UNIVERSITI KUALA LUMPUR
KAMPUS CAWANGAN MALAYSIAN SPANISH INSTITUTE

FINAL EXAMINATION

OCTOBER 2025 SEMESTER

COURSE CODE	:	SCB24803 (V1)
COURSE TITLE	:	AUTOMOTIVE POWER TRAIN
PROGRAMME NAME	:	BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN MECHANICAL (AUTOMOTIVE)
DATE	:	25 JANUARY 2026
TIME	:	9:00AM - 12:00PM
DURATION	:	3 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 6 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

Question 1

An automobile's powertrain system is made up of the fundamental parts that work together to produce power from the engine and transfer it to the wheels so the car can drive. These core components work together to convert the chemical energy stored in fuel into mechanical energy and propulsion.

(a) Sketch a typical car layout and label the locations of four essential automotive gearbox components, such as the clutch, gearbox, differential, and final drive. Moreover, identify their purpose.

(6 marks)

(b) Axles are integral structural components of wheeled vehicles that perform essential functions related to torque transmission, support and suspension attachment, and wheel alignment and stability. Describe three purposes of the axles.

(6 marks)

(c) Explain four important components in the clutch assembly of a manual transmission.

(8 marks)

Question 2

Manual transmission systems require active involvement from the driver to shift gears and control the vehicle's speed and power delivery. While they may require more skill and coordination to operate than automatic transmissions, they offer greater engagement and control for those who enjoy the driving experience.

(a) List three basic parts of a transmission and describe the purpose of each.

(6 marks)

(b) The Limited Slip Differential (LSD) system in vehicles like the Nissan Navara 2.5 L (A) serves several important functions within the drivetrain. Discuss two functions of differential system.

(6 marks)

(c) The transaxle system is a compact and efficient drivetrain configuration commonly found in modern front-wheel-drive vehicles. It combines the transmission, differential, and final drive into a single integrated unit, saving space and simplifying vehicle design. Sketch and explain the transaxle system.

(8 marks)

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

The transmission/ transaxle consists of multiple gears of varying sizes and ratios, enabling the driver to choose the appropriate gear for driving conditions such as acceleration, cruising, or climbing hills.

(a) In manual transaxle, there are bigger gears with 45 teeth on the input shaft's. It meshes with 25 pieces of gear. The 13 teeth were placed on the second gear set. The 25-tooth gear and this gear rotate at the same torque and speed. The similar size gear, which has 13 teeth, is meshing with the 13-tooth gear. Determine the gear ratio for the first, second, and entire gear sets. State the condition, speed and torque.

(4 marks)

(b) Gears are the primary parts of any drivetrain. Sketch any three types of gears.

(6 marks)

(c) Illustrate and discuss in which gear should you drive when (i) climbing a steep slope of hill and (ii) at 110 km/h on highways condition. (Hint: gear reduction/ direct drive/overdrive)

(10 marks)

Question 2

In automobiles with manual transmissions, the clutch is an essential part of the drivetrain. It performs the vital task of enabling and disabling the power transfer between the engine and the gearbox, enabling seamless gear shifting by the driver.

(a) Identify four important purposes of the clutch and examine the clutch engages in the gear train of a manual transmission with the aid of simple sketching

(10 marks)

(b) Although they are an essential component of manual gearbox systems, clutches have various weaknesses. Analyze five disadvantages of the clutch system.

(10 marks)

Question 3

Automatic transmissions offer a variety of options tailored to different driving preferences and needs. Whether through conventional automatics, dual-clutch systems, CVTs, or automated manuals, these transmissions provide a blend of convenience, performance, and efficiency.

(a) Outline five advantages of automatic transmission.

(10 marks)

(b) Analyze five important components in an automatic planetary transmission system.

(10 marks)

Question 4

Front-wheel drive (FWD), rear-wheel drive (RWD), all-wheel drive (AWD), and four-wheel drive (4WD) are the wheel drive configurations that are available in automobile systems. Selecting a specific wheel-drive setup can have a big impact on how a car handles, performs, uses gasoline, and is appropriate for different types of roads.

(a) The majority of cars in Malaysia are currently equipped with front-wheel drive (FWD). Analyze the three advantages of FWD that Proton and Perodua decided to use.

(6 marks)

(b) Nowadays, All-wheel drive (AWD) and four-wheel drive (4WD) are quite popular in Malaysia. People have the opportunity to go off-road for sport and recreation with AWD and FWD. Differentiate between AWD and 4WD cars.

(8 marks)

(c) A mechanical device called a driveshaft, driving shaft, propeller shaft, or Cardan shaft is a mechanical device for transferring power from the engine or motor to the point where useful work is applied. Examine the driveshaft (with sketching) function in the vehicle.

(6 marks)

END OF EXAMINATION PAPER