	CLO 1	CLO 2	CLO 3	CLO 4
Transportation Engineering I Practicals				
To determine the Impact Value of a given sample of aggregates	×		×	×
To perform Los-Angeles Abrasion Test on a given sample of aggregates	×		×	×
To perform Shape Test on a given sample of aggregates	×		×	×
To determine Specific Gravity and Water Absorption of a given sample of aggregates	×		×	×
To perform Penetration Test on a given sample of bitumen	×			×
To determine Softening Point of a given sample of bitumen	×			×
To find out Ductility of a given sample of bitumen	×			×
To determine Flash & Fire Point of a given sample of bitumen	×			×