

STUDENT NUMBER

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CENTRE NUMBER

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HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

INDUSTRIAL TECHNOLOGY

2 UNIT

SECTION II—PLASTICS INDUSTRIES

*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—Plastics (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—PLASTICS

(15 Marks)

QUESTION 4 This question is COMPULSORY. (5 marks)

As a new enterprise, a plastics company is contemplating manufacturing articles for use as accessories with computers, including a document holder, monitor stand and mouse holder.

Figure 1 shows a document holder.

Figure 2 shows the details of the joint.

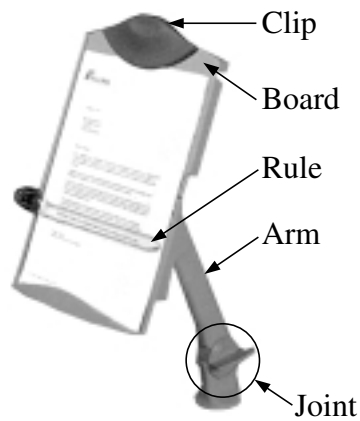


FIG. 1

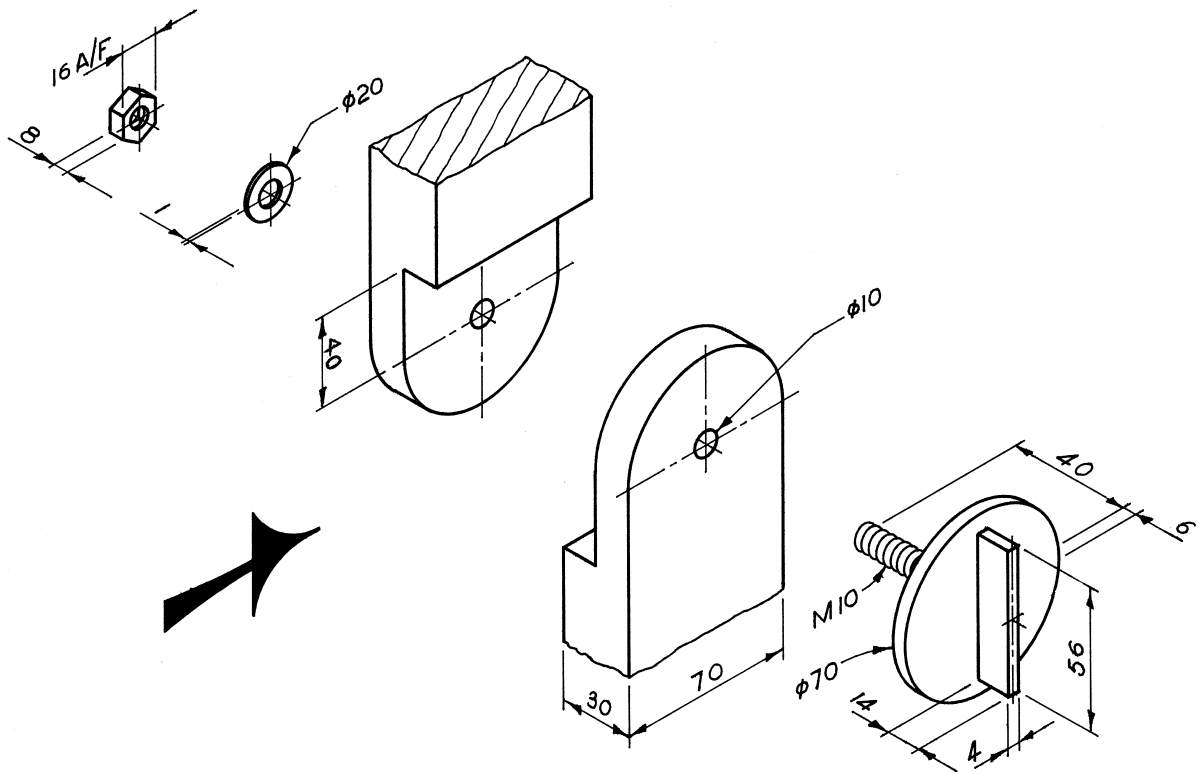


FIG. 2

QUESTION 4 (Continued)

- (a) (i) From the sketch (Figure 2) complete the view in the direction of the arrow, of the joint to a scale of 2 : 1, showing all relevant details. Use the starting points shown.



SCALE 2:1



Question 4 continues on page 4

QUESTION 4 (Continued)

- (ii) Complete the table below by listing the most suitable type of plastic and the process used to manufacture each part.

<i>Name of part</i>	<i>Type of plastic</i>	<i>Process to manufacture</i>
Rule		
Clip		
Arm		
Board		

- (b) The company is required to manufacture 10 000 boards for the document holder using GRP. Two methods are being considered, compression moulding or spray application using a chopped strand applicator.

- (i) Which method is most suitable for the manufacture of the board?

Method

- (ii) Give THREE reasons for this choice.

Reason 1

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Reason 2

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Reason 3

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QUESTION 4 (Continued)

(c) Figure 2 shows three different types of glass fibre products. Select ONE of these products that would be suitable for the board and explain the reason for your choice.

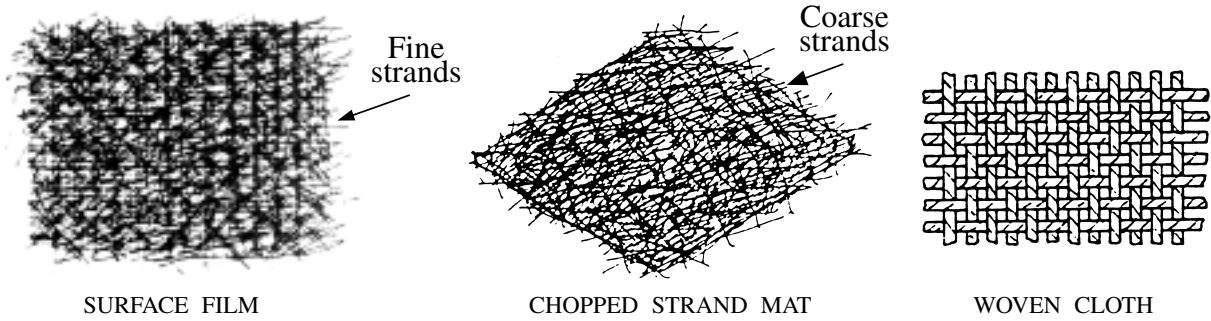


FIG. 3

Glass fibre product selection

Reason for choice

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(d) Explain the following terms when related to materials used in *resins*.

- (i) Catalyst
-
- (ii) Accelerators
-
- (iii) Gel coat
-
- (iv) Pigment
-
- (v) Filler
-

Attempt TWO questions from Questions 5, 6 and 7.

QUESTION 5 (5 marks)

- (a) The company is to make monitor stands and is in the process of selecting a manufacturing process.

One possibility is to powder-coat a metal frame (Figure 4).

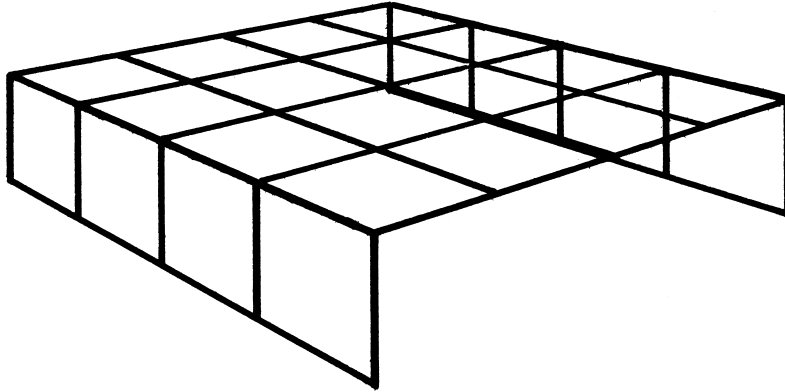


FIG. 4

- (i) Describe the following steps in the process of powder-coating.

Clean

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.....
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Apply powder

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.....
.....

Set plastic.....

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.....

QUESTION 5 (Continued)

- (ii) List THREE suitable plastic materials for use in powder-coating of metal.

Material 1

Material 2

Material 3

- (b) Another possibility would be to manufacture the monitor stand completely from plastic. The company requires a suitable design for this process.

Draw a freehand pictorial sketch of a suitable monitor stand. On the sketch, show required dimensions and any design notes that would assist with manufacture.

QUESTION 5 (Continued)

- (c) Using sketches, describe a manufacturing process that would be suitable for the monitor stand.

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- (d) List and discuss **THREE** environmental considerations in manufacturing the monitor stand.

Consideration 1

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Consideration 2

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Consideration 3

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QUESTION 6 (5 marks)

The mouse holder shown is to be manufactured from sheet PVC.



FIG 5

- (a) Describe TWO properties of PVC that allows the body of the holder to be easily shaped.

Property 1

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Property 2

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- (b) (i) An alternative mouse holder is to be constructed in a school workshop using the plug and ring method.

Describe, using sketches, the method of construction of the mouse holder.

Description of process for construction
at school

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QUESTION 6 (Continued)

- (ii) List THREE factors that must be considered when designing a mould for plug and ring moulding.

Factor 1

Factor 2

Factor 3

- (iii) Complete the sketch of a plug and ring mould to show where these design factors would be applied in the construction of the mould.

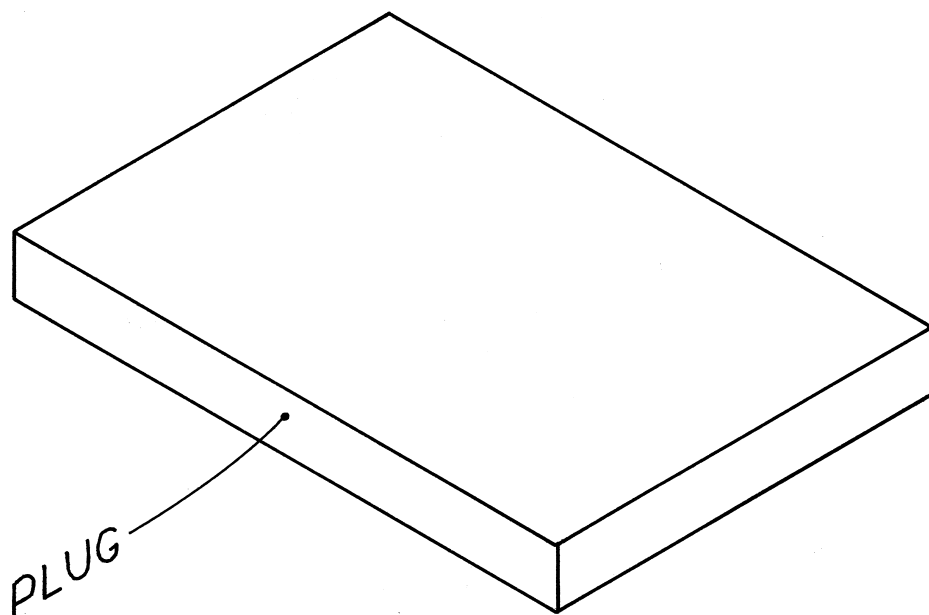
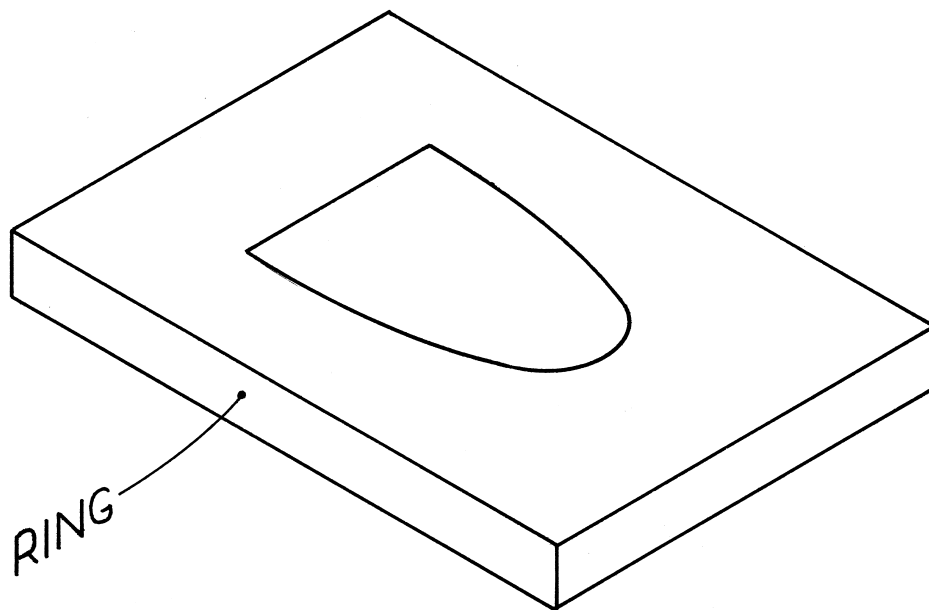


FIG 6

QUESTION 7 (5 marks)

- (a) (i) Discuss in terms of occupational health and safety, ONE regulation related to the manufacture of articles made from glass-reinforced polymer.

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- (ii) Discuss in terms of occupational health and safety, ONE regulation related to the manufacture of articles made from PVC.

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- (b) (i) What is the difference between a thermoplastic and a thermosetting plastic?

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- (ii) How is this difference reflected in the machinery used to manufacture plastic articles?

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QUESTION 7 (Continued)

- (c) The company has decided to test the materials used in manufacturing their products as part of a quality assurance program. The tests are to check the durability and strength of the products they are making.

The tests include:

- compression test
- tensile test
- impact test
- hardness test
- bend test
- impact test
- weather resistance test.

From the list of tests above, select TWO, and fully describe how the information from the test could be used to improve the quality of the company's products.

Test name

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Test name

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Question 7 continues on page 14

QUESTION 7 (Continued)

(d) A company has decided to increase the storage facilities within its factory to make sure that there is no damage and that all safety requirements are met. Discuss the storage requirements for:

(i) polyester resin;

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(ii) methyl ethyl ketone peroxide;

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(iii) PVC sheet.

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(e) During storage, clear plastic sheets made from acrylic and PVC were mixed together. List and describe THREE simple tests that could be used to identify these plastics.

Test 1

Description

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Test 2

Description

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Test 3

Description

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