FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL

Course Title: Highway Engineering I **Course Code:** CVE517
Session: 2020/21 **Semester:** First **Level:** 500
Instructions: Attempt Four Questions, **Time:** 2 hrs 45 mins

HOD'S SIGNATURE

Que. 1a. Discuss three main categories in which Traffic studies are grouped. **6mks (2mks each)**

1b. What are the following used for in traffic and transportation analysis?

i. Average Annual Daily Traffic (AADT) **3 mks**

ii. Average Daily Traffic (ADT) **3 mks**

iii. Vehicle Classification (VC) **3 mks**

Que. 2a. State the reason for conducting Spot speed studies. **1 mk**

2b. Explain what the speed characteristics determined from a spot speed study are used for. **7mks**

2c. The field data collected through a field study is summarized in table below.

Speed class km/hr	Number of vehicles observed
10-14.9	3
15-19.9	10
20-24.9	21
25-29.9	31
30-34.9	54
35-39.9	43
40-44.9	21
45-49.9	10
50-54.9	5
55-59.9	2

Making use of the above data, calculate suitable speed for traffic regulation. **8 mks**

Que.3a. State factors affecting the thickness design of highway pavement. **8mks (1Mk each)**

3b. Why is Base course provided for in flexible pavement? **4 mks**

3c. Calculate the cumulative standard axles, for designing a two lane road using following data:

Present day traffic – 1500 CV per day

Design period – 15 years

Time required in construction – 5 years

Vehicle damage factors – 2.5

Lane distribution factor – 0.75

Overall traffic growth – 10 percent

3 mks

Que. 4. a. Write short note on the following:

i. asphalt cement **4 mks**

ii. asphalt cutbacks **6 mks**

4b. i. Mention four main categories of the properties of asphalt materials pertinent to pavement construction. **4 mks**

ii. Define Flash-Point test **1 mk**

Que. 5a. The following data were obtained for a soil sample.

Mechanical Analysis

Sieve No.	Percent Fine	Plasticity Tests
4	97	LL= 48%
10	93	PL= 26%
40	88	
100	78	
200	70	

Using the AASHTO method for classifying soils, determine the classification of the soil and state whether this material is suitable in its natural state for use as a subbase material. **9 mks**

5b. Briefly describe the following test:

i.	Penetration Test	**3 mks**
ii.	Ductility Test	**3 mks**

Que.6a. Enumerate the main activities involved in any highway construction project which affect the quality of work. **4.5mks (1.5mks each)**

6b. Explain with schematic diagram only the steps in quality control management for a highway construction project. **5.5 mks**

6c. What are the primary benefits of economic analysis to a highway project? **5 mks**