



## **SUMMER EXAMINATIONS 2024**

**EXAMINATION:** UNIT 3 Packaging Materials and Containers 2

**COURSE:** CPD Diploma in Packaging Technology

**DATE:** 10<sup>th</sup> May 2024

10 am to 12 pm

**EXAMINERS:** David Little, 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)**

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 metalized BOPP can be combined with other materials to produce a reverse printed usable material for a snack product.

**(5 marks)**

### **Question 2 (25 marks)**

- a) Discuss the production of a 500 ml extrusion blow moulded shampoo container from polymer granules to product ready for dispatch to the packer filler, using sketches to illustrate your answer.

**(15 marks)**

- b) Discuss the factors which will impact the container wall thickness and any production conditions that could cause the product to be rejected.

**(10 marks)**

### **Question 3 (25 marks)**

- a) Compare and contrast the three types of adhesion: Chemical, Mechanical and Diffusion Adhesion, giving examples of suitable applications of each type.

**(15 marks)**

- b) Adhesives set after application. Describe three processes by which adhesives set and provide an example of use for each.

**(10 marks)**

#### Question 4 (25 marks)

- a) Describe the polymerisation of low-density polyethylene (LDPE).

*high pressure*  
(9 marks)

- b) Discuss how the production of high-density polyethylene (HDPE) and linear low-density polyethylene (LLDPE) is different from that of LDPE and what impact this has on the materials' properties?

(6 Marks)

- c) Briefly explain the meaning of the following polymer characteristics and describe how they can influence their properties.

- a. Chain Branching
- b. Crystallisation
- c. Orientation
- d. Glass transition
- e. Melt flow index

(5 x 2 marks)

#### Question 5 (25 marks)

- a) With the aid of a diagram describe how the seals are formed on a 1 litre stand-up pouch of soup.

(10 marks)

- b) Discuss how else you might package soup and the reasons why you would choose alternative formats. Give three different packaging format examples to illustrate your answer.

(15 marks)