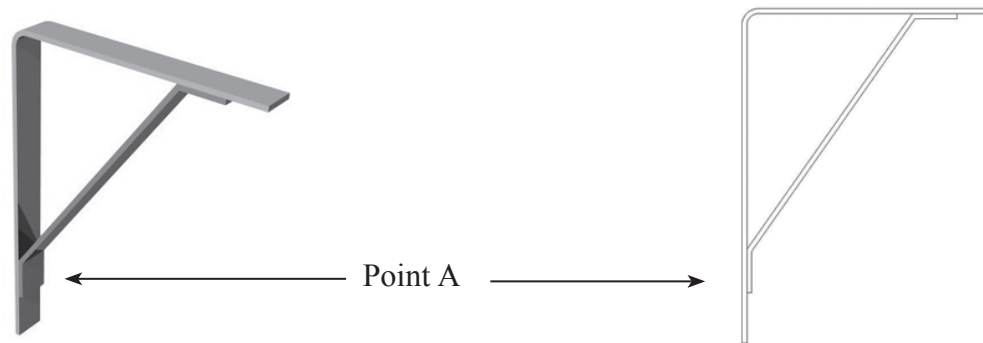


Answer ALL the questions. Write your answers in the spaces provided.

1. Figure 1 below shows a mild steel wall bracket which is designed to support a small wooden shelf.

Figure 1



Two mild steel components are riveted together at Point A to make the wall bracket. In this situation riveting is classified as a permanent joint.

- (a) Name **two** other permanent joints suitable for joining the two mild steel components.

1

2

(2)

- (b) Name **two** semi-permanent joints suitable for joining the two mild steel components.

1

2

(2)



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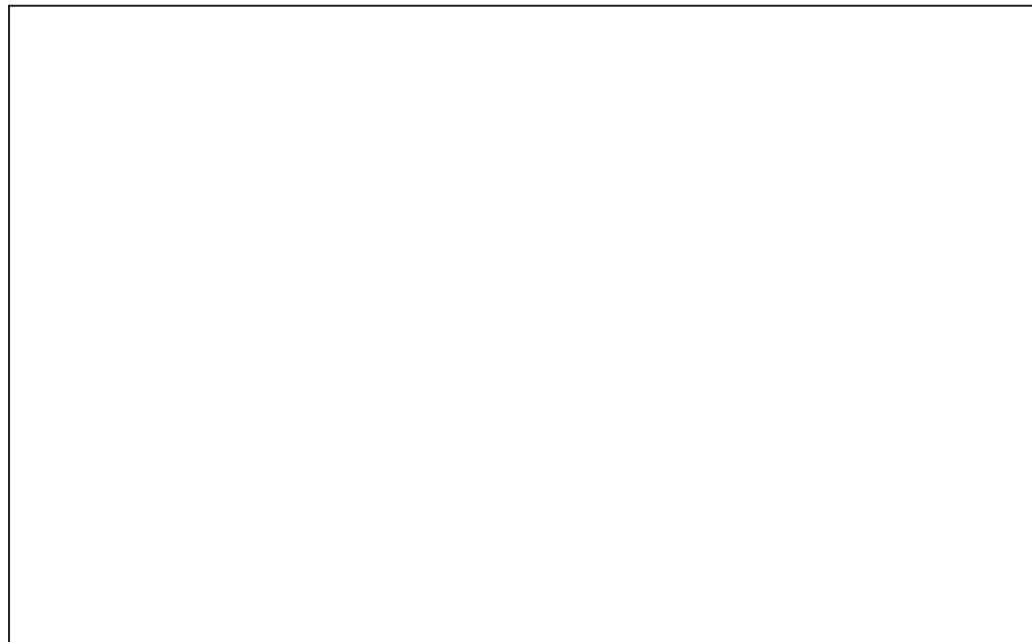
- (c) Figure 2 below shows two of the mild steel brackets supporting the small wooden shelf. The shelf is screwed to the brackets.

Figure 2



In order to screw the small wooden shelf to the mild steel brackets a pilot hole and a countersunk clearance hole are required.

In the space below, draw a labelled diagram to show the pilot hole and countersunk clearance hole.



(3)

- (d) State the purpose of using countersunk head screws.

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.....

(1)

(Total 8 marks)

Q1

3

Turn over



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2. Explain the following terms in relation to the mechanical properties of materials.

(a) Elasticity.

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..... (2)

(b) Ductility.

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..... (2)

(c) Hardness.

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..... (2)

(d) Malleability.

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.....
..... (2)

(Total 8 marks)

Q2



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3. Bearings are used frequently in mechanical systems.

(a) In the space below, sketch a ball bearing.



(3)

(b) Bushes are also a common form of bearing.

Explain **one** reason why a bush would be used in preference to a ball bearing.

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(2)



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(c) Once timber has been felled it must be seasoned (dried) before it can be used. This can be done by either kiln seasoning or natural seasoning.

(i) Describe the kiln seasoning process.

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(4)

(ii) Give **two** advantages of kiln seasoning over natural seasoning.

1

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2

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(2)

(iii) Give **one** disadvantage of kiln seasoning over natural seasoning.

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(1)

(Total 12 marks)

Q3

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7

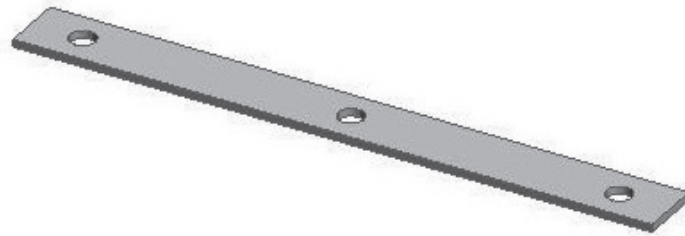
Turn over



N 2 8 9 9 3 A 0 7 2 0

4. Figure 3 below shows one of a batch of 100 small metal brackets. Each bracket has three holes in it and the positioning of the holes is crucial to it functioning correctly.

Figure 3



- (a) Explain **two** reasons why a jig would be used in the manufacture of this bracket.

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2

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(4)



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(b) (i) Give **four** advantages of the Just in Time (JIT) production system.

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4

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(4)

(ii) Explain **one** disadvantage of a Just in Time (JIT) production system.

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(2)

Q4

(Total 10 marks)

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5. Figure 4 below shows a computer mouse. The outer case is manufactured from High Impact Polystyrene (HIPS).

Figure 4



- (a) Give **three** reasons why High Impact Polystyrene is an appropriate material for the case of the mouse.

1

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3

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(3)



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blank

(b) Describe **two** quality control checks that would be carried out on the finished mouse.

1

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(4)

(c) Explain why the body of the mouse would be batch produced.

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(3)

(Total 10 marks)

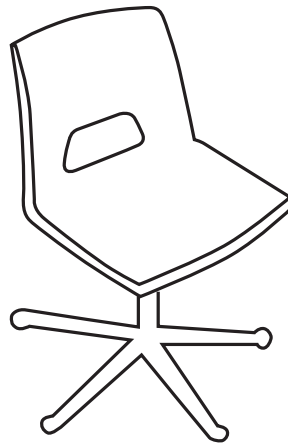
Q5

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6. Figure 5 below shows a line drawing of a chair which has been produced in high volume.

Figure 5



(a) Name a specific plastic which could be used for the manufacture of the chair seat.

..... (1)

(b) During the design stages the chair seat will have been modelled using rapid prototyping.

(i) Describe how the chair can be modelled using rapid prototyping.

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(3)



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(ii) Give **two** advantages of rapid prototyping over traditional methods of modelling.

1

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2

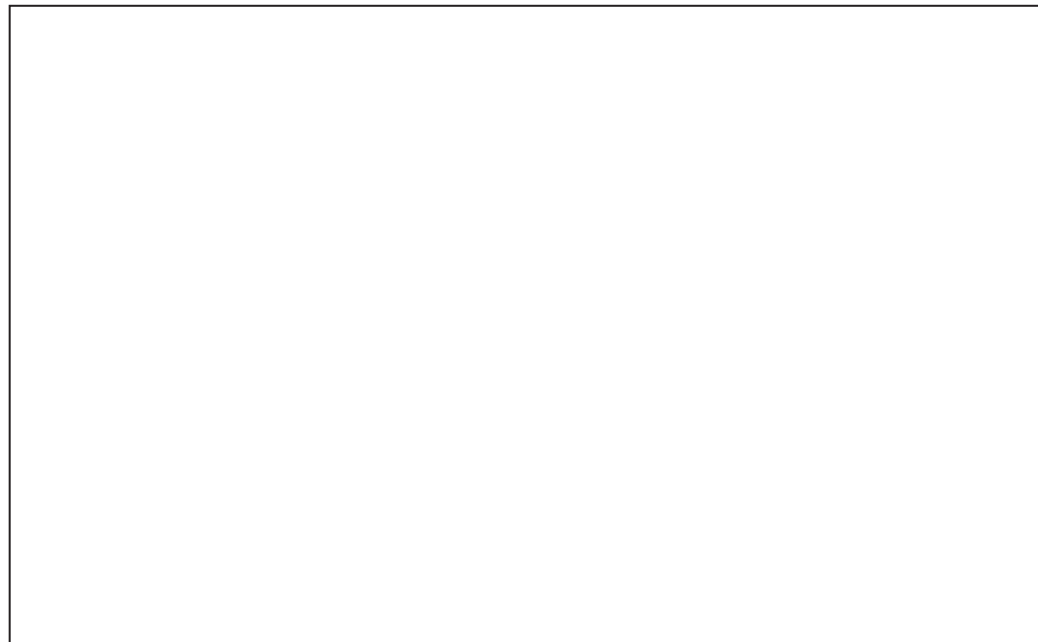
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(2)

(c) The chair seat is injection moulded.

In the space below, draw a labelled diagram of the injection moulding process.



(6)

Q6

(Total 12 marks)



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