Modified Enlarged 18pt

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Thursday 9 January 2020 – Afternoon

Level 1/2 Cambridge National In Engineering Manufacture

R109/01 Engineering materials, processes and production

Time allowed: 1 hour
plus your additional time allowance

No extra materials are needed.

Please write clearly in black ink.

Centre number | | | | | |

Candidate number | | | | |

First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF

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INSTRUCTIONS

Use black ink. You can use an HB pencil, but only for graphs and diagrams.

Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, centre number and the question numbers.

Answer ALL the questions.

INFORMATION

The total mark for this paper is 60.

The marks for each question are shown in brackets [ ].

Quality of written communication will be assessed in questions marked with an asterisk (*).

ADVICE

Read each question carefully before you start your answer.

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Answer ALL the questions.

1 (a) The table below shows four manufactured items.

Complete the table by selecting a material from the list that is suitable for each item AND give one reason for your selection. [8]

Aluminium alloy	**Copper**
Polyvinyl Chloride (PVC)	**Polycarbonate**
High Speed Steel	**Polyethylene**
Brass	

(b) Explain why tungsten carbide is used in engineering.

_____

_____

_____

_____ **[2]**

Item	Suitable material	Reason for selection
Curved corrugated roof panel		
Wheel rim		
Plumbing pipe fitting		
Twist drill		

2 (a) Complete the table by stating the material group that each material belongs to.
The first one has been completed for you. [5]

Material	Material Group
Brass	Non-Ferrous metal
Polypropylene	
Carbon Steel	
Epoxy Resin	
Carbon Fibre	
Glass	

(b) (i) Describe what is meant by the term 'shape-memory alloy'.

_____

_____

_____

_____ [2]

(ii) Give ONE example of a use for a shape-memory alloy.

_____ [1]

(iii) Name TWO other smart materials.

1 _____

2 _____

[2]

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3 Fig. 1 shows a plastic bottle which has been formed by blow moulding.

Fig. 1

(a) The table below shows the processes used to form the bottle.

Stage	Process
A	A split die the shape of the bottle is closed
B	Mould is cooled, opened and bottle removed
C	Plastic granules are fed into a hopper
D	Plastic takes the shape of the bottle
E	Air is forced into mould
F	Plastic is heated and fed into the mould

Put the processes in the correct order. Two have been completed for you. [3]

A					B

(b) (i) State why urea-formaldehyde is an unsuitable material for the body of the bottle.

_____

_____ **[1]**

(ii) State ONE forming process suitable to make the plastic screw cap used with the bottle.

_____ **[1]**

(c) State TWO safety precautions, other than Personal Protective Equipment (PPE), that must be observed when carrying out heat forming processes on thermoplastics.

1 _____

_____

2 _____

_____

[2]

(d) **Explain the benefits of using plastic to produce bottles.**

_____

_____

_____

_____

_____

_____ **[3]**

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4 Fig. 2 shows a pedestal grinder.

Fig. 2

(a) Using the list below, name the FIVE parts that have been labelled in Fig. 2.

Spark deflector	Wheel
Stand	Spindle
Tool rest	Water trough
Eye shield	Wheel guard

A _____

B _____

C _____

D _____

E _____

[5]

(b) State ONE use of a grinding wheel.

_____ [1]

(c) State TWO items of Personal Protective Equipment (PPE) that should be worn when operating a grinding machine.

1 _____

2 _____

[2]

(d) **Grinding is classified as a material removal process.**
Name TWO other material removal processes.

1 _____

2 _____

[2]

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5 Fig. 3 shows a metal plate being cut using a water jet cutter.

Fig. 3

(a) Explain the benefits of water jet cutting as a method of production.

_____

_____

_____

_____

_____

_____ [3]

(b) Name ONE other process that could be used to cut out hole A shown in Fig. 3.

_____ [1]

(c) (i) Explain what is meant by the term 'global manufacturing'.

_____

_____

_____

_____ [2]

(ii) State TWO benefits of global manufacturing.

1 _____

_____

2 _____

_____

[2]

(iii) State TWO ways that ideas can be shared between global companies.

1 _____

_____

2 _____

_____

[2]

6 (a) Fig. 4 shows an aluminium key ring blank that has been stamped using a Computer Numerical Control (CNC) punching machine.

Fig. 4

(i) Name TWO processes that could be used to manually produce the shape.

1 _____

2 _____

[2]

(ii) Explain why using the CNC punching machine is a more suitable method of producing the shape than manually.

_____

_____

_____

_____ [2]

(b)* 'The use of modern technology to design and manufacture products is very efficient but costly.' Discuss this statement.

_____ [6]

END OF QUESTION PAPER

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