

STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

INDUSTRIAL TECHNOLOGY

2 UNIT

SECTION II

AUTOMOTIVE INDUSTRIES

OPTION—ELECTRICAL

*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—Electrical (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—ELECTRICAL 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.

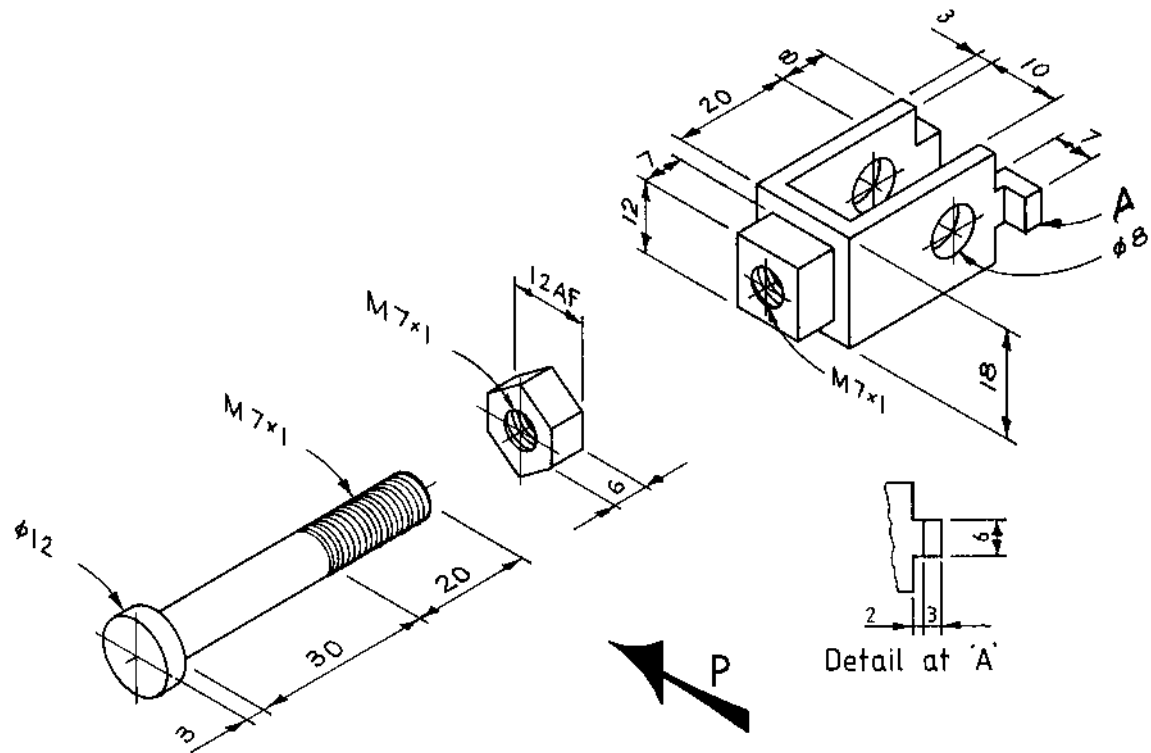
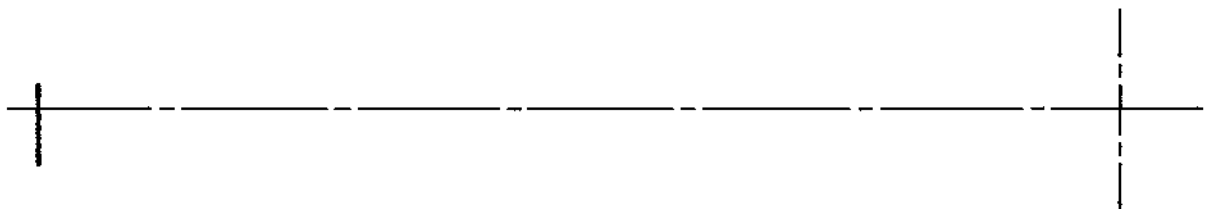


FIG. 1



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.

1
2
3
4

Question 5 continues on page 6

QUESTION 5 (Continued)

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

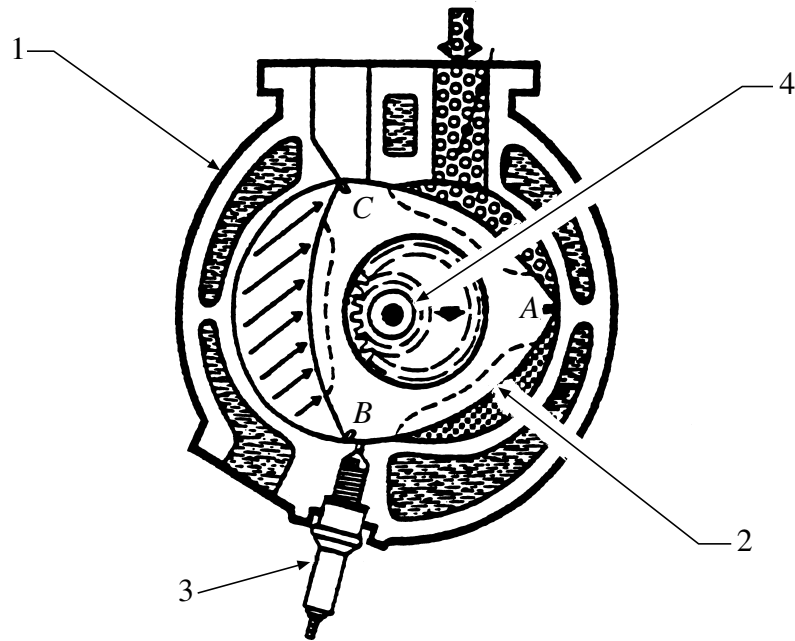


FIG. 2

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) Draw a circuit diagram for a traditional ignition system using a distributor and coil. Label each part.

(ii) A small sedan shows symptoms of being hard to start, with a weak spark and badly burnt distributor points. Describe a likely cause for this problem and the repair process.

Cause

Repair process

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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 dual filament globes are used in vehicle rear lights.

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(ii) A vehicle stop-light flashes intermittently when the brake pedal is pushed. Describe a possible fault that will cause this situation and give a method of repairing it.

Fault

Repair

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(d) Spark plugs are used to identify engine problems. Complete the following table to identify problems caused during ignition.

<i>Condition</i>	<i>Identification</i>	<i>Caused by</i>
Oil fouling		Excessive oil entering combustion chamber through worn rings and pistons, excessive clearance between valve guides and stems, or worn or loose bearings.
Gas fouling	Dry, black, fluffy deposits.	
	White, burnt, or blistered insulator nose and eroded electrodes.	Inefficient engine cooling, or engine overheating caused by improper ignition timing, wrong type of fuel, loose spark plugs, or too hot a plug.
Normal conditions		Regular or unleaded fuel.
Carbon fouling	Hard baked-on black carbon.	

QUESTION 6 (Continued)

(e) Ignition failure can be classified under three main headings.

- 1 *Loss of energy in primary circuit*
- 2 *Loss of energy in secondary circuit*
- 3 *Faulty timing*

For each of these headings indicate THREE specific conditions that could cause failure.

Loss of energy in primary circuit

Problem 1

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Problem 2

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Problem 3

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Loss of energy in secondary circuit

Problem 1

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Problem 2

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Problem 3

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Faulty timing

Problem 1

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Problem 2

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Problem 3

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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 continues on page 12

QUESTION 7 (Continued)

- (b) (i) The battery in a car should be inspected regularly.

List and describe the FOUR steps involved in battery maintenance.

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2

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3

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4

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- (ii) What is the name of the fluid used to top up a standard car battery?

Name

- (iii) Why is it important to use this fluid?

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- (iv) Research into solar powered vehicles is gaining greater support. Discuss the main reasons why solar power is not popular for privately owned vehicles.

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QUESTION 7 (Continued)

(c) (i) Use sketches to explain the difference between an alternator and a generator.

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(ii) Give TWO advantages of alternators over generators for the electrical system of a vehicle.

Advantage 1
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Advantage 2
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