OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

General Certificate of Secondary Education

B234

Manufacturing

Unit B234: Impact of modern technologies on manufacturing

Specimen Paper

Time: 1 hour

Candidates answer on the question paper.
Additional materials:

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do not write in the bar codes.
- Do not write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 60.

For Examiner's Use Only	
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This document consists of **7** printed pages and **1** blank page.

  [Turn over

Answer **all** questions.

1 For each products listed below select the correct sector they are manufactured in.

SECTORS

Chemical and Pharmaceutical
Clothing and Textiles
Motor manufacturing
Food and Drink
Furniture
Machinery and Equipment
Packaging
Electronic and Communications

Product:

Gluten free ready meal .....

Lipstick .....

Outdoor sportswear .....

Touch screen .....

Vacuum cleaner .....

Sandwich carton .....

Child's cot .....

[7]

2 Tick **one** of the following products which you will use to answer the following questions:

- ☐ Gluten free ready meal
- ☐ Lipstick
- ☐ Outdoor sportswear
- ☐ Touch screen
- ☐ Vacuum cleaner
- ☐ Sandwich carton
- ☐ Child's cot
- ☐ Holiday brochure
- ☐ Windscreen wiper blade
- ☐ Security light bulb

For your chosen product state one **technology** used:

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

For your chosen product state one **benefit** of using that technology:

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

3 Name **one** specific tool or item of equipment you have used to manufacture a product and describe how to use it safely.

Tools/equipment ..... **[1]**

Safe use .....

.....

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

4 Describe **two** features of a product you have studied that show it has been designed for manufacturing assembly.

Name of product: .....

1 .....

.....

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

2 .....

.....

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

5 Connect **one** manufacturing sector to a standardised component used in that sector.

SECTOR	COMPONENT
chemical and pharmaceutical	zip fasteners
clothing and textiles	castors
electrical	nuts and bolts
food and drink	child resistant containers
furniture	brake linings
packaging	3 pin plug
machinery and equipment	polystyrene beads
electronic and communications	A4 card
paper and print	LEDs
motor manufacturing	Chocolate vermicelli

[1]

6 Choose a **different** manufacturing sector and connect it to a standardised component used in that sector.

SECTOR	COMPONENT
chemical and pharmaceutical	zip fasteners
clothing and textiles	castors
electrical	nuts and bolts
food and drink	child resistant containers
furniture	brake linings
packaging	3 pin plug
machinery and equipment	polystyrene beads
electronic and communications	A4 card
paper and print	LEDs
motor manufacturing	Chocolate vermicelli

[1]

7 Sustainability and consideration of the environment are important issues in manufacturing. Give **two** factors to consider when deciding upon the selection of materials or components

Factor 1 .....

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

Factor 2 .....

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

8 Tick the **two** most important issues to consider when deciding whether to buy in pre-processed materials rather than to process them on site.

☐ Marketing

☐ Packaging costs

☐ Space requirements

☐ Machinery costs

☐ Material properties

☐ Assembly methods

☐ Quality

[2]

9 One consideration in Design for Manufacturing Assembly (DFMA) is **handling**

Tick **two** issues when considering handling.

☐ Marketing

☐ Packaging costs

☐ Space requirements

☐ Material properties

☐ Assembly methods

☐ Quality **[2]**

10 Describe a different consideration for each area below when designing for lean manufacture.

materials .....

.....

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

manufacturing processes .....

.....

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

quality control .....

.....

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

11 (a) Tick **two** items that are scrap.

☐ Contaminated materials

☐ Spare materials for recycling

☐ Offcuts that could be reused

☐ Faulty products that cannot be reworked or sold on

☐ Spare components

[2]

(b) Describe in detail how **one** specific type of scrap can be generated during the manufacturing process.

.....

.....

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

12 Discuss the importance of Just In Time (JIT) in reducing costs and improving manufacturing efficiency.

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

13 Discuss how and why production plans may need to be modified following a new product launch.

[6]

14 Part of a flow process chart is shown.

Flow Process Chart

☑ **Present method** ☐ **Proposed method**

Subject: *Finishing and packaging*

Chart begins: *Air cooling*

Chart ends: *Pack in outer cartons*

Symbols	Description	Distance (m)	Time (s)
○ ⇨ □ ◗ ∇	Air cooling		
○ ⇨ □ ◗ ∇	Remove from mould		
○ ⇨ □ ◗ ∇	Conveyor to line 2		
○ ⇨ □ ◗ ∇	Trim edges		
○ ⇨ □ ◗ ∇	Conveyor to inspection		
○ ⇨ □ ◗ ∇	Manual inspection		
○ ⇨ □ ◗ ∇	Pierce top		
○ ⇨ □ ◗ ∇	Wait		
○ ⇨ □ ◗ ∇	Carry to packing line		
○ ⇨ □ ◗ ∇	Box in dozens		
○ ⇨ □ ◗ ∇	Conveyor to line 4		
○ ⇨ □ ◗ ∇	Pack in outer cartons		

Tick the correct meaning of the two symbols below.

Symbol 1 ◗

☐ Operation

☐ Delay

☐ Transport

☐ Storage **[1]**

Symbol 2 ⇨

☐ Delay

☐ Transport

☐ Storage

☐ Inspection **[1]**

15 Explain the contribution of flow process charts to lean manufacture.

[4]

16* Discuss the impact of Design for Manufacturing Assembly (DFMA) on manufactured products.

[6]

Total [60]

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

General Certificate of Secondary Education

MANUFACTURING B234

Unit B234: Impact of modern technologies on manufacturing

Specimen Mark Scheme

The maximum mark for this paper is [60].

Question Number	Answer	Max Mark
1	**For each product listed below select the correct sector.** **SECTORS** **Chemical and Pharmaceutical:** **Clothing and Textiles** **Motor manufacturing** **Food and Drink** **Furniture** **Machinery and Equipment** **Packaging** **Electrical and Communications** **Gluten free ready meal** **Lipstick** **Outdoor sportswear** **Touch screen** **Vacuum cleaner** **Sandwich carton** **Child's cot** One mark for each correct placement	**[7]**

Gluten free ready meal	Food and drink
Lipstick	Chemical and Pharmaceutical
Outdoor sportswear	Clothing and textiles
	Motor manufacturing
Child's cot	Furniture
Vacuum cleaner	Machinery and Equipment
Sandwich carton	Packaging
Touch screen	Electrical and communications

<table>
<tr><th>Question Number</th><th>Answer</th><th>Max Mark</th></tr>
<tr><td>2</td><td>
Tick <u>one</u> of the following products which you will use to answer the following questions:
☐ Gluten free ready meal
☐ Lipstick
☐ Outdoor sportswear
☐ Touch screen
☐ Vacuum cleaner
☐ Sandwich carton
☐ Child’s cot
☐ Holiday brochure
☐ Windscreen wiper blade
☐ Security light bulb
For your chosen product state one technology used:
For your chosen product state one benefit of using that technology:
No marks for selection
One mark for technology used in the selected product
One mark for a benefit of using the stated technology
<table>
<tr><th>product</th><th>Eg technology</th><th>Eg benefit</th></tr>
<tr><td>Gluten free ready-meal</td><td>Controlled Environment package</td><td>ensures freshness</td></tr>
<tr><td>Lipstick</td><td>Iridescent liquid crystal compounds</td><td>Not fishscales - vegan</td></tr>
<tr><td>Outdoor sportswear</td><td>Breathable fabric</td><td>Improved wearer comfort</td></tr>
<tr><td>Touch screen</td><td>LCD</td><td>Thin screen takes up less room</td></tr>
<tr><td>Vacuum cleaner</td><td>Injection moulding</td><td>Precision made for better assembly</td></tr>
<tr><td>Sandwich carton</td><td>Temperature sensitive label</td><td>Shows that sandwich has been stored below 5C</td></tr>
<tr><td>Child’s cot</td><td>Antibacterial fibres in mattress</td><td>Reduces health risk</td></tr>
<tr><td>Holiday brochures</td><td>CAD</td><td>Can be designed and altered on screen – time saving</td></tr>
<tr><td>Windscreen wiper blade</td><td>Extrusion</td><td>Continuous process</td></tr>
<tr><td>Security light bulb</td><td>Quartz Halogen</td><td>More efficient light – high intensity – small size</td></tr>
</table>
</td><td>[2]</td></tr>
</table>

Question Number	Answer	Max Mark
3	**Name <u>one</u> specific tool or item of equipment you have used to manufacture a product and describe how to use it safely.** One mark for giving the correct name of a tool or item of equipment Eg vegetable (or other specific named) knife, scissors, chisel, vacuum former two marks for safe use described: eg wear protective clothing (1), such as (1). Use a chopping board(1) to avoid blade slipping (1) beware of hot/sharp items(1).	**[3]**
4	**Describe <u>two</u> features of a product you have studied that show it has been designed for manufacturing assembly.** No marks for naming product 2 marks for first feature described 2 marks for second feature described Eg lugs(1) for lifting in assembly(1), dog-nosed bolts(1) for auto insertion(1), yogurt packaging(1) with date stamp(1) space, injection mould evidence(1) (from sprues(1) or date/moulding number marks(1))	**[4]**

Question Number	Answer	Max Mark
5	**Connect <u>one</u> manufacturing sector to a standardised component used in that sector.**	

SECTOR	COMPONENT
chemical and pharmaceutical	**zip fasteners**
clothing and textiles	**castors**
electrical	**nuts and bolts**
food and drink	**child resistant containers**
furniture	**brake linings**
packaging	**3 pin plug**
machinery and equipment	**polystyrene beads**
electronic and communications	**A4 card**
paper and print	**LEDs**
motor manufacturing	**Chocolate vermicelli**

One mark for a correct pairing as shown below

Chemical and Pharmaceutical	Child resistant containers
Clothing and textiles	Zip fasteners
Electrical	3 pin plug
Food and drink	Hundreds and thousands
Furniture	Castors
Packaging	Polystyrene beads
Machinery and Equipment	Nuts and bolts
Electronic and communications	LEDs
Paper and print	A4 card
Motor manufacturing	Brake linings

[1]

Question Number	Answer	Max Mark
6	**Choose a <u>different</u> manufacturing sector and connect it to a standardised component used in that sector.**	

SECTOR	COMPONENT
chemical and pharmaceutical	**zip fasteners**
clothing and textiles	**castors**
electrical	**nuts and bolts**
food and drink	**child resistant containers**
furniture	**brake linings**
packaging	**3 pin plug**
machinery and equipment	**polystyrene beads**
electronic and communications	**A4 card**
paper and print	**LEDs**
motor manufacturing	**Chocolate vermicelli**

One mark for a correct pairing as shown below. Must differ from answer given in question 5.

Chemical and Pharmaceutical	Child resistant containers
Clothing and textiles	Zip fasteners
Electrical	3 pin plug
Food and drink	Hundreds and thousands
Furniture	Castors
Packaging	Polystyrene beads
Machinery and Equipment	Nuts and bolts
Electronic and communications	LEDs
Paper and print	A4 card
Motor manufacture	Brake linings

[1]

Question Number	Answer	Max Mark
7	**Sustainability and consideration of the environment are important issues in manufacturing. Give two factors to consider when deciding upon the selection of materials or components.** Labels, buttons, resistors, transistors, wood screws, foil trays, washers… 2 marks for each appropriate factor with expansion given eg: Environmental impact(1) material obtained from sustainable source therefore reducing impact on the environment(1) **One mark only for factor not expanded, eg availability, cost.**	**[4]**
8	**Tick the <u>two</u> most important issues to consider when deciding whether to buy in pre-processed materials rather than to process them on site.** ☐ **Marketing** ☐ **Packaging costs** ☐ **Space requirements** ☐ **Machinery costs** ☐ **Material properties** ☐ **Assembly methods** ☐ **Quality** One mark for each of 2 from: Space requirements Machinery costs Quality	**[2]**
9	**One consideration in Design for Manufacturing Assembly (DFMA) is handling** **Tick <u>two</u> issues when considering handling.** ☐ **Marketing** ☐ **Packaging costs** ☐ **Space requirements** ☐ **Material properties** ☐ **Assembly methods** ☐ **Quality** One mark for each of 2 from: Material properties Assembly methods Space requirements	**[2]**

Question Number	Answer	Max Mark
10	**Describe a different consideration for each area below when designing for lean manufacture.** **Materials** **Manufacturing processes** **Quality control** 2 marks for clear description of a consideration related to each area (one for a single point): <u>Materials</u> processing requirements (1) physical properties (1) to suit product specification(1) cost(1) availability(1) form supplied(1) <u>Manufacturing processes</u> Processing times(1) Reliability/efficiency(1)make to meet spec(1)cost of equipment(1) <u>Quality control</u> Inspection points(1)Improvement in reject rate(1)cost(1) of automatic equipment(1)/staffing.	**[6]**
11(a)	**Tick <u>two</u> items that are scrap.** ☐ **Contaminated materials** ☐ **Spare materials for recycling** ☐ **Offcuts that could be reused** ☐ **Faulty products that cannot be reworked or sold on** ☐ **Spare components** One mark each for spare materials for recycling and offcuts that could be re-used	**[2]**
11(b)	**Describe in detail how <u>one</u> specific type of scrap can be generated during the manufacturing process.** Chemical and Pharmaceutical -lipstick misshapes reformed - powder from tabletting (can be re-pressed) Clothing and textiles - small offcuts /materials at end of runs (sold on) Electrical and IT - faulty pcbs (sent for stripping) Food and drink - outer leaves from trimmed vegetables Furniture - wood/metal offcuts Machinery and Equipment - over ordered components Packaging - offcuts from platens	**[2]**

Question Number	Answer	Max Mark
12	**Discuss the importance of Just in Time (JIT) in reducing costs and improving efficiency** Six marks for discussion giving three relevant points, stating why two are relevant and giving an example. Or for the critical evaluation of the importance of JIT (showing an understanding of JIT) For example: • Products are scheduled to meet orders received • Be finished when dispatch is due • Materials and components are delivered to workstations • As needed for production • This means there is no waiting time • And stocks of finished product are not needed to meet orders • So no extras are made • Less storage space needed • Availability of resources as required Identification and expansion of any of the above. List is not exhaustive.	**[6]**
13	**Discuss how and why production plans may need to be modified following a new product launch** Six marks for discussion giving three relevant points, stating why two are relevant and giving an example. For example: (Discussion could follow the success of otherwise of the product) • Materials needed – increased/decreased quantities • Workers or workstations needed – increased/decreased • Tools/equipment – increase/decrease to produce more or less • Need for extra machines to produce more • Line speed or rate doubled or additional line or reduction • Storage for extra materials • Stock ready to dispatch Identification and expansion of any of the above. List is not exhaustive.	**[6]**

Question Number	Answer	Max Mark
14	**Part of a flow process chart is shown.**	

Flow Process Chart

☑ **Present method** ☐ **Proposed method**

Subject: *Finishing and packaging*

Chart begins: *Air cooling*

Chart ends: *Pack in outer cartons*

Symbols	Description	Distance (m)	Time (s)
○ ⇨ □ ◗ ▽	Air cooling		
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○ ⇨ □ ◗ ▽	Manual inspection		
○ ⇨ □ ◗ ▽	Pierce top		
○ ⇨ □ ◗ ▽	Wait		
○ ⇨ □ ◗ ▽	Carry to packing line		
○ ⇨ □ ◗ ▽	Box in dozens		
○ ⇨ □ ◗ ▽	Conveyor to line 4		
○ ⇨ □ ◗ ▽	Pack in outer cartons		

Tick the correct meaning of the <u>two</u> symbols below.

Symbol 1 D

☐ Operation
☐ Delay
☐ Transport
☐ Storage

Symbol 2 ⇨

☐ Delay
☐ Transport
☐ Storage
☐ Inspection

One mark for delay
One mark for transport

[2]

Question Number	Answer	Max Mark
15	**Explain the contribution of flow process charts to lean manufacture.** Four marks for detailed explanation: Flow process charts are used when analyzing the steps in a process, to help identify and eliminate waste. They show each step of a process in order (1) graphically(1), making it easier to see where time is being wasted(1)/identify idle time(1).	**[4]**
16*	**Discuss the impact of Design for Manufacturing Assembly (DFMA) on manufactured products.** For example: Common fixing strategy(1) enables equipment reuse(1). Standardised components (1) reduces inventory(1) Complexity reduction (1) to facilitate automation (1) Make versus buy (1) Handling (1) Product prices may be reduced due to overall production cost savings(1) products may be shaped differently (1) eg draft angles(1) Less variety between products (1) form follows production(1) Level 1 (0-2 marks) Basic discussion showing some understanding of the impact of Design for Manufacturing Assembly (DFMA) on manufactured products. There will be little, or no, use of specialist terms. Answers may be ambiguous or disorganised. Errors of spelling, punctuation and grammar may be intrusive. Level 2 (3-4 marks) Adequate discussion showing an understanding of the impact of Design for Manufacturing Assembly (DFMA) on manufactured products. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar. Level 3 (5-6 marks) Thorough analysis, showing a clear understanding of the impact of Design for Manufacturing Assembly (DFMA) on manufacture products. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.	**[6]**
	Paper Total	**[60]**

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	Total
1	7			7
2	2			2
3		3		3
4	4			4
5	1			1
6	1			1
7	4			4
8	2			2
9		2		2
10	2	4		6
11	2	2		4
12		2	4	6
13		6		6
14		2		2
15			4	4
16*			6	6
Totals	25	21	14	60