Transportation Engineering II
EG 3202 CE

Year: III **Total: 3 Hrs. /week**
Semester: II **Lecture: 3 Hrs./week**
Tutorial: Hr./week
Practical: Hrs./week
Lab: Hrs./week

Course Description:
This course is the continuation of Highway Engineering providing general background knowledge of road pavement, hill roads, road machineries, road construction technology and road maintenance.

Course Objectives:
After completion of this course students will be able to:
1. Differentiate between road pavement structures;
2. Provide concept of hill road focusing on difference aspect to be considered in design;
3. Know the different types of equipment's used in road construction along with the road construction methodology depending upon the type of road surface and
4. Be familiar with different types of failures that may occur in road pavement after its operation and probable causes of failure.

Course Contents:

Theory

Unit 1: **Road Pavement:** **[2 Hrs.]**
- 1.1 Definition, types, difference between flexible and rigid pavement
- 1.2 Different layers in pavement structure and their functions, sub-grade, sub-base, wearing course.

Unit 2: Hill Roads: **[7 Hrs.]**
- 2.1 Definition, importance of hill roads in Nepal
- 2.2 Design and construction problems in hill roads.
- 2.3 Special consideration of hill road geometric design: Temperature, Rainfall, Atmospheric pressure, Geological condition concept only
- 2.4 Typical cross sections of hill roads: drawing for concept only.
- 2.5 Special structures in hill roads like retaining walls, revetment walls, tow wall, slope protection works

Unit 3: Road Machineries: **[3 Hrs.]**
- 3.1 Methods of road construction (labor based, machine based)
- 3.2 Different types of tools, equipment and plants: Bulldozer & Scarper, Dragline, Clam shell, Power shovel, Hoe introduction.
- 3.3 Different types of compacting equipment: Smooth wheel rollers, sheep foot rollers, pneumatic tyred, impact rammers, vibrators

Unit 4: Road Construction Technology: **[18 Hrs.]**
- 4.1 Introduction
- 4.2 Activities involved in road construction: involved works only
  - 4.2.1 Earthwork
  - 4.2.2 Drainage work
  - 4.2.3 Pavement work

4.2.4 Protection works
4.2.5 Miscellaneous works

4.3 Earthwork
4.3.1 Introduction
4.3.2 Purpose
4.3.3 Earthwork in embankment/excavation
4.3.4 Relation of optimum moisture content and maximum dry density
4.3.5 Field control of compaction and test required concept only.

4.4 Construction of earthen road: Introduction, materials required, equipment required, construction procedure

4.5 Construction of gravel roads: Introduction, materials required, equipment required, construction procedure

4.6 Construction of soil stabilized roads: Introduction to soil stabilization, types of soil stabilization, mechanical stabilization of soil (materials, equipment, construction procedure)

4.7 Constructions of Water Bound Macadam (WBM) roads: Introduction, materials required, equipment required, construction procedure

4.8 Construction of bituminous roads: Introduction, types of bituminous surfacing, interface treatment (prime coat, tack coat), seal coat, functions of each coat

4.9 Surface dressing: types (single, double), materials required, equipment required, construction procedure

4.10 Grouted macadam: types (full, semi), materials required, equipment required, construction procedure

Unit 5: Highway Maintenance and Repair: [9 Hrs.]

5.1 Introduction, causes of pavement failure

5.2 Types of maintenance activities: Routine, Periodic, Special, Emergency

5.3 Maintenance of earth roads, gravel roads, WBM roads

5.4 Maintenance of bituminous roads (pot hole, patch repair works, crack sealing, edge repairing, resurfacing)

5.5 Maintenance of drainage structures

5.6 Maintenance of miscellaneous road structures (shoulder, slope, retaining structures, road furniture)

Unit 6: Bridge: [6 Hrs.]

6.1 Introduction
6.1.1 Definition, Characteristics, choice of location
6.1.2 Classification based on span, length, loading, materials and structures

6.2 T beam bridge
6.2.1 Essential elements
6.2.2 Detail of superstructure and substructure

6.3 Suspension bridge
6.3.1 Introduction
6.3.2 Components and their function

References:

1. Dinesh Kumar Shrestha, Anil Marsani, Transportation Engineering volume 1, Jasni Publications, Mid Baneshwor, Kathmandu, Nepal
2. Partha Mani Parajuli, Course Manual on Transportation Engineering I, IoE, Pulchowk, Lalitpur, Nepal.

3. C E G Justo, S K Khanna, Highway Engineering, Khanna Publications, New Delhi, India.
4. S. K. Sharma, Principles, Practice and Design of Highway Engineering, S Chand and Company Ltd. New Delhi.
5. A training manual on trail bridges, RTU, Department of Civil Engineering, Institute of Engineering.

Evaluation Scheme

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Unit	Title	Hrs. (L)	Marks distribution
1	Road Pavement	2	04
2	Hill Roads	7	16
3	Road Machineries	3	04
4	Road Construction Technology	18	28
5	Highway Maintenance and Repair	6	12
6	Bridge	9	16
		45	80