THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

Department of Civil Engineering

FIRST SEMESTER

EXAMINATION

Final Year Bachelor of Engineering in Civil Engineering

Subject Code: **CE412**

Subject Name: **TRAFFIC AND TRANSPORTATION ENGINEERING**

Date: **Friday 02nd June, 2023**

Time: **1:00 pm to 4:00 pm**

Venue: **Hydraulics Lecture Theatre (HLT)**

Examination Instructions

1. **NO MOBILE PHONE** is allowed in the examination room.
2. You have 10 minutes to read the paper.
3. Fill-in the attendance slip. **DO IT NOW**.
4. There are five questions. **ANSWER ALL 5 QUESTIONS.**
5. Marks are allocated for each question.
6. Write your answer in the answer booklet provided.
7. You can consult your notes but DO NOT discuss with someone sitting next to you. Students caught engaging in conversations will be referred to as cheating and will be removed from the examination room. Penalty is zero mark for examination.

Question 1

Why is it that, "unlike many other disciplines of the engineering, the situations that are interesting to a traffic engineer cannot be reproduced in a laboratory?". Can you provide some reasons, and elaborate on this statement?

(5 marks)

Question 2: Priority Junction

Tabulated below is the design hour flows of vehicles at Bumbu Road / Milford Haven intersection which a THREE-ARM priority junction with good visibility for all movement are given below.

EXIT / **APPROACH**	WEST	EAST	SOUTH
WEST (Bumbu Rd)		450	650
EAST (Bumbu Rd))	150		380
SOUTH (Milford Haven Rd)	400	360	

You should state clearly any assumptions you made in your calculations. Traffic composition is 20% Single Unit Trucks and 80% cars.

Assuming good visibility, calculate the delay to vehicles turning right from two approaches.

(15 marks)

Question 3 - Roundabout

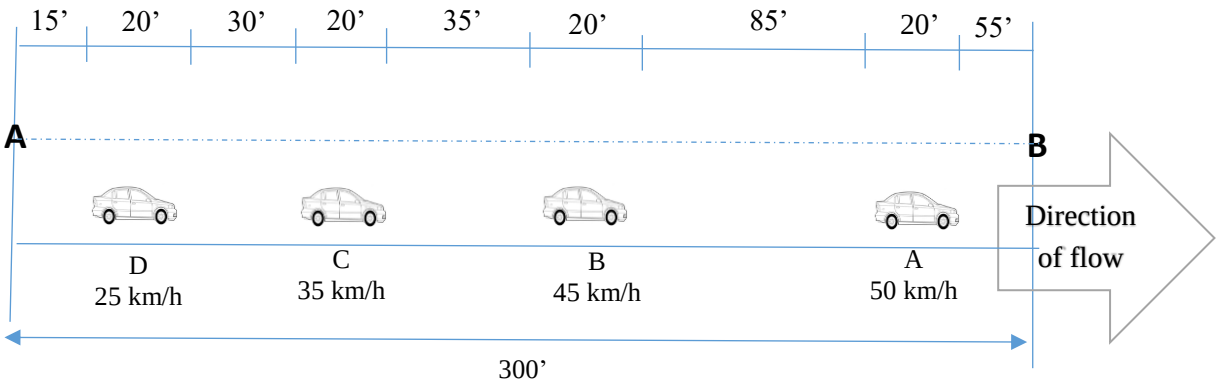
If you were to upgrade the intersection (refer to Question 2) to a roundabout, determine the saturation volume hence the critical approach, delays on each approach, total delay of the intersection and the functional life of the intersection if the traffic composition remains unchanged. The total entering traffic in the peak hour is assumed to be increasing at 6% per annum (compound).

(20 marks)

Question 4

(a) Figure below shows the location and speeds of four vehicles on a two-lane highway between section A and B with their positions of speeds obtained at an instant of time by photography . An observer located at point A observes the vehicles passing point A during a period of t sec (').

The figure below shows the vehicles travelling at constant speeds on a two-lane highway between two points (A & B). Determine the flow, density, time mean speed, and space mean speed.
(Use the information determined in the figure)



(Total marks = 15)

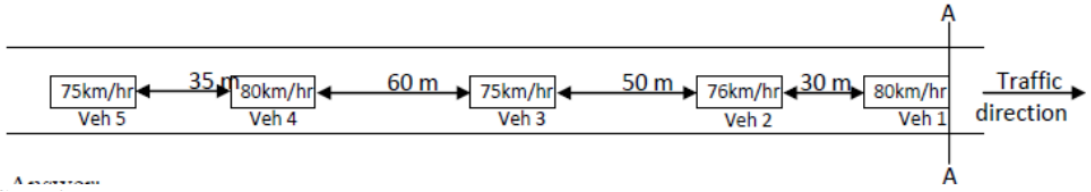
(b) Five vehicles, as shown in the figure below, are traveling at constant speeds on section of 230m length. Assuming that all vehicles have a same length of 4 m and if speeds and clear spacing between vehicles are as shown in the figure, estimate the following:

1) Average space mean speed

2) Average time mean speed

3) Traffic density

4) Average time headway arriving a section A-A



(Total marks = 15)

Question 5

(a) What are the major components of intelligent transport system? (2 marks)

(b) What is the purpose of intelligent transport system? (3 marks)

(c) List five benefits of smart transport system. (5 marks)

Total marks = 10

TOTAL MARKS FOR THE EXAMINATION = 80

END OF EXAMINATION