



SUMMER EXAMINATIONS 2022

EXAMINATION: UNIT 3 Packaging Materials and Containers 2

COURSE: CPD Diploma in Packaging Technology

**DATE: 13th May 2022
10am to 12pm**

EXAMINERS: Tony Duffy, Ron Gardiner

TIME ALLOWED: 2 hours

INSTRUCTIONS: Please answer four questions. All questions carry equal marks

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The use of programmable or text storing calculators, smart phones etc are expressly forbidden. Please note that where a candidate answers more than the required number of questions, the examiner will mark all questions attempted and then select the highest scoring ones.

Question 1 (25 marks)

- a) Explain the polymerisation of low density polyethylene (LDPE) in your own words.
(7 marks)
- b) In your own words, describe how the production of high density polyethylene (HDPE) and linear low density polyethylene (LLDPE) is different from that of LDPE
(2 x 3 Marks)
- c) Describe the meaning of the following polymer characteristics and explain how they can influence their properties.
- Crystallisation
 - Orientation
 - Glass transition
 - Melt flow index

(4 x 3 marks)

Question 2 (25 marks)

Snack foods such as crisps are often packed in bi-axial orientated polypropylene laminates.

- a) In your own words, describe the process of bi-axial orientated cast extrusion polypropylene from polymer granules to reels of material. Include a simple sketch to illustrate your answer.
(20 marks)
- b) Explain how BOPP can be metalized
(2 marks)
- c) Explain how metalized BOPP can be combined with other materials to produce a reverse printed usable material for a snack product.
(3 marks)

Question 3 (25 marks)

- a) Describe in detail the production of an injected moulded tub for soup from granular polymer to finished product.
(15 marks)
- b) Compare and contrast the processes involved in the manufacture of a soup tub by injection moulding and thermoforming and the effect on the properties of the tub.
(10 marks)

Question 4 (25 marks)

- a) A glass bottle can be sealed / closed in a variety of methods. Describe 5 methods of how a glass bottle can be sealed explaining how the seal is achieved.
(5 x 3 marks)
- b) Discuss what is required for a closure to be tamper evident and using 5 different examples, describe how this is achieved.
(10 marks)

Question 5 (25 marks)

- a) Explain the properties of the packaging materials provided for the following products:
- An amorphous polyethylene terephthalate injection stretch moulded bottle for a carbonated soft drink.
 - Biaxial orientated polypropylene / Metalized Biaxial orientated polypropylene laminate bag for crisps.
 - A high density polyethylene extrusion blow-moulded bottle for milk.
 - A Styrene Acrylonitrile cover for a lipstick pack.
- (4 x 4 marks)**
- b) Select and justify an appropriate plastic material, or combination of plastic materials, for the following products.
- Vacuum bag for a large meat cut
 - Ready meal tray for use in microwave or oven
 - Thermoformed ice cream container
- (3 x 3 marks)**