



PIABC LEVEL 5 DIPLOMA IN PACKAGING TECHNOLOGY

(Qualification Number: 600/0017/X)

EXAMINATION PAPER

June 2021

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

Issued under the authority of the
PACKAGING ASSESSMENT BOARD
30 January 2021

PIABC Level 5 Diploma in Packaging Technology
Unit 2 – Packaging Materials and Components (Paper A)
June 2021

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)

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

Question 1

- A) Discuss how the selection of raw materials, additives and pulp processing can influence the characteristics of paper. (14 marks)
- B) Identify and describe how SIX paper properties can be measured. (6 x 1 mark)

Question 2

- 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)

Question 3

Discuss the properties of the following polymeric materials and explain why they are suitable for the given application, including any limitations:

- High density polyethylene (HDPE) as used for extrusion blow moulded bottle to contain bleach. (4 x 1 mark)
- Metallised biaxially oriented polypropylene (BOPP) film as used for the packaging of potato-based snack food. (4 x 1 mark)
- Polyethylene terephthalate (PET) as used for an injection stretch blow moulded bottle to contain carbonated water. (4 x 1 mark)
- An ionomer (e.g. Surlyn) as coextruded onto high density polyethylene (HDPE) for the manufacture of a vertical form fill seal bag for a dusty dry cereal product. (4 x 1 mark)
- A thermoformed sheet of polyvinyl chloride (PVC) coated with polyvinylidene chloride (PVDC) as used for moisture sensitive tablets packed on a high-speed blister line. (4 x 1 mark)

END OF LEARNING OUTCOME 1

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Unit 2 – Packaging Materials and Components (Paper A)
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LEARNING OUTCOME 2

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

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) Explain the difference between thermoset and thermoplastic polymers in terms of structure (2 x 1 mark) and properties (2 x 4 marks).
- B) Additives are added to base resins to change their properties. Identify FIVE types of additives (5 x ½ mark) and for each discuss their use (5 x 1½ mark).

END OF LEARNING OUTCOME 2

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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)

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

Question 5

- A) Identify the FIVE main processes for forming rigid metal packaging. (2 marks)
- B) Describe with the aid of a diagram the manufacture of an unprinted drawn and redrawn metal can body from reel stock to despatch for a retorted food product. (12 marks)
- C) What quality checks and tests you would carry out in the manufacture of the can body? (6 marks)

Question 6

Dried fruits are stored in a gusseted base resealable closure pouch. The pouch is constructed from a polyethene (PE) and metallised polyethylene terephthalate (PET) laminate.

- A) Describe the production of blown polyethene (PE) film from polymer granules to reels of film ready for lamination. (12 marks)
- B)
 - a) Describe how polyethylene terephthalate (PET) film is metalized. (2 marks)
 - b) How is the thickness of the metallised layer controlled? (1 mark)
- C) Describe and explain the important requirements of the lamination process for combining the metallised polyethylene terephthalate (PET) and Polyethylene (PE). (2 marks)
- D) Describe how the closure is added and gusseted pouch is formed. (3 marks)

Question 7

- A) Describe the manufacturing process of a double walled die cut 4-colour printed corrugated case from reels of paper to finished packs ready for despatch. Printing process does not need to be described in detail. (14 marks)
- B) Identify and briefly explain how this manufacturing process can introduce quality issues for this case. (6 marks)

END OF LEARNING OUTCOME 3

END OF EXAMINATION PAPER