ELIZADE UNIVERSITY, ILARA-MOKIN,
ONDO STATE, NIGERIA

DEPARTMENT OF AUTOMOTIVE ENGINEERING

SECOND SEMESTER EXAMINATIONS

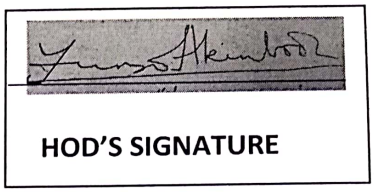
2017/2018 ACADEMIC SESSION

COURSE: ATE 536 – Vehicle Design (3 Units)

CLASS: 500 Level Automotive Engineering

TIME ALLOWED: 3 Hours

INSTRUCTIONS: Answer Any Five Questions



Date: July/August, 2018

Question 1

a. What is an automobile? How are automobiles classified?

b. Describe the impact of today's cars on the society under the following headings:

(i) Social, (ii) Economic, and (iii) Health

Question 2

a. What is the philosophy of vehicle light-weighting as it applies to the 21st century automobile?

b. State three classes of materials used for automotive construction and explain their specific areas of application.

Question 3

a. What is the NVH (Noise-Vibration & Harshness) concept and why is it a challenging task for vehicle design engineers.

b. What is the difference between 'indicated work' and 'brake work'?

c. Why the brake mean effective pressure better to describe engine performance than 'Torque' & 'Power'?

Question 4

a. State the importance of 'Electricity' in today's automobile?

b. List 4 examples of electrical/electronic components and explain how they are incorporated into the 21st century automobile circuits.

Question 5

a. Briefly explain the following types of automotive engines that are found in today's automobiles:
(i) In-line engine, (ii) V-engine, (iii) W-engine, (iv) Opposed cylinder engine and
(v) Opposed piston engine

b. List and explain five of the components of the engine emission control systems?

Question 6

Consider a 2018 Toyota Camry with a 2.5L, I4 (4-cylinder inline) engine that operates on a 4-stroke cycle at 2400rpm. The compression ratio is 8, the length of the connecting rod is 18.5cm and the engine is 'square' (B=S). At this speed, combustion ends at 25° TDC. Calculate:

a. Cylinder bore and stroke length b. Average speed c. Clearance volume in one-cylinder

d. Piston speed at the end of combustion.

Question 7

Derive an expression for the longitudinal dynamics of an automobile.