

Modified Enlarged 24pt
OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Tuesday 3 June 2025 – Afternoon

**Level 1/Level 2 Cambridge National in
Engineering Manufacture**

**R014/01 Principles of engineering
manufacture**

**Time allowed: 1 hour 15 minutes
plus your additional time allowance**

YOU CAN USE:
a calculator

Please write clearly in black ink.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF



INSTRUCTIONS

Use black ink.

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, the centre number and the question numbers.

Answer ALL the questions.

INFORMATION

The total mark for this paper is 70.

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

ADVICE

Read each question carefully before you start your answer.

SECTION A

Put a tick (✓) in the box next to the **ONE** correct answer for each question.

1 Which of these is a type of welding process? [1]

(a) CAD

☐

(b) MAG

☐

(c) PLA

☐

(d) QTC

☐

2 Which of these is a smart material? [1]

(a) Epoxy resin

☐

(b) Photochromic pigment

☐

(c) Stainless steel

☐

(d) Tungsten carbide

☐

3 Which of these describes a wasting manufacturing process? [1]

(a) The addition of material to create a product ☐

(b) The joining of two materials together to produce a product ☐

(c) The removal of material to create a product ☐

(d) The use of casting to produce a product ☐

4 Which category of LEAN WASTE means to add more components than the customer wants? [1]

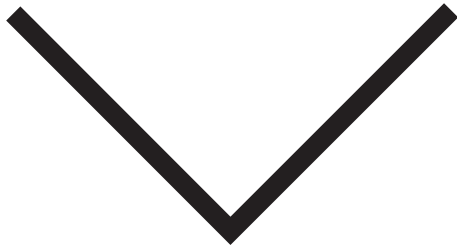
(a) Movement ☐

(b) Over-processing ☐

(c) Over-production ☐

(d) Waiting ☐

5 What does this symbol represent on an engineering drawing? [1]



(a) Countersink

☐

(b) Knurl

☐

(c) Thread

☐

(d) Tolerance

☐

6 Which of these is an additive manufacturing method? [1]

(a) Fused deposition modelling

☐

(b) Injection moulding

☐

(c) Press forming

☐

(d) Strip heating

☐

7 Which of these processes uses a cutting tool to remove material from a rotating workpiece? [1]

(a) Drilling

☐

(b) Laser cutting

☐

(c) Shearing

☐

(d) Turning

☐

8 Which of these items of equipment do you need to create a screw thread? [1]

(a) Nuts and bolts

☐

(b) Saw and blade

☐

(c) Tap and die

☐

(d) Tin snips and guillotine

☐

9 Which of these material types is a combination of two or more elements, where at least one is a metal? [1]

(a) Alloy

☐

(b) Composite

☐

(c) Thermoplastic

☐

(d) Thermoset

☐

10 According to BS 8888, what is the correct abbreviation for DRAWING? [1]

(a) DGR

☐

(b) DGW

☐

(c) DRG

☐

(d) DRW

☐

SECTION B

11 A manufacturing company makes metal exterior body panels for buses.

(a)

(i) Identify ONE process that would be suitable for finishing the bus body panels.

[1]

(ii) Explain TWO reasons why finishing processes are necessary when manufacturing the bus body panels.

1

2

[4]

(b) State THREE reasons why a quality system should be implemented for the bus body panels.

1 _____

2 _____

3 _____

[3]

(c) The bus body panels will be manufactured using a just in time (JIT) approach.

Explain ONE advantage of using a just in time (JIT) approach to manufacture the bus body panels.

[2]

12 You are vacuum forming the hard hat shown below.



(a)

(i) Identify ONE specific polymer material that would be suitable for producing the vacuum-formed hard hat.

_____ **[1]**

(ii) State TWO typical forms of supply of the material identified in part (a)(i).

1 _____

2 _____

[2]

(b) Identify TWO safety measures that should be taken when vacuum forming the hard hat. For EACH, explain why it is necessary.

Safety measure 1 _____

Why it is necessary _____

Safety measure 2 _____

Why it is necessary _____

[4]

(c) State THREE characteristics of a suitable mould for producing the vacuum-formed hard hat.

1 _____

2 _____

3 _____

[3]

13

- (a) This cutting tool for a milling machine is made from silicon carbide.



Evaluate how the PROPERTIES of this material make it suitable for this application.

[4]

(b) State TWO OTHER common applications of silicon carbide.

1

2

[2]

(c) Silicon carbide is an example of an engineering ceramic.

Describe FOUR steps required to produce a ceramic part using powder metallurgy.

1 _____

2 _____

3 _____

4 _____

[4]

14

(a) Describe what an INTERNATIONAL STANDARD is in relation to manufacturing.

[2]

(b) Explain how globalisation has impacted the cost of buying manufactured products.

[2]

[6]

15

(a) Describe what each of these material properties mean:

(i) Elasticity

_____ **[1]**

(ii) Ductility

_____ **[1]**

(iii) Malleability

_____ **[1]**

(b) State THREE types of non-ferrous metals.

1 _____

2 _____

3 _____

[3]

(c) State TWO applications of cast iron. For EACH application, explain a different reason why this material is used.

Application 1 _____

Why cast iron is used _____

Application 2 _____

Why cast iron is used _____

[4]

16

- (a) Describe TWO products that would typically be made using one-off manufacture.

An example is given for you:

EXAMPLE: A 3D printed joystick, made to fit a prototype games controller.

1 _____

2 _____

[4]

(b) Explain ONE advantage of using CAM to manufacture products.

[2]

(c) Explain ONE advantage and ONE limitation of using templates to manufacture products.

Advantage _____

Limitation _____

[4]

END OF QUESTION PAPER

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