



**PIABC LEVEL 5 DIPLOMA  
IN PACKAGING TECHNOLOGY (QCF)**  
(Qualification Number: 600/0017/X)

**EXAMINATION PAPER**

**November 2017**

**J/502/5923 UNIT 02**

**Packaging Materials and Components**

**Paper A**

Reading Time: 5 minutes

Time Allowed: 3 Hours

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

**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**

- A) a) What are the ingredients used in the manufacture of glass containers to pack a high value perfume? (7 x ½ mark)
- b) What is the function of each ingredient? (7 x ½ mark)
- c) Explain why glass is an appropriate material for this product. (8 x ½ mark)
- B) What are the advantages and disadvantages of using glass to contain a fruit preserve product (e.g. jam) from a functional, environmental and commercial perspective? (7 x 1 mark)
- C) A pharmaceutical company needs to pack a sterile eye drop liquid. Identify the type of glass which would be used for packing this product and explain why this type of glass is suitable for this application. (2 marks)

**Question 2**

- A) Discuss the properties of the following materials for the packaging the given products:
- An amorphous polyethylene terephthalate injection stretch moulded bottle for a carbonated soft drink. (4 x 1 mark)
  - A microperforated biaxial orientated polypropylene bag of salad leaves. (4 x 1 mark)
  - A high density polyethylene extrusion blow moulded bottle for bleach. (4 x 1 mark)
  - A polypropylene flip to closure for a shampoo bottle. (4 x 1 mark)
- B) Identify and briefly justify an appropriate material for these applications:
- A dissolvable film for detergent tablets. (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 whole shell on shell fish (e.g. mussels). (1 mark)

**Question 3**

- A) Identify and outline FOUR key performance properties of paperboard and explain the factors which influence these properties. (12 marks)
- B) How does flute selection influence the properties and use of corrugated board? (8 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) Explain the difference between thermoset and thermoplastic polymers in terms of structure and properties. (2 x 5 marks)
- B) Identify FIVE additives and discuss how they can affect the properties of polymers. (5 x 2 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) 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**

- A) Describe, in detail, the manufacture of biaxial orientated cast polypropylene film, from polymer granules to rolls of film ready for despatch for conversion. (12 marks)
- B) Identify an alternative process suitable for the manufacture of polyethylene (PE) film. Describe the differences in these processes. (5 marks)
- C) Describe how polymer films can be metalized. (3 marks)

**Question 7**

- A) Describe, with the aid of diagrams, the manufacture of a 70cl glass wine bottle from raw materials to bottles ready for despatch to a bottling plant. (15 marks)
- B) What additional manufacturing processes or features can be applied to improve the appearance of a glass bottle to gain marketing advantage? (5 x 1 mark)