



SUMMER EXAMINATIONS 2019

EXAMINATION: UNIT 3 Packaging Materials and Containers 2

COURSE: CPD Diploma in Packaging Technology

**DATE: 9th May 2019
10am to 12pm**

EXAMINERS: Tony Duffy, Ron Gardiner

TIME ALLOWED: 2 hours

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

PLEASE DO NOT TURN OVER THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

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) Discuss the following types of polymer outlining their structure, properties and providing an example of each.

- Thermoplastic (4 marks)
- Thermoset (4 marks)

(8 marks)

b) Briefly describe 2 polymerization processes. Provide an example of a material produced from each.

(8 marks)

c) Explain three of the following terms as applied to polymer characteristics.

- Polymer chain branching
- Crystallinity
- Orientation
- Copolymer

(3 x 3 marks)

Question 2 (25 marks)

a) Discuss the properties of the following materials for the packaging on the given products.

- An amorphous polyethylene terephthalate injection stretch moulded bottle for a carbonated soft drink.
- A micro-perforated biaxial orientated polypropylene bag of salad leaves.
- A high density polyethylene extrusion blow moulded bottle.
- A polypropylene flip to closure for a shampoo bottle.

(4 x 5 marks)

b) Identify and briefly justify an appropriate material or material combinations for these applications

- A dissolvable film for detergent tablets.
- A high performance heat seal which can seal through powder contamination.
- A ready meal tray for reheating in either oven or microwave.
- A vacuum bag for whole shell on shell fish
- A robust transparent plastic for use in water cooler containers which can be sterilised.

(5 marks).

Question 3 (25 marks)

- a) Identify the layers present in a laminate structure suitable for a carton of juice such as the product *Ribena*. Review the rational for each of the layers you have chosen for this structure.
(12 marks)
- b) What are the advantages and disadvantages of wet and dry bond lamination?
(6 marks)
- c) A typical laminate structure for a bag of crisps is MOPP / PE. What are the functions of these two layers
(5 marks)
- d) How is the OPP in the above structure metalized to form MOPP
(2 marks)

Question 4 (25 marks)

- a) Describe the production of a 500 ml polyethylene terephthalate injection stretch blow moulded bottle for a carbonated drink.
(15 marks)
- b) Justify the materials and process for this application.
(5 Marks)
- c) Discuss how an additional barrier layer could be formed into this container for use with wine or beer.
(5 marks)

Question 5 (25 marks)

- a) Describe how a bag of crisps is formed and sealed from the reel of raw material to finished product.
(10 marks)
- b) Review the 3 key parameters to control in this form fill seal process
(6 marks)
- c) Review 3 other key parameters to control
(6 marks)
- d) List three methods of testing for the effectiveness of the sealed bag
(3 marks)