



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

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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) 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 rationale 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)