



# **PIABC LEVEL 5 DIPLOMA IN PACKAGING TECHNOLOGY**

(Qualification Number: 600/0017/X)

## **EXAMINATION PAPER**

**November 2020**

**J/502/5923 UNIT 02**

**Packaging Materials and Components**

**Paper A**

### **INSTRUCTIONS TO CANDIDATES**

You are required to pass **ALL** the learning outcomes

Write your answers in the answer book provided

Wherever possible, use diagrams to illustrate your answer

This is a closed book examination

This examination paper is worth 70% of the total marks for Unit 2

Reading Time: 5 minutes

Examination Time: 3 Hours

**PIABC Level 5 Diploma in Packaging Technology  
Unit 2 – Packaging Materials and Components (Paper A)  
November 2020**

**INSTRUCTIONS TO CANDIDATE**

**You are required to answer TWO QUESTIONS from the following three questions only**

**Learning Outcome 1**

**Understand the properties of materials which make them suitable for packaging**

(This learning outcome is worth 40% of the marks for this paper)

**Question 1**

- A) Identify THREE properties of steel (3 x ½ mark) and explain why these properties make it an appropriate choice for use as a packaging material (3 x ½ mark).
- B) Identify the structure and performance differences of blackplate, tin plated steel and tin free steel (3 x 2 marks). Justify, using examples, the use of these materials for packaging applications (3 x 1 mark).
- C) Using examples; identify and describe EIGHT properties of aluminium foil when used as a packaging material. (8 x 1 mark)

**Question 2**

Fruit jams and preserves are often packed in glass jars.

- A) Identify the ingredients used to manufacture of a glass jar and describe their function. (6 marks)
- B) Discuss why glass is the preferred material for this type of product. (6 marks)
- C) Identify and discuss how the disadvantages of glass can be overcome. (4 marks)
- D) Fruit jams and preserves are also packed in flexible film and rigid plastics. Briefly discuss the advantages of these materials/formats for this product. (4 marks)

**Question 3**

- A) Discuss the properties of the following materials in relation to the packaging applications given:
- A polypropylene flip top closure for a shower gel bottle. (4 x 1 mark)
  - An amorphous polyethylene terephthalate injection stretch moulded bottle for carbonated water. (4 x 1 mark)
  - A high-density polyethylene extrusion blow moulded bottle for engine oil. (4 x 1 mark)
  - A microperforated biaxial orientated polypropylene bag of salad leaves. (4 x 1 mark)
- B) Identify and briefly justify an appropriate material for these applications:
- A dissolvable film for agricultural chemicals. (1 mark)
  - A heat sealable multi-layer film to provide high barriers to moisture and gas. (1 mark)
  - A ready meal tray for reheating in either oven or microwave. (1 mark)
  - A vacuum bag for a leg of lamb. (1 mark)

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**INSTRUCTIONS TO CANDIDATE**

**You are required to answer this question**

**Learning Outcome 2**

**Understand the synthesis and properties of polymers**

(This learning outcome is worth 20% of the marks for this paper)

**Question 4**

- A) Describe the polymerisation of low-density polyethylene (LDPE). (6 marks)
- B) Compare and contrast how the polymerisation of high-density polyethylene (HDPE) and linear low-density polyethylene (LLDPE) differs from that of LDPE. What is the impact on the materials' properties? (2 x 3 marks)
- C) Explain the meaning of the following polymer characteristics and describe how they can influence their properties:
- Crystallisation (2 marks)
  - Orientation (2 marks)
  - Glass transition (2 marks)
  - Melt flow index (2 marks)

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**PIABC Level 5 Diploma in Packaging Technology  
Unit 2 – Packaging Materials and Components (Paper A)  
November 2020**

**INSTRUCTIONS TO CANDIDATE**

You are required to answer **TWO QUESTIONS** from the following three questions only

**Learning Outcome 3**  
**Understand the conversion of raw materials into packaging materials**  
**and packaging components**  
(This learning outcome is worth 40% of the marks for this paper)

**Question 5**

- A) Outline the production process for a collapsible aluminium tube for a solvent based adhesive (7 marks), including how its quality is assured (3 marks).
- B) Identify and explain the importance of each of the criteria which should be stated on the component specification. (10 marks)

**Question 6**

- A) Describe, with the aid of diagrams, the manufacturing process for a thermoformed container to hold a soft spread product such as margarine or butter. In your answer describe the process from receipt of a reel of material to despatch of finished container to the filler. (10 marks)
- B) Justify a suitable material for the container. (2 marks)
- C) Compare and contrast the process to manufacture the above container by thermoforming and injection moulding. (8 marks)

**Question 7**

- A) Describe the manufacturing process of a single wall corrugated board from reels of paper to sheet board. (9 marks)
- B) Discuss how the manufacture of double walled board is different from single walled board. (2 marks)
- C) A case can be described as an RSC 0201 case with dimensions of 350 x 250 x 300 mm. Discuss what this means. (3 x 1 mark)
- D) Discuss FOUR performance characteristics which would be found on a corrugated case specification and how they would be measured. (4 x 1½ marks)

**END OF EXAMINATION PAPER**