



PIABC LEVEL 5 DIPLOMA IN PACKAGING TECHNOLOGY

(Qualification Number: 600/0017/X)

EXAMINATION PAPER

June 2019

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

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 and describe the function of the raw materials commonly used in either amber or green glass. (6 marks)
- B) Discuss why amber or green glass is commonly used for packing beer. (8 x 1 mark)
- C) Pharmaceutical glass can be classified as types I, II and III. Describe the differences and applications of these different types. (3 x 2 marks)

Question 2

- A) Explain how the construction and material properties of a 3-piece steel can help to protect and preserve a can of beans over its shelf life. (5 x 2 marks)
- B) Using examples, discuss TEN characteristics of aluminium foil packaging. (10 x 1 mark)

Question 3

- A) Liquid milk can be packed in glass bottles, high-density polyethylene (HDPE) bottles and paper based liquid cartons. Describe each pack type and evaluate its use for this application. (3 x 4 marks)
- B) A dairy produces milk in high-density polyethylene (HDPE) bottles, cream in polypropylene (PP) pots, and cheese in a polyethylene (PE)/nylon laminate flow wrap. They want to move to using a single plastic material for all products. Justify why polyethylene terephthalate (PET) is the suitable material that they should select. Highlight the problems this may cause. (8 marks)

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) Briefly describe the following THREE polymerisation processes (3 x 2 marks) and provide an example of one material produced from each (3 x 1 mark):
- Free radical initiated addition polymerisation
 - Co-ordination addition polymerisation (catalyst initiated)
 - Condensation polymerisation
- B) Explain what a copolymer is (1 mark) and describe THREE different structures which are possible (3 x 1 mark).
- C) Give an example of copolymer and its application. (1 mark)
- D) Define THREE of the following FOUR polymer characteristics (3 x 1 mark) and explain how they influence material properties (3 x 1 marks):
- Crystallisation
 - Orientation
 - Glass transition
 - Melt flow index

INSTRUCTIONS TO CANDIDATE

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

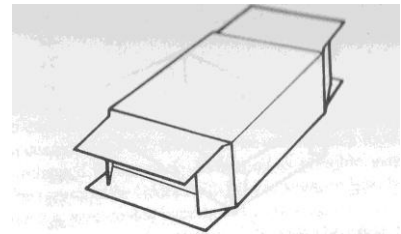
Learning Outcome 3
Understand the conversion of raw materials into packaging materials
and packaging components
(This learning outcome is worth 40% of the marks for this paper)

Question 5

- A) Describe, with the use of diagrams, the production process of a wrinkle walled foil container from an aluminium ingot to despatch of containers to the customer. (14 marks)
- B) Compare and contrast wrinkle walled foil containers versus pressed paperboard containers for take away meals. (6 marks)

Question 6

- A) Describe, with the aid of diagrams, the manufacture of a printed and glued paperboard carton (pictured) from receipt of board to despatch of cartons which will be used for direct food contact on a fully automated packing line for a branded dried food product. You must fully describe and justify the grade, structure and properties of the board and how they relate to the functional and aesthetic requirements. (*Note: A full description of the printing process is not expected.*) (15 marks)



- B) Identify TEN quality checks that you would carry out on the carton. (10 x ½ mark)

Question 7

Snack foods, such as roasted nuts, are often packed in bi-axial orientated polypropylene (BOPP) laminates.

- A) Describe the manufacture of bi-axial orientated cast extrusion polypropylene from polymer granules to reels of material. (15 marks)
- B) Describe how BOPP can be metalized. (2 marks)
- C) Discuss how metalized BOPP can be combined with other materials to produce an appropriately printed pack for a snack product. (3 marks)