COURSE CODE: *CVE 409*
COURSE TITLE: *Highway Engineering*
NUMBER OF UNITS: *3 Units*
COURSE DURATION: *Three hours per week*

COURSE DETAILS:

Course Coordinator: Dr. O. S. ABIOLA
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COURSE CONTENT:

Soil engineering aspects of Highways, Railways and Airfields. Highway geometrics; Route location; Pavement materials and laboratory tests; Fundamentals of traffic engineering- traffic studies and analysis- O-D survey, traffic counts

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 publsiher, 1988.

LECTURE NOTES

HIGHWAY GEOMETRIC DESIGN

– **Factors Influencing Highway Design**

Highway design is based on several design standards & controls, which depend on;

- Functional classification
- Expected traffic volume and vehicle mix
- Design speed

– **Design of the Alignment**

- Horizontal alignment
- Vertical alignment
- Super-elevation

ROUTE LOCATION

– **Techniques for Highway surveys**

ü Ground surveys

ü Remote sensing

– **Principles of Highway location**

v Office study: engineering, topography, geology etc.

v Reconnaissance : is to identify several feasible routes

v Preliminary location survey are used to evaluate the economic & environmental feasibility of the alternatives routes

v Final location survey

– **Preparation of highway plans**

SOIL ENGINEERING

- **Soil Characteristics**:
  - ü Origin & formation of soils
  - ü Surface texture
- **Basic Engineering properties of soil**
  - ü Atterberg limits
  - ü Permeability
  - ü Shear strength
- **Classification of soils for Highway** use-AASHTO; USCS
- **Soil Tests for pavement design**-Compaction,CBR

BITUMINOUS MATERIAL

- **Description and Uses of bituminous binders-** Asphalt cements; SC; RC asphalts, Asphalt emulsion
- **Properties of asphaltic materials**

ü Consistency

ü Durability

ü Rate of curing

ü Resistance to water action

- **Tests for asphaltic materials**-consistency test; penetration test
- **Asphaltic concrete** is a uniformly mixed combination of bitumen, coarse, fine aggregates & fillers

TRAFFIC ENGINEERING

- **Spot speed studies**- are conducted to estimate the distribution of speeds of vehicle in a stream of traffic at a particular location on a highway
  - v Speed characteristics
  - v Locations of spot speed studies
  - v Methods for conducting spot speed studies
  - v Presentation and Analysis of Spot speed data
- **Headway**- space mean & time mean
- **Traffic Volume**- Different types of traffic counts are carried out, depending on the anticipated use of the data to be collected e.g ADT. AADT
- **Origin-Destination Study**