



SUMMER EXAMINATIONS 2015

EXAMINATION: UNIT 3 Packaging Materials and Containers 2

COURSE: CPD Diploma in Packaging Technology

**DATE: 21st May 2015
10am to 12pm**

EXAMINERS: Colm Munnelly, Mary Grufferty, Tony Duffy

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 what is meant by the following terms with regard to polymers. Use examples to illustrate your explanations
- 1) Homopolymer and Copolymer **(2 marks)**
 - 2) Thermoplastic and Thermoset **(2 marks)**
 - 3) Amorphous and crystalline **(2 marks)**
 - 4) Creep or Cold flow **(2 marks)**
 - 5) Melting Point [T_m] and Glass Transition Temperature [T_g] **(2 marks)**
- b) Outline how molecular realignment is used to produce heat shrink films **(5 marks)**
- c) The Properties of plastics can be classified into four general groups.
- 1) List these four general groups and outline what specifically these property groups relate to **(5 marks)**
 - 2) Name and outline the importance of any 5 quality tests that are carried out to determine the properties of plastics **(5 marks)**

Question 2 (25 marks)

Returnable glass beer bottles have paper labels applied to them for information and selling functions.

- a) Describe the application process for a paper label to a glass bottle **(8marks)**
- b) Briefly review why the following parameters are important to control for this application process:
- Machine Direction and Cross Direction of Label **(3 marks)**
 - Storage conditions of labels **(3 marks)**
 - Porosity of labels **(3 marks)**
 - Cobb value of labels **(3 marks)**
- c) Select and Justify a suitable glue for this application process **(5marks)**

Question 3 (25 marks)

- a) Describe how a seal is achieved with a wadded screw cap closure on a bottle of oil and a waddles screw cap closure on a carbonated soft drink plastic bottle. What are the critical dimensions with these closure systems?
(10 marks)
- b) Discuss the material equipment and process requirements for achieving a good heat seal.
(10 marks)
- c) Describe the seal used for applying a can end to a can body.
(5 marks)

Question 4 (25 marks)

- a) Describe with the aid of diagrams the extrusion blow moulding process for a polypropylene bottle.
(20 marks)
- b) List the advantages and disadvantages of this process in comparison to injection blow moulding
(5 marks)

Question 5 (25 marks)

- a) Discuss the theory of Mechanical Adhesion using a substrate example.
(5 marks)
- b) Discuss the theory of Chemical Adhesion using a substrate example.
(5 marks)
- c) Describe the properties and applications of a starch based adhesive
(5 marks)
- d) Describe the properties and applications of a cold seal adhesive
(5 marks)
- e) Describe the properties and applications of a hot melt adhesive
(5 marks)