UNIVERSITI KUALA LUMPUR
KAMPUS CAWANGAN MALAYSIAN SPANISH INSTITUTE

FINAL EXAMINATION

OCTOBER 2025 SEMESTER

COURSE CODE	:	SCB12402 (V2)
COURSE TITLE	:	AUTOMOTIVE ENGINEERING FUNDAMENTALS
PROGRAMME NAME	:	BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN MECHANICAL DESIGN
DATE	:	25 JANUARY 2026
TIME	:	9:00AM - 11:00AM
DURATION	:	2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 8 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

Question 1

According to requirement, automobile bodies are classified mainly into different types namely private vehicle, commercial vehicle, fleet transport vehicle, passenger transport vehicle etc. and all kind of vehicle requires chassis as a supporting frame of vehicle.

(a) List the six type of loads acting on chassis frame

(6 marks)

(b) Describe four important roles of chassis of the vehicle.

(4 marks)

(c) The automotive industry uses a few different types of chassis, including monocoque, ladder, backbone, tubular space frame, and ULSAB. Describe the construction of the chassis frame (see the diagram below, as a guidelline).
Refer Below - Figure1 : Ladder chasis .

(10 marks)

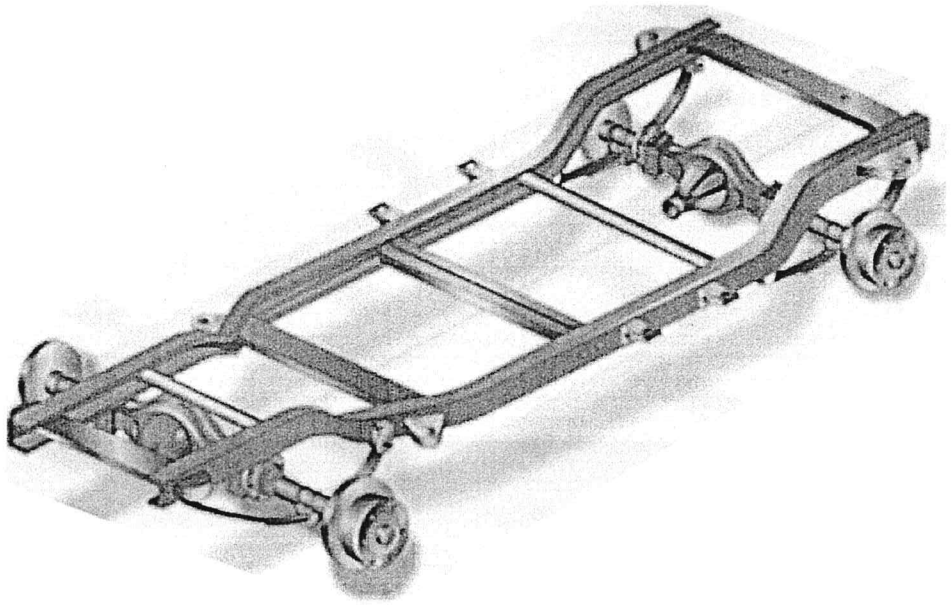

Figure 1: Ladder chasis

Question 2

The study of the forces at work on a moving car is called **vehicle dynamics**, and you need to understand some of these concepts in order to appreciate why a suspension is necessary in the first place.

(a) The shock absorbers are classified according to their operation, structure, and working medium. Find out about two shock absorbers from the three classifications available.

(4 marks)

(b) Automotive engineers usually study the functions of a suspension system through three important principles: ride comfort, road holding, and handling. Demonstrate all of those principles.

(6 marks)

(c) Show five major function of car shock absorber.

(10 marks)

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Vehicle dynamics is the study of the forces acting on a moving car; to fully get why a suspension is required in the first place, you must grasp some of these ideas. The majority of auto engineers look at a moving car's dynamics from two angles: handling and ride.

(a) Interpret the meaning of ride and handling in the context of vehicle dynamics engineering.

(4 marks)

(b) While riding, sometimes the vehicle are requires going through the undistributed rough road, sometimes tires not really grip the road and body rolls occurred. Examine how the suspension system helps to allow the vehicle body to ride, keep tires in contact with the ground and minimize body roll.

(6 marks)

(c) Demonstrate the distinction between sprung weight and unsprung weight using a basic sketch.

(10 marks)

Question 2

The device that transfers an automobile's engine's power from the engine to the driving wheel is called the transmission (or power train). Clutch, gearbox, propeller shaft, universal joints, rear axle, wheel, and tires make up this system.

(a) Show the difference between tyre and wheel.

(4 marks)

(b) A hydrodynamic device called a fluid coupling is used to transfer spinning mechanical power. It has been utilized in place of a mechanical clutch in car transmissions. Findout the way a fluid connection can function as a mechanical clutch.

(6 marks)

(c) There are four components inside the very strong housing of the torque converter: the pump, turbine, stator, and transmission fluid. Show how each of the components plays a role.

(10 marks)

Question 3

The suspension system components are located between the frame of the vehicle and the road.

(a) Show the four purposes of suspension systems.

(2 marks)

(b) Distinguish the four types of springs used in automotive suspension systems (coil spring, leaf spring, torsion bar, and air spring)

(12 marks)

(c) If only soft springs were used to improve riding comfort, the car body would lean out excessively during turns due to centrifugal force. With independent suspensions, this tendency is especially great. Indicate the role of the stabilizer bar in improving this situation - to reduce body roll and increases the tire trction as well.

(6 marks)

Question 4

Due to its ability to generate power by turning fuel's thermal energy into force and motion, the engine is a crucial part of any automobile system. This image of an engine components is found in figure below.

Refer Below - Figure2 : Engine components .

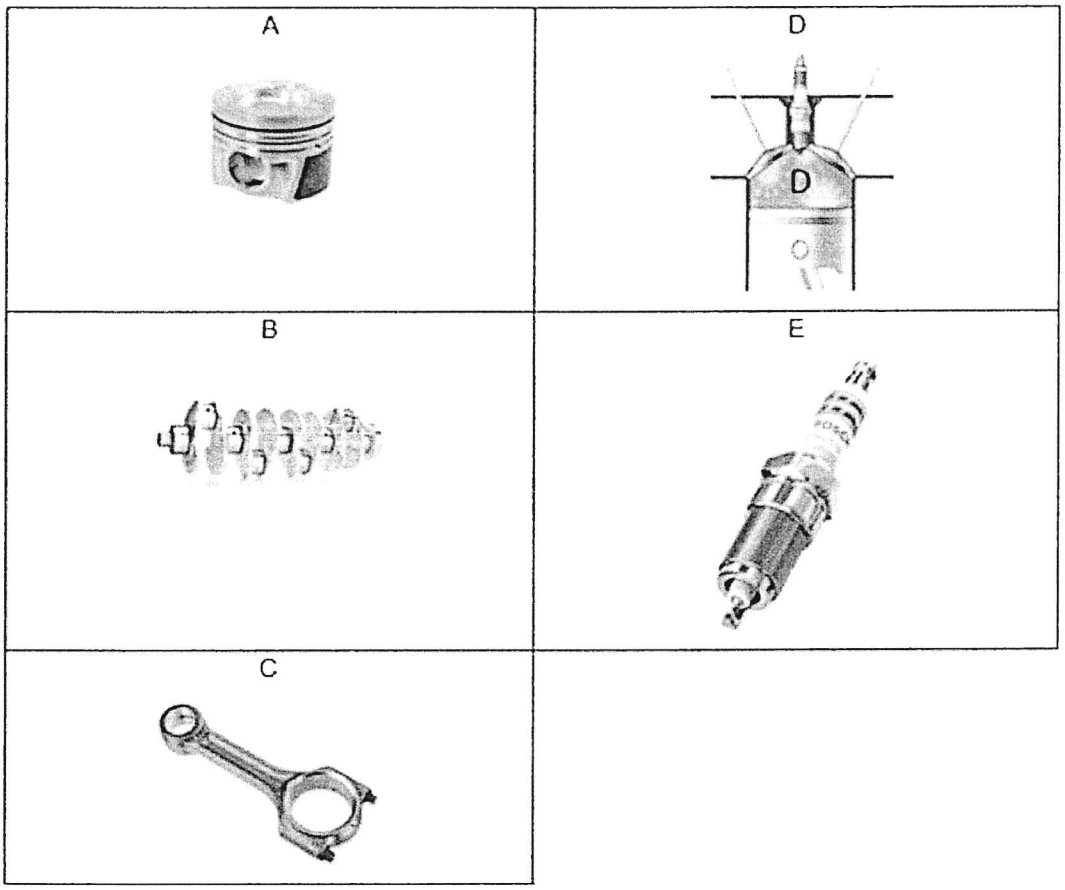

Figure 2: Engine components

(a) As indicated in the above figure, identify and demonstrate the purpose of each of the components of A, B, C, D, and E.

(15 marks)

(b) Discuss the piston's oil ring and compression ring functions.

(5 marks)

END OF EXAMINATION PAPER