



# PIABC LEVEL 5 DIPLOMA IN PACKAGING TECHNOLOGY

(Qualification Number: 600/0017/X)

## EXAMINATION PAPER

June 2018

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

**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)

***INSTRUCTIONS TO CANDIDATE: YOU ARE REQUIRED TO ANSWER  
TWO QUESTIONS FROM THE FOLLOWING THREE QUESTIONS ONLY***

**Question 1**

For each of the following **FOUR** product/pack types:

- Pharmaceutical tablet in a white plastic blister pack with an aluminium push through lid
- Long life milk in a multi layer carton with an aluminium layer
- Ready-to-cook meal in a foil tray
- Bar of chocolate with a folded aluminium wrap

- A) State, with reasons, a typical gauge of aluminium foil which would be suitable and explain the important properties which the foil will deliver. (4 x 1½ marks)
- B) State and explain the function of all additional materials and components required in the primary packaging. (4 x 1½ marks)
- C) Choosing **TWO** of the above products, propose a primary packaging material solution which does not contain aluminium foil (2 x 1 mark). Discuss in detail the advantages and disadvantages of your proposals (2 x 3 marks).

**Question 2**

A carbonated orange fruit drink can be packed in plastic, metal and glass containers.

- A) For each of these materials; identify suitable pack types to contain the drink. (3 marks)
- B) With reference to the properties of the drink, explain how each of these containers are able to provide a shelf life of at least 12 months. (3 x 3 marks)
- C) Discuss the advantages and disadvantages of using plastic to contain this product from a functional, environmental, commercial and aesthetic perspective. (8 marks)

**Question 3**

- A) Identify and describe the function of the raw materials commonly used in container glass manufacture. (5 marks)
- B) The following products are usually packed in glass packaging:
- a) Refillable carbonated soft drink bottle
  - b) Perfume
  - c) Jam
  - d) Ampoules for injectable drugs
  - e) Sparkling wine

For each of the above products; discuss why glass is the preferred material and what other materials could be used. (5 x 3 marks)

**Learning Outcome 2**  
**Understand the synthesis and properties of polymers**  
(This learning outcome is worth 20% of the marks for this paper)

***INSTRUCTIONS TO CANDIDATE: YOU ARE REQUIRED TO ANSWER THIS QUESTION***

**Question 4**

- A) Describe the polymerisation of Polyethylene (PE). (5 x 1 mark)
- B) Explain the following terms and discuss their effect on polymer characteristics:
- a) Co-polymerisation (2½ marks)
  - b) Branching (2½ marks)
  - c) Molecular weight (2½ marks)
  - d) Crystallinity (2½ marks)
  - e) Tacticity (2½ marks)
  - f) Orientation (2½ marks)

**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)

***INSTRUCTIONS TO CANDIDATE: YOU ARE REQUIRED TO ANSWER TWO QUESTIONS FROM THE FOLLOWING THREE QUESTIONS ONLY***

**Question 5**

- A) Describe the production of a metal can for a carbonated beverage from coil of material to can bodies packed ready for despatch to the packer filler. (12 marks)
- B) Describe the production of a ring pull can end for a carbonated beverage can from coil of material to can ends ready for despatch to the packer filler. (4 marks)
- C) Justify why the use of this container and closure is appropriate for a carbonated drinks product. (4 marks)

**Question 6**

- A) Describe in detail the production of an injected moulded 500ml container for fresh cream from granular polymer to finished product. (8 marks)
- B) Compare and contrast the processes involved in the manufacture of a fresh cream container by injection moulding and thermoforming and the effect on the properties of the container. (6 x 1 marks)
- C) Identify and justify the key performance information to be included on a specification of an injection moulded fresh cream container. (6 marks)

**Question 7**

- A) Describe the production process for making kraft paper for use as a liner in a corrugated case. Start with felled trees and finish with rolls of paper ready to despatch to the corrugated board manufacturer. (15 marks)
- B) How can the properties of paper and paperboard be varied on paper and paperboard forming machines? (5 marks)