OCR
Oxford Cambridge and RSA

Thursday 10 January 2019 – Afternoon

LEVEL 1/2 CAMBRIDGE NATIONAL IN ENGINEERING MANUFACTURE

R109/01 Engineering materials, processes and production

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
None

Duration: 1 hour

R109O1

7604023296

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the barcodes.

INFORMATION FOR CANDIDATES

- The total number of marks for this paper is **60**.
- The number of marks for each question is given in brackets **[ ]** at the end of each question or part question.
- Dimensions are in millimetres unless stated otherwise.
- Your quality of written communication will be assessed in questions marked with an asterisk (*****).
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 **(a)** Fig. 1 shows a taxi.

Fig. 1

(i) Circle the ferrous metal commonly used to make vehicle bodies such as the taxi.

mild steel **brass** **titanium** **zinc** **[1]**

(ii) Give **one** property of the material chosen in part **(i)** that makes it suitable for a vehicle body.

.....

..... **[1]**

(iii) Name **one** other ferrous metal.

..... **[1]**

(b) Fig. 2 shows a boat. The hull of the boat is made from Glass Reinforced Plastic (GRP) and is manufactured using a moulding process.

Fig. 2

(i) Circle the term from the list below which describes Glass Reinforced Plastic (GRP).

Ferrous **Non Ferrous** **Smart material** **Composite** **[1]**

(ii) Give **three** properties or characteristics that make GRP a suitable material to use for manufacturing a boat hull.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Fig. 3 shows a milk bottle made from a ceramic material.

Fig. 3

(i) Name the material used to make the bottle in Fig. 3.

..... **[1]**

(ii) Give **two** reasons why the material chosen is suitable for the bottle.

1 .....

.....

2 .....

.....

[2]

2 A list of engineering materials is given below.

Concrete	**Copper**	**Epoxy Resin**
Nylon	**Phenol Formaldehyde**	**Polyvinyl Chloride (PVC)**

(a) Complete the following table by adding **two** thermoplastics and **two** thermosetting plastics from the list above. Give a different use for each of the materials selected.

Thermoplastic	**Use**
1.	
2.	
Thermosetting Plastic	**Use**
1.	
2.	

[8]

(b) Blow moulding is one example of a heat process used to shape thermoplastic materials. Name **two** other heat processes used for shaping thermoplastic materials.

1 .....

2 .....

[2]

3 **(a)** **(i)** Fig. 4 shows a range of different forms of supply for mild steel.
State the name of each form in the space provided.
One has been done for you.

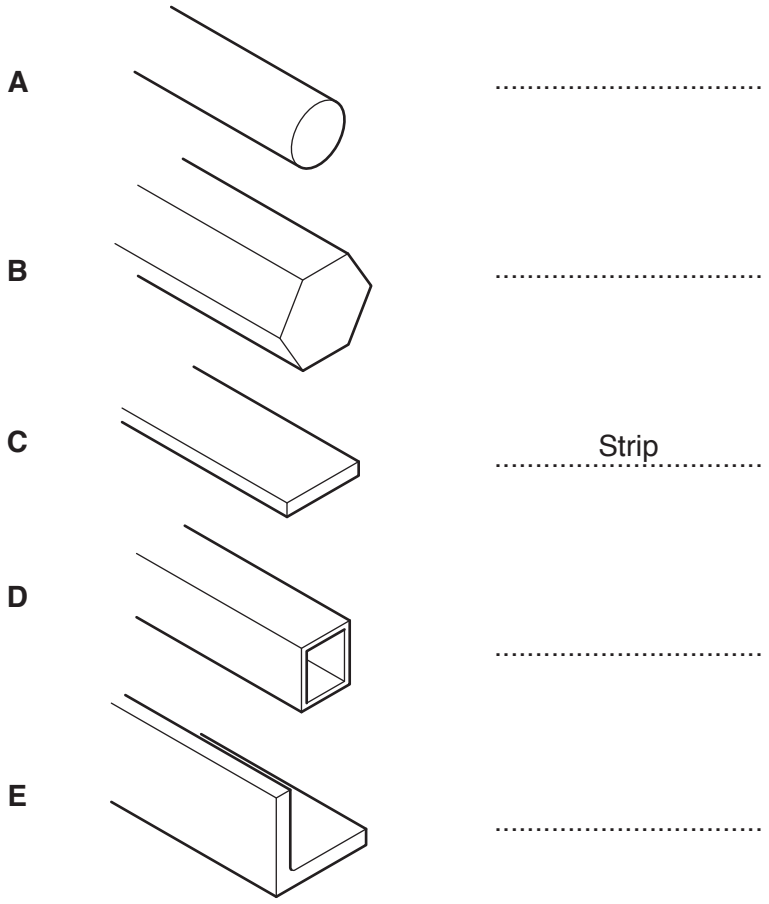

Fig. 4

[4]

(ii) An outdoor bracket which can be used to hold a flower basket is shown in Fig. 5.
The bracket is made from mild steel and has been shaped on the forge.

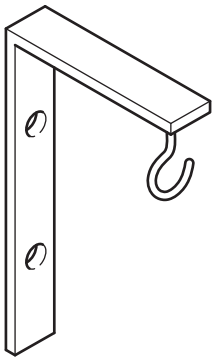

Fig. 5

State which material form in Fig. 4, **A**, **B**, **C**, **D** or **E**, is suitable for the forged bracket.

..... **[1]**

(b) Use the terms given below to complete the table to show the correct order of stages in forging the bracket.
Two stages have been done for you.

Place metal on the anvil | **Heat the metal in the forge**

Cut metal to required length | **Drill holes in bracket for wall fixing**

Allow metal to cool | **Hammer the metal to a right angle**

Stage	Process
1	Cut metal to required length
2	
3	
4	
5	
6	Allow metal to cool

[3]

(c) Give **two** reasons why forging the bracket is a more appropriate method than cold bending.

1 .....

.....

2 .....

.....

[2]

4 Fig. 6 shows a manual vertical milling machine.

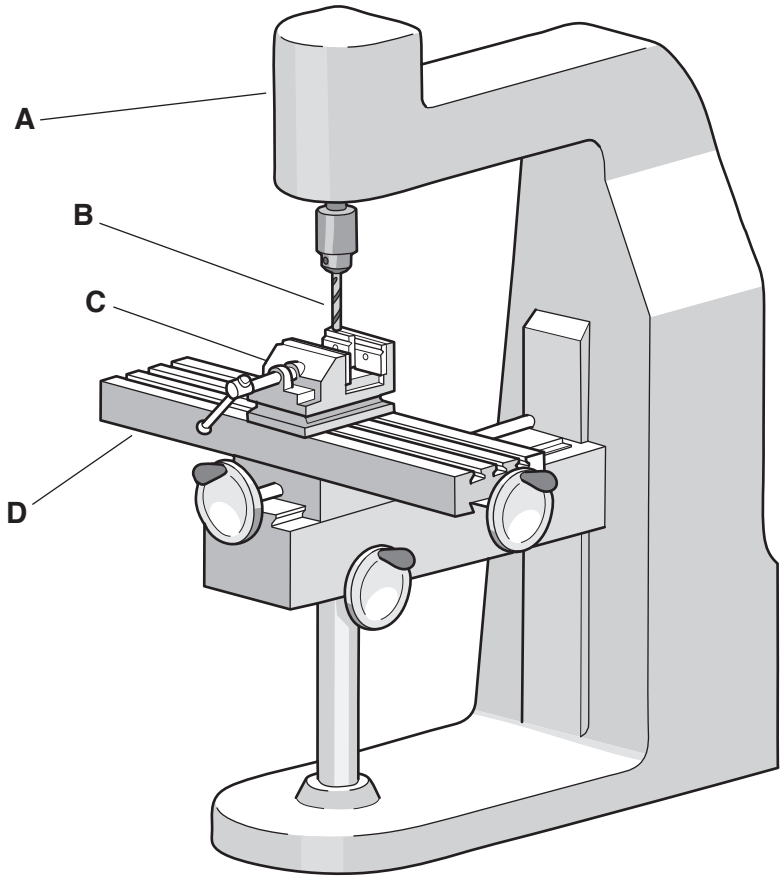

Fig. 6

(a) Name the four parts of the milling machine that have been labelled in Fig. 6.

A .....

B .....

C .....

D .....

[4]

(b) State the number of axes of movement on the milling machine shown in Fig. 6.

..... **[1]**

(c) Milling machines can be used for drilling.
State **two** other operations a milling machine can carry out.

1 .....

.....

2 .....

.....

[2]

(d) State **three** safety checks that should be carried out on a milling machine before switching the machine on.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

5 **(a)** Laser welding is one type of welding.

(i) Give **one** example of where laser welding may be used.

.....

..... **[1]**

(ii) Name **one** other type of welding.

..... **[1]**

(iii) State **two** PPE precautions that should be taken when welding.

1 .....

.....

2 .....

..... **[2]**

(b) Give **two** benefits of using Computer Aided Design (CAD) to create a model prior to going into full scale production.

1 .....

.....

2 .....

..... **[2]**

(c) Describe a rapid prototyping process that could be used to make a 3D prototype.

.....

.....

.....

.....

.....

..... **[4]**

6 **(a)** Describe the impact made by modern technology on the following:

(i) The workforce

.....

.....

.....

..... **[2]**

(ii) The product

.....

.....

.....

..... **[2]**

(b)* Discuss the advantages and disadvantages of modern technology in engineering production when compared with more traditional processes.

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..... **[6]**

END OF QUESTION PAPER

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