

COURSE CODE: *CVE 505*
COURSE TITLE: *Highway and Transportation Engineering*
NUMBER OF UNITS: *3 Units*
COURSE DURATION: *Three hours per week*

COURSE DETAILS:

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COURSE CONTENT:

Transportation Planning; Highway Administration and Finance; Highway Lighting; Pavement signals, signs and control; Intersection & Interchange; Traffic studies & Parking facilities

READING LIST:

1. James H. Banks. Introduction to Transportation Engineering. McGraw-Hill Company, 2002.
2. Nicholas J. Garber & Lester A. Hoel. Traffic and Highway Engineering. Thomson Corporation, 2002.
3. Telimoye M. Oguara. Highway Engineering: Pavement design, construction and maintenance. Malthouse Press Limited, 2006
4. Francis J. Gichaga & Neville A. Parker. Essentials of Highway Engineering. Macmillan publishers, 1988.
5. Martins Rogers. Highway Engineering. Blackwell Science, 2003.

LECTURE NOTES

TRANSPORTATION PLANNING

The process for planning transportation systems is rational one that intends to furnish unbiased information about the effects that the proposed transportation project will have on the community and its expected users. The transportation planning process is not intended to furnish a decision or to give a single result that must be followed, although it can do so in relatively simple situations. Rather, the process is intended to give the appropriate information to those who will be responsible for deciding whether the transportation project should go forward.

- Good highway transport facilities are the result of sound planning.
- Basic elements of Transportation Planning
- Transportation planning is concerned with the development of a transportation plan for an urban area or for an entire state.
- Levels of transportation planning- Policy, System & Project
- Transportation planning process- Goal identification; generation of alternative plans; performance & impact analysis; evaluation and selection

TRANSPORTATION DEMAND ANALYSIS

- Transportation demand analysis plays several important roles in transportation engineering and planning. The goals of transportation demand analysis are to describe travel in meaningful terms, to explain travel behaviour and on the basis of an understanding of travel behaviour, to predict demand for various types of transportation services.
- **Travel Demand Modelling**
 - ü Trip generation models
 - ü Trip distribution models
 - ü Mode choice models
 - ü Trip assignment models

HIGHWAY ADMINISTRATION AND FINANCE

– Administration – 3 tiers of government & PPP

– **Highway Finance**

Traditionally given the public goods nature of highways the financing structure and sources of finance are closely related to the role of government. Many of these attempts is to minimize risk to the government. These are- toll financing, equity financing, subordinated loans, etc.

- Selecting & measuring evaluation criteria
- Evaluation based on economic criteria

HIGHWAY LIGHTING

Night time illumination of a roadway is very important in promoting safety and operational efficiency. In addition to furthering highway safety, lighting in urban environments promotes safety to pedestrians. In rural areas lighting is generally applied in critical such as interchanges, intersections, railroad crossings at grade, narrow or long bridges etc.

- Design of Highway Lighting
- Types & Installation

PAVEMENT SIGNS, SIGNALS AND TRAFFIC CONTROL

Common to all transport modes but method of effecting control varies with mode and complexity of situations faced. Operation control is the control exercised over vehicles' motion and traffic with the principal purposes of

- (a) Enhancement/sustenance of safety
- (b) Reduction of system delays
- (c) Increase/protection of system capacity

q **Highway traffic control devices**

Commonly used traffic control devices include;

- § Traffic signals and signs
- § Pavement markings
- § delineators

INTERSECTION DESIGN

- Highway intersection is required to control conflicting and merging streams of traffic so that delay is minimized. This is achieved through the choice of geometric parameters that control and regulate the vehicle paths through the intersection
- Types of At-grade Intersections
- Design Principles for At-grade Intersections
- q **An interchange** is a system of interconnecting roadways used in conjunction with one or more grade separations of highways. It accommodates movement of traffic between two or more roadways at different elevations
 - Justification of Interchange
 - Types of Interchange

TRAFFIC STUDIES AND PARKING FACILITIES

- Travel time and delay studies- A travel time study determines the amount of time required to travel from one point to another on a given route. In conducting such a study, information may also be collected on the locations, duration and causes of delays. When this is done, the study is known as a travel time and delay study.
- ü Application of travel time & delay data
- ü Definition of terms related to time and delay studies
- ü Methods of conducting travel time and delay studies
- q Parking studies- any vehicle travelling on a highway at one time or another be parked for either a relatively short time or much longer time, depending on the reason for parking. The provision of parking facilities is therefore an essential element of highway mode of transportation.
- q Types of parking facilities- On-street & Off-street
- q Definitions of parking terms
- q Methodology of parking studies
- q Analysis of parking data