



REPORT ON THE NOVEMBER 2017 EXAMINATIONS

PIABC LEVEL 3 CERTIFICATE IN PACKAGING (QCF)

(QN: 600/0455/1)

AND

**PIABC LEVEL 5 DIPLOMA IN PACKAGING
TECHNOLOGY (QCF)**

(QN: 600/0017/X)

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PIABC LEVEL 3 CERTIFICATE IN PACKAGING (QCF)

Unit A: The Fundamental Principles of Packaging

This Unit is assessed by a 2-hour examination in which candidates have to answer five questions.

Learning Outcome 1: Understand the role and functions of packaging

QUESTION 1

(This question is worth 25% of the marks for this unit)

- A) Define primary, secondary and tertiary packaging. (3 x 2 marks)
- B) List the typical primary (2 marks), secondary (3 marks) and tertiary (2 marks) packaging used to contain and transport a glass jar of sauce from the food manufacturer to the retailer.
- C) Identify THREE mechanical hazards that the complete pack may experience during its journey, describing the typical causes and explain how the packaging system minimises the effects. (3 x 4 marks)

Markers Comments

1. *Summary of what was expected in the answer*
Knowledge of primary, secondary and tertiary packaging for a glass jar of sauce, supply chain hazards and how to minimize them.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Mostly answered well.

Learning Outcome 2: Understand the major packaging materials and how they are combined to form packaging components

QUESTION 2

(This question is worth 25% of the marks for this unit)

Liquid soup with a long shelf life can be packed in glass and metal containers.

- A) Describe the two types of containers, closure mechanisms and how they are decorated. (2 x 3 marks)
- B) Identify the production processes involved to manufacture the packaging components (2 x 3 marks) and explain the functional characteristics of the materials used which make them suitable to pack the product (2 x 3 marks).
- C) For ONE of the pack types, describe a typical secondary and tertiary packaging solution for this product. (7 marks)

Markers Comments

1. *Summary of what was expected in the answer*
Manufacturing processes for a can or glass jar of soup and the characteristics of the materials involved in each case. Knowledge of primary, secondary and tertiary packaging for a glass jar or tin can of soup.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Not answered that well on the whole. A lot of relevant detail on process and material functions omitted.

Learning Outcome 3: Understand the packaging development processes

QUESTION 3

(This question is worth 20% of the marks for this unit)

- A) Using a product/pack of your choice, what sort of information would you need to consider to develop a product/packaging brief. (7 marks)
- B) List SIX key process steps involved in development of the packed product from initial concept to launch. (6 x ½ mark)
- C) Identify FIVE roles/disciplines which will be involved in developing new packaging (5 x ½ mark) and discuss the importance of each role in ensuring a successful product is launched (5 x 1½ marks).

Markers Comments

1. *Summary of what was expected in the answer*
Product – based information for a brief. Development process from concept to launch. Five roles/disciplines involved in the above.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Answered reasonably well on the whole. Main points were lost in Part A where non-product information was included.

Learning Outcome 4: Understand packaging costs and quality systems

QUESTION 4

(This question is worth 15% of the marks for this unit)

- A) Describe FIVE business cost elements associated with the production of a packet of biscuits wrapped in a plastic flow wrap and collated in a case on a pallet (5 x 1½ marks) and state which are fixed and variable (5 x ½ mark).
- B) Define profit. (2 marks)
- C) How does unacceptable quality affect profit? (3 x 1 mark)

Markers Comments

1. *Summary of what was expected in the answer*
Packaging line costs and whether fixed or variable. An understanding of profit and how that can be compromised by poor quality.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Answered reasonably well on the whole. Main points were lost in Part A where fixed and variable costs were not correctly identified.

Learning Outcome 5: Understand the relationship between packaging and the environment

QUESTION 5

(This question is worth 15% of the marks for this unit)

- A) Define what is meant by an environmentally responsible pack. (3 marks)
- B) Briefly describe THREE options that are available to deal with empty glass containers for carbonated beverages. (3 x 3 marks)
- C) Briefly describe ONE way of evaluating the environmental impact of a packaging material. (3 marks)

Markers Comments

1. *Summary of what was expected in the answer*
Definition of an environmentally responsible pack, disposal options for glass beverage bottles and a brief description of LCA (assessment or analysis) or carbon footprint.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Not answered that well on the whole. Some of the definitions were rather vague.

PIABC LEVEL 5 DIPLOMA IN PACKAGING TECHNOLOGY (QCF)

Unit 1: Packaging in Today's World

This unit is assessed by a 3 hour examination and candidates have to answer six questions.

Learning Outcome 1: Understand the role of packaging in the modern society

QUESTION 1

(This question is worth 10% of the marks for this unit)

Describe FIVE significant changes (societal/technological) and the impact they have had on product packaging. (5 x 2 marks)

Markers Comments

- Summary of what was expected in the answer*
Five societal/technological changes and their impact on packaging e.g. refrigeration, globalization, family sizes, time-poor consumers, etc.
- Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most answered well. Marks were lost for not explaining packaging impact fully.

Learning Outcome 2: Understand the structure and interactions of elements in the packaging supply chain

QUESTION 2

(This question is worth 20% of the marks for this unit)

Labelled punnets of fresh strawberries weighing 400g are to be imported using air transport and sold through a major retailer.

- Describe the supply chain from the field where the strawberries are picked through to the retail store with a full description of the load construction (including the primary and secondary packs). (8 marks)
- Discuss the likely hazards the packed product may encounter, their effects and how the packaging and processes used could minimise the damage and reduce cost. (10 marks)
- How can coding systems help in the packing, distribution and sale of this product? (2 marks)

Markers Comments

- Summary of what was expected in the answer*
Supply chain of picked strawberries from field to international destination, packaging formats and the hazards encountered, both mechanical and climatic. Coding systems.
- Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most answered well. Marks were lost for lack of accurate detail; a few missed the need for chilled distribution.

Learning Outcome 3: Understand the functions of packaging

QUESTION 3

(This question is worth 30% of the marks for this unit)

- A) Identify the functions of packaging. (4 marks)
- B) Discuss how the primary packaging of a can of soup performs the functions of packaging. (6 marks)
- C) a) Discuss how a shelf ready pack for collating packs of biscuits performs the functions of packaging. (6 marks)
b) Briefly describe an appropriate tertiary packaging for the shelf ready packaging case identified above. Discuss how this contributes to the functions of the complete pack. (6 marks)
- D) Describe how temperature and humidity changes can cause deterioration of various types of packaging materials. (8 marks)

Markers Comments

1. *Summary of what was expected in the answer*
8 functions of packaging and how they are discharged by primary, secondary and tertiary packaging. Effects of temp and humidity on different packaging materials.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most answered reasonably well. Marks were lost for lack of accurate detail, a few missed out some of the important packaging functions.

Learning Outcome 4: Know the principles of the key legislation, regulations and standards relating to the packaging supply chain

QUESTION 4

(This question is worth 15% of the marks for this unit)

- A) Describe TWO types of intellectual property, which are protected by legislation, that need to be considered when designing new packaging. (2 x 2 marks)
- B) Identify a piece of legislation which aims to protect workers (1 mark). Describe ONE requirement of this legislation (2 marks) and the consequences of failing to comply (1 mark).
Note: Please state which country's legislation is being cited.
- C) Compare and contrast the use of legislation versus standards in achieving desirable good practice. (5 x 1 mark)
- D) What is a due diligence defence and when can it be used? (2 marks)

Markers Comments

1. *Summary of what was expected in the answer*
IP: patents, trademarks etc. Legislation to protect workers (e.g. Health & Safety at Work), comparison of legislation and standards, due diligence.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most answered reasonably well. Marks were lost for lack of accurate detail, a few failed to contrast legislation with standards.

Learning Outcome 5: Understand the factors that affect the impact of packaging on the environment

QUESTION 5

(This question is worth 15% of the marks for this unit)

- A) Explain what is meant by an environmentally responsible pack. (4 marks)
- B) Discuss the factors that can impact on the degree to which packaging waste can be minimised. (8 marks)
- C) What is life cycle assessment? (3 marks)

Markers Comments

1. *Summary of what was expected in the answer*
Define and environmentally responsible pack (minimize energy, waste, materials but meet functions)- how is packaging waste minimisation impacted, Life cycle assessment.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Part B a bit problematical as most answers didn't match the brief but were valid.

Learning Outcome 6: Understand the relationship between packaging and marketing

QUESTION 6

(This question is worth 10% of the marks for this unit)

- A) a) Identify the 4 P's of marketing. (4 x ½ mark)
- b) Explain the relationship between packaging design and the 4 P's. (4 x 1 mark)
- B) Using examples; identify the characteristics of a strong brand and discuss how this is supported by the packaging used. (4 x 1 mark)

Markers Comments

1. *Summary of what was expected in the answer*
Marketing 4Ps and how they affect packaging design. Characteristics of a strong brand ie coherence, uniqueness, relevance and distinctiveness and how these are supported by packaging.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Few were able to identify the 4 key aspects of brand strength but most knew the 4Ps.

Unit 2: Packaging Materials and Components (Paper A)

Paper A is worth 70% of Unit 2 and is assessed by a 3 hour examination. Candidates have to answer five questions. Candidates have the option to answer two out of three question for both Learning Outcomes 1 and 3.

<p>Learning Outcome 1: Understand the properties of materials which make them suitable for packaging</p>

This Learning Outcome is worth 40% of the marks for this paper and candidates were required to answer two of the following three questions: 1, 2 & 3

QUESTION 1

- A) a) What are the ingredients used in the manufacture of glass containers to pack a high value perfume? (7 x ½ marks)
b) What is the function of each ingredient? (7 x ½ marks)
c) Explain why glass is an appropriate material for this product. (8 x ½ marks)
- B) What are the advantages and disadvantages of using glass to contain a fruit preserve product (e.g. jam) from a functional, environmental and commercial perspective? (7 x 1 mark)
- C) A pharmaceutical company needs to pack a sterile eye drop liquid. Identify the type of glass which would be used for packing this product and explain why this type of glass is suitable for this application. (2 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A & B – Silica Sand provides a structure; Soda Ash lowers the glass transition/melting temperature but it makes the glass water soluble. Limestone stops the solubility. Perfume contains alcohol and aromatic compounds so the inert nature and absolute barrier to are amongst the reasons it is used. Adv/Disadv include: easy to recycle or reuse but high energy input required. Also, heavy to transport. Part C – Type II treated glass.
Marker 2: Aa & b - students were expected to identify and describe the function of the ingredients used to make glass. Consideration to particular product should be considered. Ac - The properties of glass which make glass appropriate for the packaging of perfume. B - The advantages and disadvantages of glass for packing jam should be explained under the headings: Function, Environment and Commercial. C - Students should identify the need have low migration levels and hence Type II glass being appropriate.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Most students answered this question and provided good quality answers. Part A & B were generally well answered however, a better understanding of an ingredient's function was lacking. Part C – Type I borosilicate glass was proposed for eyedrops. Although Type I is a more resistant material to leaching than Type II, it is unlikely to be used for this use.

QUESTION 2

A) Discuss the properties of the following materials for the packaging the given products:

- An amorphous polyethylene terephthalate injection stretch moulded bottle for a carbonated soft drink. (4 x 1 mark)
- A microperforated biaxial orientated polypropylene bag of salad leaves. (4 x 1 mark)
- A high density polyethylene extrusion blow moulded bottle for bleach. (4 x 1 mark)
- A polypropylene flip to closure for a shampoo bottle. (4 x 1 mark)

B) Identify and briefly justify an appropriate material for these applications:

- A dissolvable film for detergent tablets. (1 mark)
- A heat sealable multi-layer film to provide high barriers to moisture and gas. (1 mark)
- A ready meal tray for reheating in either oven or microwave. (1 mark)
- A vacuum bag for whole shell on shell fish (e.g. mussels). (1 mark)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – An understanding of the product's properties was needed to discuss how the properties of the packaging can meet the functions required. E.g. a carbonated soft drink contains CO² and H₂O. Therefore, the bottle must have such barriers. The bottle will need strength through orientation to contain the internal pressure.

Marker 2: A – Students are expected to discuss the properties of each material for the given applications. This can include both the advantages of the material and its limitations. Answers are expected to cover a wide range of issues e.g. functional properties, manufacture, costs, etc. B – Students are expected to select an appropriate material or material combinations for the given applications.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Many students gained reasonable marks in Part A, but many failed to identify appropriate materials in Part B. Part A - Students did not sufficiently discuss the properties of the product which would have linked directly to the properties required in the packaging. Part B – Some excellent answers but very clear that some students had not revised sufficiently well on material applications.

QUESTION 3

A) Identify and outline FOUR key performance properties of paperboard and explain the factors which influence these properties. (12 marks)

B) How does flute selection influence the properties and use of corrugated board? (8 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – Identification and explanation of properties such as deadfold characteristics i.e. the ability to maintain a fold and the factors such as caliper, grain direction, fibre length and type. Part B - Corrugated fibreboard can be specified by the construction (single face, singlewall, doublewall, etc.), flute size, burst strength, edge crush strength, flat crush. The choice of corrugated medium, flute size (A, C, B, E microflute), combining adhesive and linerboards can be varied to engineer a corrugated board with specific properties to match a wide variety of potential uses. Double and triple-wall corrugated board is also produced for high stacking strength and puncture resistance. Fluting is made from recycled papers and hardwood fibres, with chemical and starch additive for strength.

Marker 1: A - Students were expected to identify FOUR important properties of paperboard and explain which factors influence the properties. Factors to be considered could include fibre source, pulping, beating sheet formation, coating and additives. B – Required students to

discuss how the selection of flute material and profile can influence the properties and use of corrugated board packaging. Students were expected to describe the characteristics of the main flute types used.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Generally a poorly answered question. Many students did not discuss four properties and few relative to properties to the manufacturing process. Few students discussed the range of flutes available. Part A - Students did not sufficiently discuss the key performance properties of paperboard, nor their influencing factors. Part B – Some excellent answers but many just described flute types and ignored the choice of materials, adhesives and failed to mention burst strength etc.

Learning Outcome 2: Understand the synthesis and properties of polymers

QUESTION 4

(This question is worth 20% of the marks for this paper)

- A) Explain the difference between thermoset and thermoplastic polymers in terms of structure and properties. (2 x 5 marks)
- B) Identify FIVE additives and discuss how they can affect the properties of polymers. (5 x 2 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A –Thermoset plastics always remain in a permanent solid state, whereas thermoplastics can be remelted back into a liquid. Thermoset plastics contain polymers that cross-link together during the curing/moulding process to form an irreversible chemical bond. Thermoset plastics significantly improve the material's mechanical properties, providing enhances chemical resistance, heat resistance and structural integrity. Part B – Additives include antioxidants, stabilisers and inhibitors, slip agents, anti static agents, anti-blocking agents, anti-fogging agents and colours.

Marker 2: A required a description of the structural differences between thermoset and thermoplastic materials i.e. the degree of cross linking of polymer chains. The impact of this structure on the properties of the materials should be described e.g. temperature stability, chemical resistance, scratch resistance, recycling options, dimensional accuracy, etc.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Few students were able to describe the differences in structure between thermoset and thermoplastics well. Few properties were identified. Additives were often omitted and students discussed polymers, and processing impacts. Part A – Most students explained the difference in structure quite well but some failed to cover the properties in sufficient detail. Part B – Additives were identified but discussion of how they affected the properties of polymers could have been better. The answers have been universally poor. Part B asked for 5 additives, some answers have included copolymers, monomers, catalyst, free radicals, print, and lamination films. I think the biggest frustration was asking in Part A for the difference between thermoset and thermoplastic polymers both in structure and properties (2 x 5 marks) and I got lots of pretty drawings showing the structures, 2 marks, but then little on properties 8 marks

Learning Outcome 3: Understand the conversion of raw materials into packaging materials and packaging components

This Learning Outcome is worth 40% of the marks for this paper and candidates were required to answer two of the following three questions: 5, 6 & 7

QUESTION 5

- A) Identify the FIVE main processes for forming rigid metal packaging. (2 marks)
- B) Describe with the aid of a diagram the manufacture of an unprinted drawn and redrawn metal can body from reel stock to dispatch for a retorted food product. (12 marks)
- C) What quality checks and tests you would carry out in the manufacture of the can body? (6 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – Three piece, Draw, Draw wall iron, Impact extruded, Draw and redraw. Part B – Required a full description, with diagrams, of the manufacture of drawn and redrawn can.

Part C – Quality checks include dimensional accuracy including capacity, fit to closure/container and seal integrity, dimensional stability in different conditions (e.g. thermal processing), product resistance, integrity and scuff resistance of coatings.

Marker 2: A – Students were expected to identify 5 different methods used to form rigid metal packaging e.g. 3 piece welded can, impact extruded tube, drawn and wall ironed can etc. B – Students were expected to describe the process used to manufacture a 2 piece drawn and redrawn can. Key processing steps include unwinding material, lubrication stamping and drawing – redrawing beading and flanging cleaning, laynare added and cured, inspected and packaging. Some description of the draw and redraw process is expected. C – A brief description of the quality checks that would be used on the can body e.g. dimensions, coating cover and thickness, leak tests, strength tests.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Most students provided adequate answers. Most lacked detail to gain high marks. Some students appeared confused over the production process including welding and end seaming. Part A – Most students identified the five main processes. Part B – the description and use of drawings to describe the process varied from excellent to very poor. It sometimes helps to draw each stage in a column and then describe what is happening alongside. Part C – Identify the quality check and say why it is carried out.

QUESTION 6

- A) Describe, in detail, the manufacture of biaxial orientated cast polypropylene film, from polymer granules to rolls of film ready for despatch for conversion. (12 marks)
- B) Identify an alternative process suitable for the manufacture of polyethylene (PE) film. Describe the differences in these processes. (5 marks)
- C) Describe how polymer films can be metalized. (3 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – A detailed description of polymer and additives added to plasticating extruder, into a slot die followed by casting on a chilled drum. Orientation in machine and cross directions, annealing, slitting and reeling. Part B – Blown film process. Part C – Vacuum metallisation process.

Marker 2: A – Required a description of the manufacturing process for BOPP by casting. A description of the extruder operation was expected including a description of the die and

casting rollers. Orientation of the cast film should be described. B – Required a discussion on how blown film production differs from cast. C - Required a brief description of the vacuum metalisation process.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

This was an unpopular question with students. Some good answers were provided, however other answers clearly demonstrated that the students did not understand the process. Part A – This part of the question had 12 marks allocated to it but answers were poorly described and the use of correctly annotated diagrams would have helped. Part B – Most students identified the blown film process but the differences between this and the cast process could have been better. Part C – this was generally answered well.

QUESTION 7

- A) Describe, with the aid of diagrams, the manufacture of a 70cl glass wine bottle from raw materials to bottles ready for despatch to a bottling plant. (15 marks)
- B) What additional manufacturing processes or features can be applied to improve the appearance of a glass bottle to gain marketing advantage? (5 x 1 mark)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – A detailed description of the process identifying ingredients, including cullet. Furnace, forehearth and gob formation. Either blow and blow or narrow neck press and blow process in IS machine, followed by hot end coating. Lehr and cold end coating with automatic and manual inspection followed by palletization and identification. Part B – Additional manufacturing processes and features include colour and where added (furnace or fore hearth), surface finishes - tactile, medals/shields, acid etching, label recess, printing processes such as screen, foil blocking or other decoration, Internal debossing and external embossing. Marker 2: A – Students were expected to provide a detailed description of the manufacturing process for a 70cl wine bottle. Key aspects would include the raw materials the operation of the furnace, the gob formation, the manufacture method either P+B or B+B. It is difficult to describe this process without diagrams. Hot and cold end coatings, Lehr, inspection and packaging. B – Required the students to suggest options to improve the appearance of the bottle. Use of colours, complex shapes, embossing and various labelling and printing options could be considered.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

A wide range of performance from students. Poorly scoring students often failed to provide detail e.g. the forming processes were often poorly described and little detail was included about the furnace. Several students referred to "raw materials" with no additional detail. Part A – This part of the question was generally well answered but correctly drawn and annotated diagrams would help. Part B – this was well answered.

Unit 2: Packaging Materials and Components (Paper B)

Paper B is worth 30% of Unit 2 and is assessed by a 2 hour examination. Candidates have to answer three questions.

Learning Outcome 4: Understand the raw materials, properties and applications of packaging adhesives

QUESTION 1

(This question is worth 30 marks for this paper)

- A) Describe the theories of mechanical, chemical and diffusion adhesion (3 x 2 marks) and provide an example of where each is used (3 x 1 mark).
- B) Describe how an emulsion adhesive sets. (3 x 1 mark)
- C) Describe how adhesive performance can be assessed. (4 marks)
- D) A hot melt adhesive is used to secure the end flaps of a printed high gloss corrugated carton. There are reports of the flaps opening. Returned samples show that all of the adhesive is on one flap and that it has peeled cleanly off the other flap. Fully discuss the possible reasons for this failure and suggest possible solutions. (7 x 2 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – Three theories to be described along with an example where used. For example mechanical adhesion theory can be described when adhesive flows into surface irregularities and then sets. The adhesive is mechanically keyed into the surface such as when a starch adhesive is used to bond liners for corrugated board. Part B – An explanation about the constituents of an emulsion adhesive. When applied to a substrate and the loss of water, the emulsion breaks, a green bond will form, compression required until the adhesive dries. Part C – The basic approach to assessment needs to be described along with suitable test methods such as a tensile pull on lap joint along with an understanding of the environmental conditions. Part D – a FULL discussion of reasons for failure and the suggestion of possible solutions such as checking that the flaps are held securely closed long enough for adhesive to set.

Marker 2: A – Required a description of the 3 main theories of adhesion, mechanical, chemical and diffusion, and the student to provide an appropriate example of each. B – Required a description of the steps in the setting of an emulsion adhesive. This required a brief description of what an emulsion adhesive is and then how water removal causes the adhesive to break and set. C – Required the students to describe the assessment of adhesive performance e.g. using tensile tests. Key issues associated with the tests should be identified e.g. failure mode, temperature, etc. D – Required an analysis of possible causes of this failure e.g. hot melt temp, surface contamination, time pressure adhesive, amount used, etc.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Most students provided reasonable answers, and demonstrated their understanding. Some descriptions lacked technical detail preventing most from achieving very high marks. Part A – This part of the question was generally well answered but sometimes incorrect examples were used. Part B – generally poorly answered. Few students explained the importance of a polymer encased in a stabilizing colloid suspended in water. Part C – suitable test methods described but often without reference to external conditions. Part D – Generally well answered.

Learning Outcome 5: Understand the different types of labels and the materials used

QUESTION 2

(This question is worth 30 marks for this paper)

- A) Using examples of packed products; discuss the reasons why plastic film might be chosen over paper as a material for labels. (6 x 1 mark)
- B) Discuss what you need to consider when drawing up a specification for both wet glue and self-adhesive labels. Consider all stages of the supply chain when you format your answer. (8 x 2 marks)
- C) Describe FOUR tests that can be used to evaluate the performance of printed labels as part of the development process. (4 x 2 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – A discussion is required. For instance, plastic labels can show a range of aesthetic effects such as gloss, matt, opaque, transparent or pearlescent finishes. Part B – The question is asking for a discussion about what needs to be considered when drawing up a specification, not a written specification. An example would be use of the product: how, where (kitchen/bathroom), by whom – materials, colours, aesthetic effects. Part C – Answers should describe suitable test methods such as a rub / scuff test and why.

Marker 2: A – Required students to identify advantages of plastic labels over paper labels e.g. reverse printing, scuff resistance, no-label look, moisture resistance, tear resistance, improved flexibility, etc. B – Required students to discuss, not just state, issues to be considered in developing a specification. Issues could include product characteristics, material of pack, conditions of label application and use, print requirements, label packaging, etc. C – Required a description of 4 tests to assess label performance. This required the test name, description of the test and justification.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

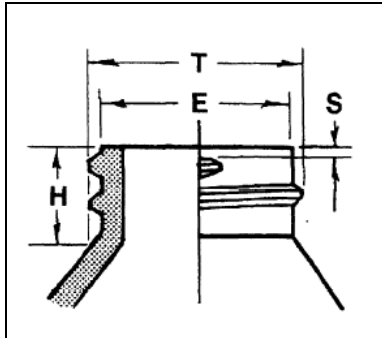
Many students failed to provide descriptions of tests or discussion of the factors to be considered which limited their marks. Part A – This part of the question was generally well answered. Part B – This could have been answered better especially if a discussion around what you need to think about when drawing up a specification. Part C – suitable test methods described but often without referring to what could happen if the test was not performed.

Learning Outcome 6: Understand closure systems and the factors that affect seals

QUESTION 3

(This question is worth 30 marks for this paper)

- A) a) Describe the dimensions indicated by the letters shown in the diagram below and explain their overall importance with respect to the closure. (2 marks)



- b) What dimension is usually denoted by the letter *l* and why is it important? (2 marks)
- c) Briefly describe the difference between a symmetrical and modified buttress thread for a plastic bottle. (2 marks)
- B) For the following closure mechanisms, discuss the FIVE key factors to be considered to achieve an appropriate functioning system:
- Roll on Pilfer Proof closure on a glass bottle containing liquid. (5 x 1 mark)
 - Ice cream wrap using pattern cold seal adhesive. (5 x 1 mark)
 - A full aperture easy open end for a retort can of pet food. (5 x 1 mark)
 - An induction seal on the paper laminate was contained within the plastic closure on an instant coffee jar. (5 x 1 mark)
- C) Name the TWO main tests you would conduct when evaluating the fitness for purpose of a peelable heat seal on a thermoformed film pack of red meat and state why you would perform these tests. (2 marks)
- D) What are the FOUR key control factors to achieve a heat seal? (2 marks)

Markers Comments

1. *Summary of what was expected in the answer*

Marker 1: Part A – this question required a knowledge and understanding of the H I E T S bottle finish dimensions and the difference between symmetrical and modified buttress threads. For example the *l* dimension is critical to ensure there is a good seal between the bore of the bottle and the bore seal on the closure. Part B – The question is asking for a discussion about what needs to be considered to achieve a good seal and will function effectively. For example, a full aperture easy open end for a retort can of pet food requires an end made from the correct material with shoulder compound in correct place. The score and pull ring must not leak under pressure. The seaming chucks are correctly designed and set to ensure a double seam is formed. The pull ring must be correctly attached to closure and a score of sufficient weakness so the can end will open efficiently. Part C – Answers should describe two suitable tests such as leak and peel strength and why. Part D – Four key control factors include time and temperature amongst others.

Marker 2: A – Required a definition of the various elements of screw thread dimensions, and description of the differences in a symmetrical and modified buttress thread. B – Required a discussion of key factors to be considered in the formulation of an effectively sealed container. Some discussion of each product is expected. ROPP issues - aluminium temper, was characteristics, resistance to contents, correct pressure, effective forming. Cold seal - correct

pattern, quantity of adhesive, pressure, time, contamination neat forming. Can end - correct materials, sealing compound, effective double seals, chuck pressure, score depth. Induction heat seal – appropriate pad make up, cup material temp stable, sealing layer compatible with jar, appropriate heating time, adequate pressure applied by cup, etc. C – Required two different types of test to be described e.g. leak testing and peel strength. D – Time, temp, pressure, contamination.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Most students provided reasonable answers demonstrating a knowledge of the topics, but few provided the additional descriptions required for high marks. Part A – Mixed answers.

Students need to fully revise these key dimensions. Part B – A knowledge and understanding of each closure system was needed and sometimes the answers were muddled. Part C – Generally well answered. Part D – Generally well answered.

PIABC

08 February 2018

Unit 3: Packaging Processes

This unit is assessed by a 2 hour examination and candidates have to answer five questions.

Learning Outcome 1: Understand the packaging design and development process

QUESTION 1

(This question is worth 20% of the marks for this unit)

- A) A manufacturer is planning to launch a new fruit and nut cereal bar; briefly describe the information required to produce the packaging brief relative to each of the following headings:
- Eight relevant items of information about the product. (4 marks)
 - Eight relevant items of information about the market for the product. (4 marks)
 - Four relevant items of information about the storage and distribution system used. (2 marks)
- B) Identify SIX key departments involved in the launch and comment on their contribution to the packaging development process. (6 marks)
- C) In the design and development process; briefly describe two types of test programmes relative to the finished pack which need to be considered and why. (4 marks)

Markers Comments

1. *Summary of what was expected in the answer*

A – Required a description of the types of information required for product development, the 1st list is about the product e.g. physical state, size, sensitivity to moisture, oxygen, UV, shelf life, odours, temperature stability, etc. Information about the market could include size, demographics, competition, selling price, expected features, retail method, consumption opportunity, etc. Storage and distribution will identify potential hazards, transport modes, climatic hazards, etc. B – Required the identification of 6 different functions with an organisation which contribute to the development of the product. The department structures vary considerably so a wide range of departments could be discussed. Typically marketing, production, technical, packaging, purchasing and packaging could be included. C – Required two testing programmes to be discussed. These could include distribution testing, shelf life testing, or consumer trials.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Most students provided good answer to be question, however detail and discussion, were often limited.

Learning Outcome 2: Understand the main printing and decoration processes used in packaging

QUESTION 2

(This question is worth 20% of the marks for this unit)

- A) Discuss the factors which could lead to colours of a global brand appearing different to customers. (5 marks)
- B) Summarise the stages of the print preparation process for soft drink cans. (5 marks)
- C) Describe the process of printing metal cans for a soft drink product (8 marks) and how is this process influenced by the ink used (2 marks).

Markers Comments

1. *Summary of what was expected in the answer*

A – Required an discussion of issues which could cause colours to appear different. Students were expected to discuss issues with light, observer and object. Other issues could include print quality issues and colour fading. B – Required a description of the print preparation process. The artwork approval, plate making, and ink preparation. C – Required a description of the print process for soft drinks can. Key aspects of the offset letterpress should include, ink distribution train, printing plates, use of offset roller, transfer to can, and curing/drying.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

Most students provided adequate answers. Few included detail or arguments and discussions to gain high marks. Some students appeared to write al you know without addressing specifics of the question.

Learning Outcome 3: Understand packaging machinery and packaging line operations

QUESTION 3

(This question is worth 20% of the marks for this unit)

- A) Describe the packing line for packaging individually wrapped chocolate bars, which are sold in a multipack carton of six bars, from receipt of packaging materials to finished packed products ready for despatch. (14 marks)
- B) Discuss the factors which contribute to this line's overall equipment effectiveness (OEE) and for each factor provide an example how the OEE could be improved. (3 x 2 marks)

Markers Comments

1. *Summary of what was expected in the answer*

A – Required a description of the elements of a production line for the given product. The description should start with raw materials in storage to finish product ready for despatch. All key steps in the operation should be identified including coding and quality checks. B – Required students to describe the elements which contribute to OEE and to provide suggestions as to how each element could be improved.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*

A wide variety of answers but most students performed reasonably well. Low marks were received for forgetting quality and coding operations and ignoring or changing the identified packaging format e.g. ignoring the collation box.

QUESTION 4

(This question is worth 20% of the marks for this unit)

- A) Describe and justify an appropriate method for ensuring that the required amount of product is placed into the following packs. Use a different system for each.
- Carbonated soft drink filled into glass bottle (3 marks)
 - Individual frozen prawns into bag (3 marks)
 - Talc powder into a container (3 marks)
- B) Describe, with the aid of a diagram, the operation of a vertical form fill seal packaging machine for packing 2.5 kg bags of potatoes. (11 marks)

Markers Comments

1. *Summary of what was expected in the answer*
A – Required a description of a filling system which will provide the required amount of material in each pack. The answer should describe how this is achieved e.g. how the amount is controlled. The most appropriate solutions are: the carbonated beverage required a pressure level filler; frozen prawns will use a multi-head weigher; talc will use a cup filler which may be vacuum assisted (auger filler may also be appropriate). B – Required the student to explain the operation of a VFFS machine. It is only the operation of this item that is required not the whole process. The descriptions should include the tension of the film, the forming collar, formation of the back seal, the operation of the end sealing jaws and the introduction of the product.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students provided acceptable answers. Poor answers were associated with students not focusing in the specific requirements of the question and giving a general overview.

Learning Outcome 4: Understand how quality systems impact on packaging

QUESTION 5

(This question is worth 20% of the marks for this unit)

- A) Identify and discuss TEN core elements of a Quality Management System. (10 x 1 mark)
- B) Using a glass bottle as an example; explain the importance of a purchasing specification to the packer filler. (5 x 2 marks)

Markers Comments

1. *Summary of what was expected in the answer*
A – Required a core element of a QMS to be identified and discussed these could include: policy, objectives, manual, roles and responsibilities, data management, continuous improvement, document control, resources, operating procedures and corrective actions. B - Required students to discuss the importance of a purchasing specification. While some items to be included on the specification could be included the focus is on what the specification does e.g. provides legal contract, allows product to be assessed, used to compare suppliers, provides transparency in operations, etc.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students provided adequate answers. Detail and discussion were often lacking. For Part B some students focused on what should be included in the spec.