



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

INDUSTRIAL TECHNOLOGY

2 UNIT

SECTION II

AUTOMOTIVE INDUSTRIES

OPTION—CHASSIS

*Total time allowed for Sections I and II—One hour and a half
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Where appropriate, show all working for solutions neatly and clearly.
- You may use Board-approved drawing instruments and calculators.

Section II—Chassis (15 marks)

- Question 4 is COMPULSORY.
- Attempt TWO questions from Questions 5, 6 and 7.
- Answer the questions in the spaces provided in this paper.

MARKER'S USE ONLY

| Question | | | | |
|----------|--|--|--|--|
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |

SECTION II—CHASSIS OPTION

(15 Marks)

QUESTION 4 This question is COMPULSORY. (5 marks)

- (a) The nearside rear of a small sedan is damaged in an accident. The repairer's quotation is presented below. Assess the total cost of the repair if mechanical labour is charged out at \$43/h and the painter is paid at \$45/h.

| <i>Action</i> | <i>Hours</i> | <i>Costs</i> |
|--|--------------|--------------|
| <i>Remove and replace</i> | | |
| Rear bar assembly | 1·0 | |
| Tail lamp assembly | 0·5 | |
| <i>Repair</i> | | |
| Nearside guard | 3·0 | |
| Rear beaver panel | 1·0 | |
| Rear bar mounting bracket | 0·5 | |
| <i>Prepare and respray damaged body panels</i> | 4·0 | |
| <i>Supply new</i> | | |
| Rear bar | | \$250 |
| Rear tail lamp assembly | | \$135 |

Total cost \$

QUESTION 4 (Continued)

- (b) An exploded pictorial drawing of a brake cable connecting piece is given in Figure 1. Using the information given, draw an assembled view in the direction of the arrow **P** to a scale of 2 : 1.

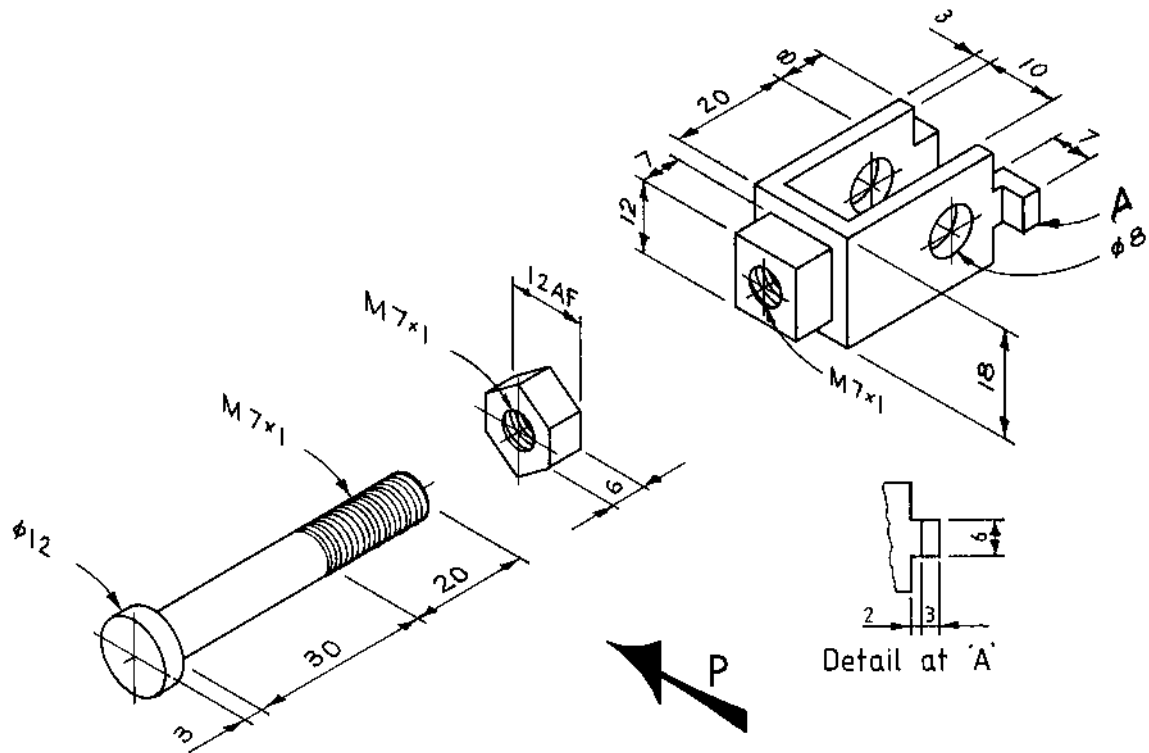
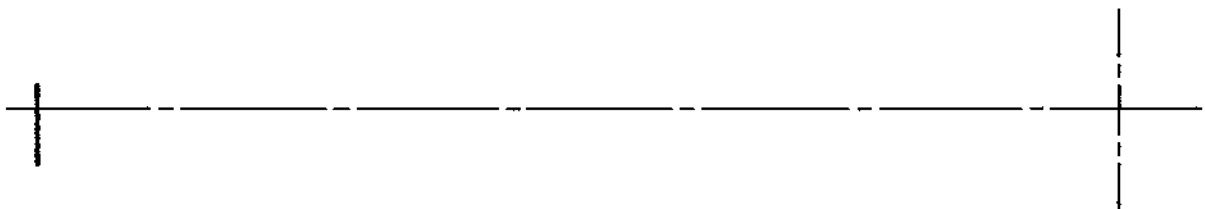


FIG. 1



SCALE 2:1

QUESTION 4 (Continued)

- (c) The table below shows a number of standard symbols commonly found in automotive drawings. Give the interpretation of the symbol in the space provided.

| <i>Symbol</i> | <i>Interpretation</i> |
|---------------|-----------------------|
| ∅ | |
| M20 × 2.5 | |
| ∅ 12.5 ± 0.1 | |

- (d) Describe TWO advantages and TWO disadvantages of electric and pneumatic power tools used in automotive workshops.

| | <i>Electric power tools</i> | <i>Pneumatic power tools</i> |
|-----------------------|-----------------------------|------------------------------|
| <i>Advantage 1</i> | | |
| <i>Advantage 2</i> | | |
| <i>Disadvantage 1</i> | | |
| <i>Disadvantage 2</i> | | |

- (e) Describe the purpose of the Australian Design Rules for the automotive industry.

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Attempt TWO questions from Questions 5, 6 and 7.

QUESTION 5 (5 marks)

- (a) (i) Every automobile manufacturer specifies a routine maintenance schedule for new vehicles. Explain why the maintenance schedule is more frequent while the vehicle is new.

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- (ii) List the FOUR stages of the four-stroke internal combustion engine cycle.

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2
3
4

Question 5 continues on page 6

QUESTION 5 (Continued)

(b) The diagram below shows the cross-section of a rotary engine.

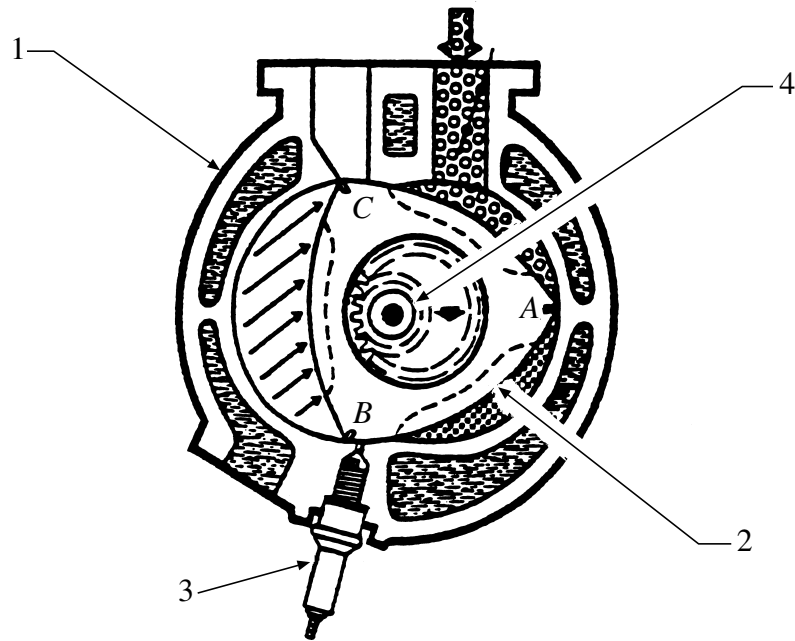


FIG. 2

Explain the function of component *B* and the components labelled 1–4 in Figure 2.

Component *B*

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Component 1

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Component 2

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Component 3

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Component 4

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QUESTION 5 (Continued)

- (c) (i) The differential in a rear-wheel-drive vehicle has two functions. Describe ONE of these functions and explain how it is achieved within the unit.

Function

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Explanation

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- (ii) The front wheel of a front-wheel-drive vehicle shows sideways movement when jacked off the ground. Name TWO possible causes of this problem.

1

2

- (iii) Describe why universal joints are used between the gearbox and differential in a rear-wheel-drive vehicle.

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QUESTION 6 (5 marks)

(a) Oils are used in vehicles to reduce friction and reduce corrosion.

(i) What is meant by the term *viscosity*?

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(ii) Why do manufacturers recommend differing viscosities for summer and winter use?

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(b) (i) Why is synthetic oil recommended for high performance engines?

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(ii) What is meant by the terms:

1 *friction modified*?

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2 *detergents*?

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QUESTION 6 (Continued)

- (c) (i) Explain why it is necessary to provide tie-rod adjustment in the steering system of a vehicle.

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- (ii) Describe the purpose of *castor* in the front-wheel alignment of a vehicle.

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- (iii) Describe the main advantages of four-wheel-drive over conventional two-wheel-drive in family sedans.

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Question 6 continues on page 10

QUESTION 6 (Continued)

(d) (i) Three examples of tyre wear are shown in Figure 3.

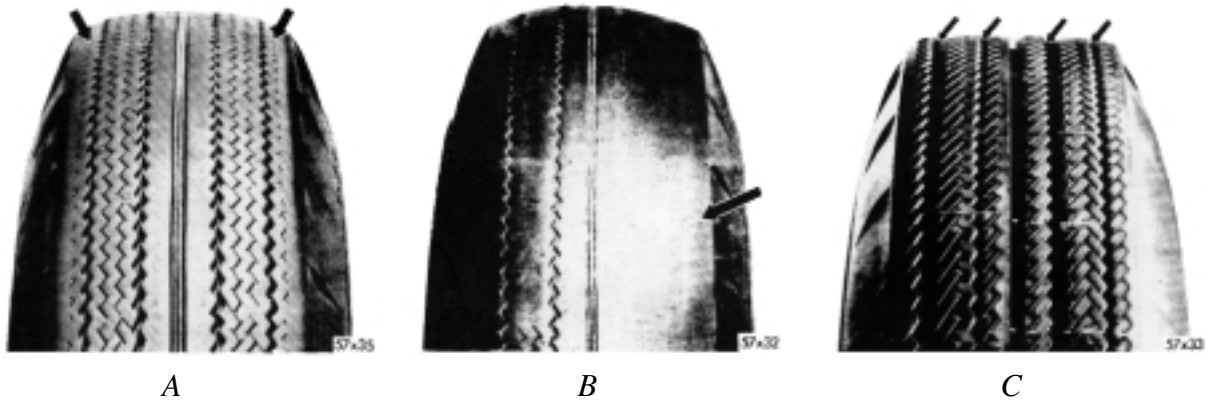


FIG. 3

Identify the cause of the wear in tyres *A*, *B* and *C* shown in Figure 3.

Cause of wear *A*

Cause of wear *B*

Cause of wear *C*

(ii) How would you correct the problem in the wear pattern in tyre *B*?

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QUESTION 6 (Continued)

(e) Describe briefly how a wheel alignment for a small sedan is carried out.

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Please turn over

QUESTION 7 (5 marks)

- (a) (i) Name and describe THREE areas of regular preventative maintenance on a vehicle.

Name 1

Description

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Name 2

Description

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Name 3

Description

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- (ii) Select ONE of these areas and describe in detail the program of maintenance that would be necessary to keep the vehicle in running order.

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QUESTION 7 (Continued)

(b) Brake fade is being experienced in a light four-wheel-drive vehicle.

(i) Describe what is meant by *brake fade*.

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(ii) Describe TWO reasons why brake fade occurs.

Reason 1

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Reason 2

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(iii) Select ONE reason from part (ii) and fully describe how the problem could be rectified.

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(c) The servo-assist mechanism reduces the physical effort the driver has to use on the brake pedal.

Describe how the servo-assist mechanism works.

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QUESTION 7 (Continued)

(d) The components of a rear suspension are shown in Figure 4.

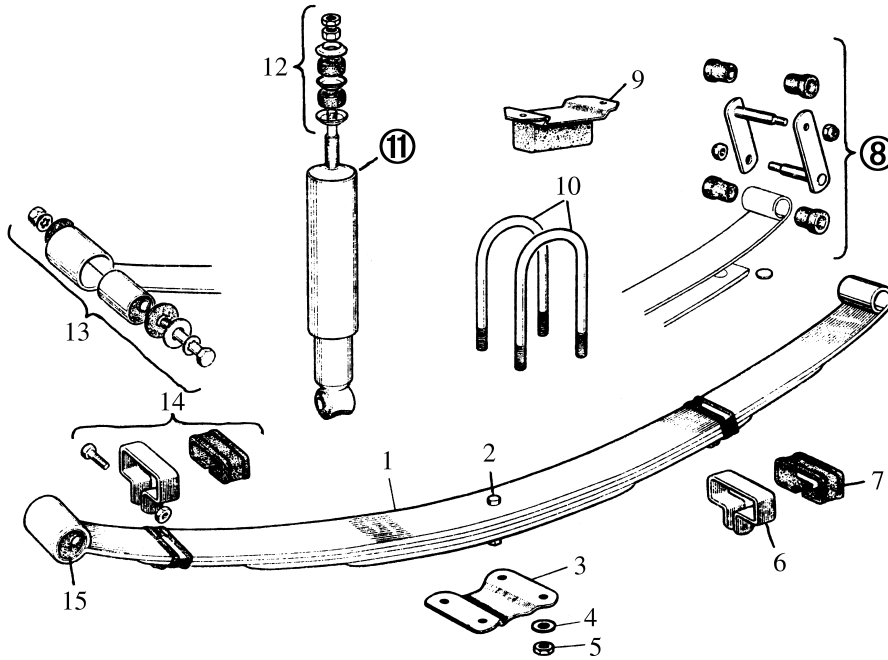


FIG. 4

(i) Name the components grouped at no. ⑧.

Name

(ii) Describe the effect on performance when the rubbers in no. ⑧ wear badly.

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(iii) Name the component no. ⑪.

Name

(iv) Describe the effect on the vehicle when this component is faulty.

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