



PIABC

Awarding Qualifications
for the Materials Cycle

REPORT ON THE JUNE 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) Name and explain SIX functions of packaging. (6 x 2 marks)
- B) Name THREE mechanical or environmental hazards that can be found in a warehouse. Give an example of the effect this can have on a packaged product and show how packaging can protect against that hazard. (3 x 3 marks)
- C) Briefly describe FOUR considerations that must be taken into account when using modified atmosphere packaging (MAP). (4 x 1 marks)

Examiners Comments

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

Functions of packaging effects and mitigation of hazards and considerations regarding MAP: Part A - Brief description of the functions, contain, protect, preserve, inform, sell and provide convenience. Part B - A discussion how 3 warehouse hazards can damage products and how packaging assist in preservation and protection. Part C - Description of 4 issues to be considered using MAP (e.g. seals, barriers, puncture, volume).

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

Mostly answered well, but more detail needed on hazards in some cases. Most students provided reasonable answers to Part A. Part B often neglected the effect of the hazard and/or the use of packaging to protect against the hazard. Some very remote hazards were considered. Answers to Part C were often limited.

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)

- A) A liquid carton (such as a Tetra Pak) for a long life orange juice is constructed from a multi-layer laminate material. Identify the materials layers in this pack and explain their function. (9 marks)
- B) List EIGHT different properties of a bottle to contain a carbonated soft drink. Against each property, compare the relevant merits of glass and polyethylene terephthalate (PET) in the performance of the final product. (8 x 2 marks)

Examiners Comments

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

Part A - Knowledge of 'Tetrapak' structure and functions of layers. Description of the functions of the layers of carton (PE/Paper/Tie/Al/Tie/PE). Part B - Comparison of performance of glass and PET for carbonated drink. Criteria could include: strength/clarity/barrier/chemical resistance/brittleness/etc.

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

Most students provided well argued answers to both parts of this question. Although quite a few candidates could not accurately explain layers/functions in Part A.

Learning Outcome 3: Understand the packaging development processes

QUESTION 3

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

A beverage manufacturer is planning to launch a new range of carbonated fruit drinks.

- A) Identify and explain FOUR product related factors to be considered in developing the new pack. (4 x 1 mark)
- B) Identify and explain SIX marketing related factors to be considered in developing the new pack. (6 x 1 mark)
- C) Discuss the packaging line related factors to be considered in developing the new pack. (4 x 1 marks)
- D) Identify and briefly explain the responsibilities of SIX roles/disciplines which will be involved in developing new packaging. (6 x 1 mark)

Examiners Comments

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

Product/market/packing line considerations in developing a new pack for carbonated fruit drink. Six roles/disciplines involved in new pack development. Part A – Explanation of 4 product related considerations (e.g. shelf life barriers required, solid contents, temperature stability, etc). Part B – Explanation of 6 marketing related considerations (e.g. customer profile, geographic market, product season ability, market size, features required, etc). Part C – Explanation of 4 packaging line related considerations (e.g. line speeds required, pack stability, new equipment required, compatibility with existing products, cross contamination issues). Part D – Explain the functions of 6 roles involved in pack development (e.g. purchasing, engineering, production, quality, marketing, legal, suppliers, customers, etc).

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

Some weaknesses in 'product' related factors in particular. Most students provided reasonable answers. Part A was often poorly approached with marketing, production and engineering considerations being reviewed more than product specific considerations.

Learning Outcome 4: Understand packaging costs and quality systems

QUESTION 4

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

- A) Explain each of the steps required by a packer-filler to ensure that a delivery of 100,000 empty printed plastic bottles for shampoo is suitable for use. This is the first delivery from a new supplier. (10 marks)
- B) Outline how the operation of a good quality management system can improve profitability. (5 marks)

Examiners Comments

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

Checks and inspections to ensure delivery of shampoo bottles meet requirements. How an effective QMS improves profitability. Part A – Brief description of incoming quality assessment program including initial document and condition, sampling plan, testing program and AQL. Part B – A selection of benefits of an effective QMS (e.g. reduced waste, moral, reputation).

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

Part A was poorly answered with most students providing very limited detail.

<p>Learning Outcome 5: Understand the relationship between packaging and the environment</p>

QUESTION 5

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

Explain FIVE methods of managing packaging waste and discuss their relative advantages and disadvantages. (5 x 3 marks)

Examiners Comments

1. Summary of what was expected in the answer

Five methods of dealing with packaging waste - a brief discussion of the issues, relative advantages and disadvantages of reduce, reuse, recycle, recover (energy generation) and landfill.

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

Some candidates provided too little relevant/limited in detail and often did not consider the full range of options. Some answers demonstrated a lack of knowledge of basic terminology.

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)

- A) Globalisation is often cited as a significant driver for change. Discuss how globalisation has impacted on the packaging industry. (5 marks)
- B) Companies can be heavily criticised within the media if they are deemed to have not acted in a socially responsible manner. Discuss the actions companies can take to ensure that they are considered as socially responsible. (5 marks)

Examiners Comments

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

Impact of globalisation on packaging - a discussion of the impact on packaging of globalisation where several issues are discussed. Knowledge of company's CSR - a discussion of how a company can be socially responsible with several issues discussed. A range of issues is expected not just environmental.

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

It is important that answers are developed, not just bullet point topics. Many answers discussed issues which were not related to globalisation (e.g. shelf ready growth, family size), but packaging trends were social changes that not necessarily the effects of globalisation. CSR answers should consider issues other than environmental.

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)

- A) Define and briefly describe the primary, secondary and tertiary packaging for a 400g rectangular pack of hard cheese. (3 x 2 marks)
- B) Outline a typical supply chain for this product from cheese manufacturer to retailer. (2 marks)
- C) For the packaging described above, discuss the ways the components work together to optimise the complete packaging solution in the supply chain. (3 x 3 marks)
- D) What are the most significant hazards faced by the packed product in the supply chain and discuss how they can be minimised or controlled? (3 x 1 mark)

Examiners Comments

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

Primary/secondary/tertiary packaging (for hard cheese) and how they work together. Supply chain hazards for above product. Part A – Definition of primary/secondary/tertiary packs and examples what could be used for the specified product. Part B – A description of the distribution channel from manufacturer to retailer (e.g. through RDC). Part C – A description of how the complete packs contributes to an efficient packaging solution for the supply chain. Factors to be considered could include product shelf life, effective use of space, damage limitation, information provision, handling, etc. Part D – Key hazards could include temperature control, compression, puncture, vibration or contamination. Answers must indicate how these are controlled.

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

Most answers were good and well answered. Most significant problems were failure to identify how hazards can be controlled. Little information on supply chain – what happened in the manufacture was not relevant.

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 (8 x ½ mark)
B) 750 g of cornflakes are packed in a high-density polyethylene bag inside a paperboard carton. 12 cartons are placed in a corrugated board case and palletised on a wooden pallet. The load is secured with stretch wrap. Discuss how this packaging system performs the functions of packaging. (20 marks)
C) Discuss impact of shelf ready packaging in the supply chain. (6 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
Part A – Identification of the all 8 packaging functions of packaging. Part B – A discussion of how the packaging system (i.e. the pack of cornflakes) performs the functions of packaging. Better answers tended to discuss each function in turn e.g. inform, was discussed with respect to the primary, secondary and tertiary packaging. Students structured the answers on what does the HDPE bag do tended to miss out functions. Part C – A description and discussion of 2 - 3 impacts of SRP.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students made a good attempt and answered reasonably well. Some lacked enough detail or did not mention all 8 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) Discuss how intellectual property created during the packaging development process can be protected. (5 marks)
B) Stating a specific example of legislation; discuss how it is being used to reduce the impact of packaging on the environment. (5 marks)
C) Discuss the relative merits of using legislation versus standards in achieving acceptable product quality. (5 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
Knowledge of patents/trademarks/copywrites, environmental legislation and comparisons between legislation and standards. Part A – This question required a description of IP protection which are available (e.g. patents, trademarks and copywriting). Use of confidential agreements is also possible. Key applications of each protection should be provided. Part B – A specific piece of legislation should be identified and a few requirements discussed (e.g. produces responsibility obligations (packaging waste)). Part C – Several difference on legislation and standards is expected (e.g. legislation minimum standards, enforced by legal systems). Standards can be higher standards, enforced by range of bodies. Legislation state specific, standards can be applied anywhere.

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

A wide variety of performance in this question, but mostly okay. Some did not compare legislation and standards fully. Most students had a reasonable attempt at Part A however some answers lacked detail. Several students answered Part B in only vague terms others provided detailed answers. Some students failed to understand that Part C required a comparison of use of legislation and standards and only provided a discussion of the advantages of having legislation.

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) What is meant by an environmentally responsible pack (2 marks) and describe how to achieve it (3 marks)?
- B) Discuss the stages of conducting life cycle assessment in evaluating the environmental performance of a plastic bottle. (10 marks)

Examiners Comments

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

A definition of environmental responsible packaging and some examples of how this is achieved. Part B required a discussion of HOW to conduct a LCA for a plastic bottle with some examples of the information required.

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

Few students provided an overview of how to conduct a LCA. The LCA part was a bit thin on overall stages and too narrow in some cases. Many just focused on carbon footprinting. Most students were able to provide reasonable definition of an environmental pack.

Learning Outcome 6: Understand the relationship between packaging and marketing

QUESTION 6

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

- A) Identify and briefly describe FIVE responsibilities of the marketing department when developing of a new packed product. (7 marks)
- B) Briefly discuss the THREE fundamental messages a brand must convey for it to be successful. (3 x 1 mark)

Examiners Comments

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

A description of five key responsibility of marketing when launching new product (e.g. need, sector, price, distribution, values). Three fundamental messages of a brand – identification, differentiation, guarantees.

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

Most students had reasonable answers. Some evidence of rushed answers. Very few candidates identified the brand fundamentals mentioned in the marking brief.

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.

Learning Outcome 1: Understand the properties of materials which make them suitable for packaging
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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) List the ingredients glass used in the manufacture of glass bottles to pack a UV sensitive product (6 x ½ mark) and explain how they affect the properties of the glass (6 x ½ mark).
- B) Discuss why glass is the material of choice for packing spirit based beverages. (8 x 1 mark)
- C) The pharmaceutical industry classifies glass as I, II and III; describe the differences and applications of these types. (3 x 2 marks)

Examiners Comments

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

Part A – Identification of the main ingredients in amber glass and their functions in the mix.

Part B – A discussion of why glass is an appropriate for spirits. Students were expected to provide a wide range of reasons why this is the 'material of choice'. Part C – A description of what the 3 types of pharma glass are and the application for which they are used.

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

Most students provided reasonable answers for Parts A & B, some lacked details on the functions of the ingredients. Few students correctly understood the differences in the types of glass.

QUESTION 2

- A) Discuss how the selection of raw materials, additives and pulp processing can influence the characteristics of paper. (14 marks)
- B) Identify and describe how SIX paper properties can be measured. (6 x 1 mark)

Examiners Comments

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

Students were expected to identify the properties of soft and hard wood and recycled materials for use in paper making. Describe the additives used in the paper pulp preparation. Discuss the impact of different pulping systems on the paper making process and quality of the paper made. Describe the effect of beating and refining. Students were expected to identify and briefly describe how 6 tests on paper (not board) are conducted.

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

Most students provided reasonable answers to the question. The beating and refinement part of the question was generally poorly answered.

QUESTION 3

- A) Discuss each of the key criteria to be considered when selecting a metal suitable for a food or drink product of your choice (5 marks). Discuss the relative merits of steel and aluminum for your chosen product (5 marks).
- B) Discuss the advantages and disadvantages of using a flexible pouch instead of a rigid container for a food product of your choice (5 marks). Suggest a suitable material of construction for the pouch, giving reasons for your selection (5 marks).

Examiners Comments

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

Part A – Students were expected to identify a product and pack format and describe the key considerations in selecting a metal for this application. The comparison should be made between the performance of aluminium and steel. Part B – Students expected to discuss the relative merits of flexible and rigid containers and suggest a suitable material or materials to be used in the flexible pack.

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

This was an unpopular question. Few students answered this question however they did provide reasonable answers.

Learning Outcome 2: Understand the synthesis and properties of polymers
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QUESTION 4

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

- A) Describe the polymerisation of low density polyethylene (LDPE). (6 marks)
- B) Describe 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? (2 x 3 Marks)
- C) Explain the meaning of the following polymer characteristics and describe how they can influence their properties:
- Crystallisation (2 marks)
 - Orientation (2 marks)
 - Glass transition (2 marks)
 - Melt flow index (2 marks)

Examiners Comments

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

Part A – Required a description of the polymerisation of LDPE. In particular the initiation, propagation and termination stages. Part B – Required a description how HDPE (use of a catalyst) and LLDPE (a co-polymer) are different from Part A, and how this modifies material properties. Part C – Required a explanation of several polymer characteristics.

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

Most students provided reasonable answers. Several students struggled with Part B and with descriptors of what crystallisation and glass transmission are.

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

Describe in detail, with the aid of diagrams, the conversion process to manufacture a glass jar used to pack jam (fruit preserve). Start with raw materials added to the furnace and finish with jars packed ready for despatch. You are expected to explain how each stage of the process contributes to the delivery of a fit for purpose container to the customer. (20 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
The question required a description of glass production from raw materials to finished containers ready for despatch. Key stages include raw materials, furnace, IS machine, coatings, lehr, QC and packaging.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students achieved average marks. Few obtained high marks in this question. Descriptions of the moulding process was often poor.

QUESTION 6

- A) Describe, with the aid of diagrams, the manufacture of a coloured extrusion blow moulded plastic bottle to hold 750ml of a liquid household chemical (e.g. bleach). In your answer describe the process from receipt of raw materials to despatch of finished container to the filler, name a suitable material for the container and explain why. (15 marks)
- B) What are the advantages and disadvantages of the extrusion blow moulding process? (5 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
Part A – A description of the EBM process from raw materials to finished container was expected. In particular the operation of the extruder and the blow moulding of the container.
Part B – A description of the advantages and disadvantages of the EBM process for making a bottle.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students provided adequate answers. Details of the extruder and the blow moulding operation were at times a little limited and prevented higher markers being achieved.

QUESTION 7

- A) For a collapsible aluminum tube suitable for an eye cream, list and explain the importance of each of the criteria which should be stated on the specification. (10 marks)
- B) Outline the production process for such a tube, including how its quality would be assured. (10 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
Part A – Required a discussion of items for the specification. A range of general specification information should be provided (e.g. specification ID, date, product, ownership, etc). Part B - A range of technical aspects should be included (e.g. material requirements, dimension, and tolerances, coatings, closure type, material performance (e.g. hardness)).
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students answering the question were able to provide a reasonable range of items for the specification. However the descriptions of the impact extrusion manufacturing methods were generally poor.

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 TWO theories of adhesion. (2 x 3 marks)
- B) Describe and justify the type of adhesive you would use for the following applications:
- A label for a returnable beer bottle (6 marks)
 - Manufacture of a corrugated board (6 marks)
 - Self-adhesive (pressure sensitive) label (6 marks)
- C) Define the following terms and describe their importance to packaging adhesives:
- Tack (2 marks)
 - Open time (2 marks)
 - Viscosity (2 marks)

Examiners Comments

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

Part A – A description of 2 types of adhesion theory e.g. mechanical adhesion, chemical adhesion or diffusion adhesion. Part B – Requires an appropriate adhesive to be selected and justified for each application e.g. casein based for beer bottle label, starch for corrugated board and acrylics and rubber/resin blends for PSL. Part C – Required a definition of the terms and a indication as to why these are important.

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

A wide range in quality of answers with some students gaining nearly full marks and others performed poorly. Open time was commonly confused with closing time. Other answers were not justified.

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) For the following types of labels used to decorate a bottle, describe, with the aid of diagrams, the materials used, the methods of manufacture and how they are applied to the container.
- Pressure sensitive label (13 marks)
 - Shrink sleeve (13 marks)
- B) What are the advantages of shrink sleeves over pressure sensitive labels for this type of application? (4 marks)

Examiners Comments

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

Part A - Students were expected to identify describe the materials used in the label types and describe how these labels are produced and how they are applied to containers. Part B – The advantages of shrink label over PSL need to be considered.

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

Most students provided reasonable answers to this question. Several students delivered exceptional answers.

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

QUESTION 3

(This question is worth 30 marks for this paper)

- A) Discuss SIX key factors affecting the efficiency of a heat seal closure of a multi-layer sachet, and explain how they can be controlled. (18 marks)
- B) For EACH of the following, describe in detail a suitable closure system. Give reasons for your selection and explain how efficient closing is achieved. You must use a different closure system for each.
- a) 250ml PET bottle of shampoo (6 marks)
 - b) 1 litre HDPE bottle of milk (6 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
Part A – Students were expected to identify and discuss a range of issues which are important to achieving an effective heat seal performance. Part B – Students expected to propose and justify a closure type for the given packs explaining how effective closure is achieved.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students provided reasonable answers with a few exceptional answers. Students lost marks for failing to provide detail on why the heat seal characteristics were important.

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) Briefly describe the SIX main steps in a packaging development process. (6 x 1 mark)
B) Identify and explain the information required to assemble a complete packaging brief. (14 x 1 mark)

Examiners Comments

- Summary of what was expected in the answer*
Part A - Brief description of stages of product development. Part B - Identification and explanation of the relevance of information to be included in the packaging brief.
- Overall comment on students' performance, quality of answers and how students could answer better in the future*
Part A generally answered well. Part B some students provided a list of questions/statements without expanding to why these are important.

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)

You are briefed to produce an 8 colour gravure printed film for a range of chocolate bars. This is a very high volume range and will be sealed with cold seal adhesive.

- A) Describe the gravure print process in detail, with the aid of diagrams, explaining:
- the construction and manufacture of the printing cylinders and the two main methods of engraving (4 marks)
 - the type and composition of ink used (3 marks)
 - the printing and finishing process itself to create a reel of film for despatch to the packer. (9 marks)
- B) What are the advantages (4 x ½ mark) and disadvantages (4 x ½ mark) of this print process for the product above?

Examiners Comments

- Summary of what was expected in the answer*
Part A - A description of the gravure printing process for a confectionary wrapper. Specific detail was required on cylinder manufacturer, ink composition and printing process. Part B – Required identification of advantages and disadvantages of this process.
- Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students provided reasonable answers however details cylinder manufacture and ink composition were generally weak.

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 a packaging line for the packaging of sliced cooked meats, from the supply of packaging materials into the store to finished product ready to dispatch to the customer. (1 x 14 marks)
- B) A key performance indicator for the packer filler is the overall operating efficiency (OEE). Discuss what this is (2 marks) and how it can be improved (4 marks).

Examiners Comments

1. *Summary of what was expected in the answer*
Part A - A description of a complete line for packing cooked sliced meat from product packing to despatch to customer. Key quality checks need to be included. Part B - Definition of OEE and term explained. Several examples described how OEE can be improved. Examples need to be explained not just listed.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Most students provided good answers. Weight and metal checking were frequently omitted.

QUESTION 4

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

- A) Gravity, vacuum or pressure can be used to fill liquids into containers. Describe these filling methods and discuss their relative merits. (3 x 3 marks)
- B) a) Describe the operation of a thermoform fill and seal machine, which is used to produce and pack single servings pots of milk for the catering market. (6 marks)
- b) What are the advantages and disadvantages of the above process compared to using bought in preformed pots? (5 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
A description and relative merits of three level filling methods including product and container issues. A description of a thermo-form fill and seal process with a discussion of the advantages of this over purchase of formed tubs.
2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Process descriptions of the thermoforming system were often poor and sometimes very accurate.

Learning Outcome 4: Understand how quality systems impact on packaging

QUESTION 5

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

- A) Define what is meant by a quality management system. (5 marks)
- B) Discuss how a quality management system ensures fitness for purpose of the product, using one of the following as an example (15 marks):
- A plastic bottle for bleach
 - A film for a chocolate bar
 - A corrugated transit case for the distribution of glass bottles

Examiners Comments

1. *Summary of what was expected in the answer*
Definition of quality management system. A discussion of how the elements of a quality management system relate to the quality “fitness for purpose” of a product.

2. *Overall comment on students’ performance, quality of answers and how students could answer better in the future*
Many students focused on items to be included in specifications and how these would be tested rather than an overview of all elements of QMS.