REPORT ON THE NOVEMBER 2016 EXAMINATIONS

LEVEL 3 CERTIFICATE IN PACKAGING (QCF)

(Qualification Accredited Number: 600/0455/1)

AND

LEVEL 5 DIPLOMA IN PACKAGING TECHNOLOGY (QCF)

(Qualification Accredited Number: 600/0017/X)

Issued: 13 March 2017

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 soup is packed in a labelled 1 litre glass jar with a metal lug closure. Six jars are collated into a shelf ready corrugated case, which are palletised 20 cases to a layer and stacked seven layers high. The pallet is stabilised with stretch wrap. The product is shelf stable at ambient temperatures.

A) List the SIX main functions of packaging. (6 x ½ marks)
B) Explain how this primary package performs the functions of packaging (6 x 1½ marks) and why each one is important (6 x ½ mark).
C) Explain how this secondary packaging performs the functions of packaging (5 x 1½ marks) and why each one is important (5 x ½ mark).

Examiners Comments

1. *Summary of what was expected in the answer*
   Knowledge of the 6 main functions of packaging (i.e. contain, inform, sell, protect, preserve and convenience) and how these are met by the glass soup jar and its secondary packaging. Contain - for example: Primary - pack will be sized to contain the appropriate amount of product and allow for headspace. Pack will be sealed to provide a leak proof closure. The seal is achieved by use of a soft sealing compound in the lid which moulds to the top edge of the jar to provide seal. Force is applied to the seal area through by the pressure exerted by tightening the closure. Important to contain the product so the product gets to the consumer. Leakage of product may damage other products. Secondary - case will contain an appropriate number of packs. Case will enclose the product and be sealed with adhesive or take to prevent accidental or deliberate loss of product. Case will prevent loss of primary packs to ensure correct number of packs reaches the retailer/distributor.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most answered this well, or very well. Those that didn't did poorly throughout. Candidates lost marks because functions such as 'cost' and 'environmental' are not part of the 6 'main functions' and some technical detail lacking.

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)

Propose suitable primary and secondary packaging for retail sale of ONE of the following products:

- 6 over-the-counter painkiller tablets; or
- 75ml moisturising body lotion

In your proposal you should:

A) Identify the packaging components which are required for both primary and secondary packaging. (6 marks)
B) State a suitable material for each component identified. (6 marks)
C) Give your reasons why you have selected these materials. (13 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Primary and secondary packaging for one of either OTC painkiller tablet or 75ml body lotion. Materials used in either case and why. Part A - a simple list of components (e.g. bottle, closure, label etc). Part B – identification of materials for each of the above component types. Few students understood this. For example: 6 over-the-counter painkiller tablets. Key product properties: dry, hard/fragile, for human consumption when in pain. Primary: Small in size thus likely to be portable in bag/pocket & thus must survive such handling to protect against breakage and ingress of moisture; Tablets must be easy to access, although possibly child resistant and tamper evident (reassurance of product integrity); Need for providing a large amount of consumer information for legal compliance; Competitive sector – needs to attract attention, but constrained by small size – see below. *Secondary:* Protection against mechanical hazards of supply chain; Protection against tampering; Stock control via coding; Competitive sector – needs to attract attention, but constrained by small size, thus secondary display pack must meet this function.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Mostly answered well, but some technical detail lacking in the 'materials chosen and why' sections. Students need to look at the points allocated for each section and put in the effort to their answers appropriately.

Learning Outcome 3: Understand the packaging development processes

QUESTION 3

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

A) Using examples to illustrate your answer; discuss FOUR technical related factors to be considered in developing a new pack. (4 x 2 marks)
B) Using examples to illustrate your answer; discuss FOUR market related factors to be considered when developing a new pack. (4 x 2 marks)
C) Identify FOUR roles/disciplines which will be involved in developing new packaging. Discuss the importance of each role in ensuring a successful product is launched. (4 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   A broad understanding of what is incurred in development - four technical and four market related factors to be considered when developing a new pack. For example: storage conditions - the storage conditions (i.e. temperature and humidity will impact on the package and the product. For freezer use low temperature moisture resistance adhesives are required). How packaging interacts across a company - four roles/disciplines which contribute to the development and how they do so. For example: purchasing will identify most cost effective suppliers of products and services and develop contracts.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Not answered that well despite being quite an easy question. Marks were lost for listing non-technical factors, in particular. Discipline's section answered better. The need to read the instructions is paramount. The poor answers did not really address A & B in particular.

Learning Outcome 4: Understand packaging costs and quality systems

QUESTION 4

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

A) List TEN costs of packing a product at a packer/filler and give an example for each. (10 x 1 mark)
B) Briefly discuss FOUR types of quality costs that could be incurred by a business. (4 x 1 mark)
C) If quality is defined as 'conformance to requirements', how do you communicate and agree these requirements with a supplier. (1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Understand the factors affecting cost – and whether these are quality related. Ten true costs of packaging a product (i.e. packaging material costs, management of packaging waste), four costs of quality (i.e. cost of internal faults (defects found at factory)) and how to ensure conformance to a spec. (i.e. requirements are communicated and agreed with suppliers through purchasing or packaging specifications).

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Answered well in the main. Some vagueness on the first costs section, but 'specification' part was on the whole answered correctly.

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. (2 marks)
B) a) Define a life cycle assessment. (2 marks)
   b) Discuss the reasons why a life cycle assessment is important for a business and its limitations. (6 marks)
C) Using examples; discuss why, from an environmental perspective, there is no such thing as an ideal packaging material or pack. (5 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Define an environmentally responsible pack, define and discuss lifecycle assessments and discuss why there is no 'ideal environmental packaging format'. An understanding of positive and negative packaging impacting cost environment. An understanding of positive and negative packaging impacting cost environment.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Not answered well in the main. Some vagueness on the lifecycle assessment section cost points. No-one demonstrated a good understanding of lifecycle assessment. Also Part C should have been straightforward, but most candidates did not seem to read the question properly to realise that for 5 points they needed to do more than just waffle!

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) Discuss how packaging has adapted to suit the needs of modern lifestyles over the last 50 years. (8 marks)
B) As well as being environmentally responsible; briefly describe the TWO other major drivers that encourage manufacturers today to reduce the amount of packaging they use. (2 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Impact of modern lifestyles on packaging and how packaging plays a role in modern society (i.e. change in households occupancy (e.g. increase in single occupancy households in some countries and smaller families - smaller packs and ready meals)). Two non-environmental reasons to reduce packaging (i.e. legislation concerning packaging use and its disposal - now widespread legislation in EU and around the globe).

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most well answered, particularly Part A.

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) Outline the steps in the supply chain from forest to packer filler for a corrugated board case. (5 marks)
B) A mobile phone (cell phone), sold via an online retailer, is individually packed in a plastic bag with moulded pulp end caps and placed in a corrugated board case.
   Describe the causes and effects of FIVE hazards which could be encountered from the product manufacturer to the consumer (5 x 2 marks) and how the packaging would mitigate the effects. (5 x 1 mark).

Examiners Comments

1. *Summary of what was expected in the answer*
   Understanding of the supply chain of a corrugated case (e.g. source: wood or recycled material; pulp mill & paper mill: converts source material into pulp and onto paper sheet and manufacture limited range of materials; corrugator: paper sourced from different paper mills and combined into corrugated board; printer & boxmaker: prints and converts board into packaging; and packer filler: packs and seals cases). Hazards encountered by a phone packaging in a bag with pulp end caps and a corrugated case – causes, effects and ways of mitigation (e.g. shock - drops and impacts, likely during manual handling and distribution through postal system; may cause breakage; and protection by cushioning in pack).

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

Learning Outcome 3: Understand the functions of packaging

QUESTION 3

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

A) Tablets can be packed in a blister pack and carton or a plastic bottle. Discuss how both of these packaging formats perform the functions of packaging. (13 marks)
B) A branded shampoo is packed for distribution through a major supermarket. Describe an appropriate primary, secondary and tertiary package for this product and discuss how the functions of packaging are achieved by each. (11 marks)
C) Discuss the factors which will cause the following packs to degrade:
   a) Plastic bottle for detergents (2 marks)
   b) Corrugated case used for delivery of a laptop computer (2 marks)
   c) Decorated metal biscuit box (2 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Understanding the functions of packaging – in detail – and applied to real life case. Functions of packaging (contain, preserve, inform, etc.) and how they are fulfilled by blister tablet packs and shampoo packaging. Causes of degradation in plastic detergent bottle, corrugated laptop case and a metal biscuit box.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Some students were not specific enough about identifying the correct terms for the functions (contain, preserve, inform, etc.) so the answers were a bit 'waffley'.

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 a specific item of legislation, regulation or standard is being used to reduce the impact of packaging on the environment. (5 marks)
B) Discuss how a specific item of legislation, regulation or standard is being used to ensure safe food products are produced. (5 marks)
C) Discuss how a specific item of legislation, regulation or standard is being used to ensure consumers are not misled. (5 marks)

In each case provide the name of the legislation, regulation or standard, the country or origin and then relate specific requirements to the desired impacts.

Examiners Comments

1. *Summary of what was expected in the answer*
   To know the main principles of the key legislation, regulation and standards and how they impact upon packaging, environment, food safety and consumer protection.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Generally good. Some students were a bit vague about the legislation, regulation and standards and their impact.

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) Describe and justify, using examples, THREE environmental factors (excluding disposal) that need to be considered when making packaging choices. (3 x 3 marks)
B) Identify THREE methods of managing consumer packaging after its first use and describe the relevant considerations for each method. (3 x 2 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   An understanding of the impacts of packaging within the environment. Non-disposal environmental factors to be considered when choosing packaging (e.g. the role of packaging in reducing product wastage, air/water/land pollution during extraction/production of materials, depletion of the Earth's resources, etc.) and relative merits of 3 forms of post-use disposal (i.e. reuse, recycling, incineration with energy recovery, recovery through composting and landfill).

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   A couple misinterpreted the meaning of 'managing...packaging after 1st use' and others included disposal methods in Part A.

Learning Outcome 6: Understand the relationship between packaging and marketing

QUESTION 6

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

Briefly discuss TEN different activities or tools used in the market research process to identify consumer needs. Give examples to explain your answer. (10 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Understand the interactivity of packaging and marketing - ten activities/tools used to identify consumer needs (e.g. SWOT analysis, determining product viability, assessing consumer needs, gap analysis, test markets, consumer panels/consumer research, competitor research, etc.).

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Mostly answered well with some a few candidates gaining 100%. Some students included promotional activities more associated with post launch which would not be classified as 'consumer research' in the way outlined in the question.

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.

Learning Outcome 1: Understand the properties of materials which make them suitable for packaging

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) Identify the layers in a "Tetra" pack type carton for long life fruit juice (2 marks).
   b) Discuss the properties and functions of each material which are required for this product. (10 marks)
B) a) What are the main features of paper or board which are derived from virgin soft woods and hard woods? (3 marks)
   b) How can beating/refining improve the properties of the fibres? (5 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Structure of Tetrapak, properties and functions of each layer. Distinctions between paper made from hard or soft woods. Fibre properties as a result of beating/refining. Part A required a description of the construction for a tetrapak type liquid carton for a long-life product. The answer should have identified the layers within the material and provided a short description of how each of the layers contributes towards the container performing the functions of packaging, including tie layers. Part B focused on the properties of paper and how fiber source and beating could affect the characteristic of the material. The question expected several characteristics which are impacted by beating to be discussed.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most were OK on the Tetrapak section (with some technical errors), but were less able to provide full detail on the soft/hard wood types and beating effects.

QUESTION 2

A) Identify TEN properties of aluminium foil when used as a packaging material. Using examples, discuss the advantages and disadvantages of these properties when using this packaging material. (10 x 1 mark)
B) Explain how the construction and material properties of a 3-piece steel can help to protect and preserve a can of soup over its shelf life. (5 x 2 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Properties of aluminium foil and the structure and properties of a 3-piece steel can for packing soup. Part A required 10 important packaging related properties of aluminium to be identified and described. It is important that the properties must be related to the use of aluminium as a packaging material and the importance should be demonstrated using examples of the application. Part B focused on the properties of a three piece can and its ability to protect and preserve a packaged soup. The answer could include material characteristics the construction method methods of the can e.g. welded seam and double seamed ends.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most marks were lost on the 3-piece can part than the foil. There were few very good answers to this question. Candidates did not consistently relate to the properties to the materials to the

packs and products. Some candidates discussed basic can making processes, but again did not relate these to how the can performance in protecting the product.

QUESTION 3

A) The following formats are used to pack instant coffee. Justify the materials used for each.
   a) Glass jar (4 marks)
   b) Flexible laminate pouch (4 marks)
   c) Spirally wound composite container (4 marks)
B) Discuss why glass is the preferred material for packing perfume. (4 x 1 mark)
C) Discuss FOUR disadvantages of glass for the packing of a carbonated beverage when compared to amorphous polyethylene terephthalate. (4 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Materials used and their functions in packing coffee in glass jars, laminate pouched and composite cans. Glass properties for packing perfume and disadvantages of glass vs. PET for CSD. Part A required a justification of the materials used in three different packaging formats used for coffee. This required the relevant material properties to be identified and related to their use in the packaging construction. Part B required a description as to why glass was the preferred material for use in perfume packaging. This required a discussion of relevant glass properties for protection and marketing and use of this type of product. Part C required four disadvantages of using glass for carbonated soft drinks as an alternative to PET.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Glass parts answered better than the pouch and composites. Many candidates provided reasonable answers. It is worth noting that Part A was looking for material properties rather than format capabilities although they are linked and was not looking for comparisons in material properties in comparison to alternative materials.

Learning Outcome 2: Understand the synthesis and properties of polymers

QUESTION 4

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

A) Discuss the following types of polymer outlining their structure, properties and provide an example of each:
   - Thermoplastic (3 marks)
   - Thermoset (3 marks)
B) A carbon double bond is feature of some important monomers. Describe the importance of the double bond in polymerization processes (4 marks) and provide FOUR examples of monomers which have this characteristic. (2 marks)
C) For each of the following; describe the material characteristic, how it influences the properties of the plastic and explain where it is used to good effect:
   - Orientation (4 marks)
   - Crystallinity (4 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Structure and properties of thermoplastic and thermoset polymers. How the double bond assists in the polymerisation process. Orientation and crystallinity of polymers. Part A discussion of the difference between thermoplastic and thermoset plastic materials. Part B required a description of the addition polymerisation process with a careful explanation of the function of the carbon double bond. Part C a definition of crystallinity and orientation of plastics and a description of how these change the properties of the materials.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Many students listed polymers instead of monomers as requested and a few misinterpreted 'orientation' and gave examples of different forms of co-polymers. Few candidates could provide complete answers. Many candidates were trying to write all they knew about the topic rather than answer the specific question.

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 soft drinks manufacturer is planning to develop bespoke 330ml decorated glass bottles for a new range of carbonated fruit beverages.

Using diagrams where applicable, describe in detail, the narrow neck press and blow manufacturing process for these bottles starting with raw materials and finishing with dispatch of decorated containers to the customer. Explain why this process is appropriate for this pack. (20 marks)

Your answer should include quality considerations and decoration options.

Examiners Comments

1. *Summary of what was expected in the answer*
   Process of producing glass bottles via the NNPB method, from raw materials through to dispatch of bottles to packer/filler. The answer was expected to include a description of the glass making process from raw materials finished products. In particular descriptions of the raw materials, furnace, the NNPB process, coatings and lehr, quality checks and packaging for dispatch were required. A description of decoration options was also required.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most students answered quite well although some diagrams were a bit thin on detail. Few candidates could provide a good description of the NNPB process. Many answers demonstrated that the candidates did not understand the process. While artistic diagrams are not required when diagrams are used they must accurately demonstrate key aspects of the process. Where diagrams are not used to describe the process the written description must be able to provide the same degree of detail that can be achieved in a diagram.

QUESTION 6

A) Describe how aluminium can be combined with paper to form a flexible packaging material by:
   - wet bond lamination (6 marks)
   - vacuum metallisation (6 marks)

   Your answer should include a reference to the thickness of the aluminium in both processes and an explanation of why a vacuum is required in the metallisation process.

B) Describe two additional methods which could be used to combine aluminium and polymer films into a flexible packaging material. (2 x 3 marks)

C) Heat seal coatings can be applied to aluminium foil; describe ways of how the coating weight can be controlled. (2 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Forms of laminating aluminium with paper and polymers and how to control the gauge on heat seal coating on foil. Part A required a description of the wet bond lamination process for combining paper and aluminium and the vacuum metallisation process. Part B required a brief description of two other methods to combining aluminium and polymers e.g. dry bond lamination, extrusion costing or extrusion lamination. Part C required a description of two methods for controlling coating weights e.g. use of a gravure cylinder where excess material is scrapped of the cylinder before application or a knife to remove excessive coating for a coating flooded onto the material, or the thickness of a extrusion coating controlled by the die size.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most students answered quite badly and showed little knowledge of the topic. Few candidates attempted this question and most were poorly answer. Little detail was provided. Often the processes were incorrectly described e.g. aluminium and polymers cannot be co-extruded and vacuum metallisation does not suck the aluminium onto or into the surface.

QUESTION 7

A) Describe and justify the conversion process for a wraparound, die cut, 4 colour printed single wall corrugated blank designed for packing twenty four 330ml bottles containing beer for sale in a major supermarket. Start with paper reels and end with blanks ready for despatch to the packer filler. Use diagrams where necessary. (12 marks)
B) Briefly discuss the advantages/disadvantages of corrugated compared to Kraft solid board as a material to manufacture a container for this pack. (6 x 1 mark)
C) Identify FOUR pieces of key performance information that should be included on a specification of a single wall corrugated case. (4 x ½ mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Conversion process for a single wall corrugated blank. Properties of corrugated vs. KSB. Information to be found on a corrugated case specification. Part A required a description of the corrugated case manufacture process from reels of paper to finished packs. The answer should include a description of the corrugated board manufacture process. Part B required a brief comparison of the relative characteristics of kraft solid board and corrugated board for wrap around cases for beer. Part C required the identification of 4 performance critical items of information to be included on a product specification for a corrugated case.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most students answered quite well and showed good knowledge, but there were some diagrams which were lacking detail and marks were lost on the comparative properties vs. KSB. A popular question attempted by many candidates. The quality of the descriptions of the process varied from very poor to good, however almost all the diagrams used to describe the processes were poor. A diagram of the corrugator would have assisted in the answer of this question.

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) What are the differences between mechanical and specific (chemical) adhesion theories? (2 x 3 marks)
B) Describe the factors that affect the choice of an adhesive for TWO of the following packaging application (2 x 5 marks):
- Wrapper for an ice cream bar (single serve)
- Wet glue label on a glass beer bottle
- Production of corrugated board
- Clear label on a shampoo bottle

C) Apart from the factors above, identify what other detailed information would you expect to see in an Adhesive Data Sheet and why is it important? (7 x 1 mark)
D) a) What is a hot melt adhesive? (1 mark)
b) Identify the constituent parts of a typical hot melt adhesive used on an automated packing line for sealing corrugated cartons and explain their functions. (4 x 1½ marks)

Examiners Comments

1. *Summary of what was expected in the answer*
Part A requires a description of the mechanical and chemical theories on bonding. Part B requires a discussion of an appropriate adhesive to use for 2 applications. The discussion should consider the mature of the products and potential packaging lines. Part C required the review of the types of technical information one could expect to find on an adhesive information sheet. Part D required a definition of what a hot melt adhesive is and then to suggest the material types which would be used to construct a hot melt adhesive.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
Few candidates were able to provide concise definitions of adhesive theory. Selection of adhesives was generally appropriate however several candidates did not read the question carefully and discussed alternative adhesion problems, e.g. discussion of sealing corrugated cases rather than the manufacture of corrugated board.

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) Discuss the advantages and disadvantages of injection in-mould labelling for the manufacture of a biscuit box. (6 marks)
B) Discuss the advantages and disadvantages of a shrink sleeve to decorate a shampoo bottle. (6 marks)
C) Discuss the differences between the performance of paper and plastic labels. (6 marks)
D) Discuss how grain direction affects how labels should be orientated for application as a wet glue label to a cylindrical glass bottle. (6 marks)
E) Describe (with the aid of a diagram) a typical construction and manufacturing process of a self adhesive label. (6 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   The questions required a number of comparisons to be made. For each comparison, a range of issues should be explored. The question requires more detail that just listing the areas of difference; a short description/discussion is required. The method of orientation of a wet glue label required and explanation as to why this orientation is important. The manufacture of PLS label requires a description of the label materials and a brief description of how these materials are converted to the labels. It is does not require a description of the application process.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most candidates provided reasonable answers covering a reasonable range of issues. Many answers were too brief to achieve full marks as more explanation was required.

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

QUESTION 3

(This question is worth 30 marks for this paper)

A) Using examples; briefly discuss and justify SEVEN ways you could seal a pack without using heat in the process. (7 x 2 marks)
B) For the following THREE packs, describe in detail using diagrams, how you would achieve an effective seal:
   a) Induction seal on a coffee jar (4 marks)
   b) Heat seal on a plastic sachet of sugar (4 marks)
   c) Hot melt adhesive patterned seal on an end load carton flap (4 marks)
C) Describe TWO ways you could verify the integrity of the closure seal for the following packs:
   a) A three piece metal can of pet food. (2 x 1 mark)
   b) A modified atmosphere tray and lid pack of red meat (e.g. beef) (2 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Understanding the closure systems and seal factors. Part A required the description of a range of ways to seal packs without heat. This requires the identification of the seal type, an explanation of how a seal is achieved. Part B required a description of how the seal was created in 3 different pack formats. Key consideration for achieving an effective seal should be identified. Part C required a description of 2 ways to assesses seal integrity (not strength) for the two different packs.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most candidates provided reasonable answers did not include the required detail to gain higher marks. How seals are achieved is important and wads, etc. must be included in answers. Several candidates failed to describe how heat seals are achieved or important considerations in ensuring effective seals.

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 major brand owner has suggested there is an opportunity for a space travel inspired soft drink. Describe the packaging development process for this product from concept to a successful product established in the market. (Assume the process will require a new PET bottle shape). Highlight key project milestones. (20 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   A clear understanding of the general development process of packaging. The question required a description of the activities required to develop a new packaging concept. The answers should have included the various departments/organisations involved and the principal activities required. The question required all activities up to and including post launch evaluation of a successful product.

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 general understanding of the issues involved. Few students included scale up to launch or marketing campaigns, or post launch reviews. Candidates with a good structure to the development process generally provided better answers. It was interesting that some students assumed the choice of 'space travel inspired' theme was relevant. It seemed to distract their answers and waste effort. There was also a deal of confusion in terms of the general flow of development – and where to take the process, as indicated in the question.

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) a) Identify the 3 additive primary (½ mark) and the 3 subtractive primary colours (½ mark).
   b) How does their use provide the basis for all graphic printing? (2 marks)

B) When specifying and checking colour printing of packaging; what are the key elements and factors to consider? (4 x 1 marks)

C) a) With aid of a diagram; briefly describe the flexographic print process for a 4-colour flexible HDPE film for packing frozen food. (7 marks)
   b) What are THREE advantages/disadvantages of flexographic (3 x 1 mark) and gravure (3 x 1 mark) printing for the above film?

Examiners Comments

1. *Summary of what was expected in the answer*
   A clear understanding of decoration processes. Part A required a description of how the CYMK process can produce a spectrum of colours. Part B required a description of how printed materials can be assessed. Part C required a description of the flexo printing process. And a comparison of this process with Gravure for printing film.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Good in most cases. Most students answered Parts A & C reasonably well. Some comparisons of the print process were not relevant as they did not apply to the plastic film printing, e.g. surface roughness. Part B was poorly answered with candidates discussing a wide variety of issues not related to the checking of packaging printing. Closer care needed to be taken in reading the question accurately and remembering what learning outcome they are answering against.

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 filling line for a plastic bottle of tablets with a child resistance closure and carton from receipt of packaging components to collated product ready for despatch to customer. (14 marks)
B) Describe how accumulators can improve the efficiency of a filling line. (3 marks)
C) Discuss the elements which contribute to overall equipment effectiveness. (3 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   General understanding of packing line structures and purpose. Part A required a description of a packaging process for the given product. Answers should include all packaging operations expected on the line. Part B required a discussion of how accumulators could be used to improve line performance. Part C required brief discussion of the factors which contribute to OEE.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Most students answered Part A well. There was some confusion with Part B, with students indicating that accumulators enabled equipment to run faster. Few students provided concise descriptions of OEE. Students would benefit from studying alternative key product feeding lines – rather than just the end in their ones in their own factories.

QUESTION 4

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

A) Discuss how the correct weight of individually frozen prawns could be metered. (5 marks)
B) Describe TWO methods of metering the correct volume of olive oil into a glass bottle.(2 x 4 marks)
C) Compare the use of fixed weight and variable weight approaches to retailing pre-packed meat products. (4 x 1 mark)
D) Discuss THREE methods used to apply variable or lot marking data to a carton board case. (3 x 1 mark)

Examiners Comments

1. *Summary of what was expected in the answer*
   Understanding the key dosage/metering methods in filling packaging with product. Part A required a description of how accurate weights could be dispensed, for this product, a multi head weigher is the most likely approach but other methods could be appropriate. Part B required a description of two methods of metering oil, constant volume and level methods were expected however two constant volume methods would be acceptable. It is important to describe how the metering is achieved. Part C required brief discussion of the factors to be considered in comparing the use of fixed weight and variable weight systems. Part D required a description of 3 different methods of applying variable lot data.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Generally adequate to good. But signs of time pressures in one of the candidates. Descriptions of the metering systems in Part A & B often lacked specific details on how the metering was achieved rather than the filling. Many candidates failed to understand the differences in fixed and variable weight systems.

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 Quality Control and Quality Assurance and explain the difference between the two. (4 marks)
B) Explain the difference between critical, major and minor defects. Using a glass bottle as an example, identify two of each type of defect. (3 x 2 marks)
C) Discuss the reasons why a packaging specification is agreed between a buyer and seller. (7 marks)
D) Explain why it is important to set correct tolerance levels. (3 marks)

Examiners Comments

1. *Summary of what was expected in the answer*
   Understanding of quality systems – and QMS. Part A required a definition of quality control and assurance. Part B required critical major and minor defects to be defined and examples of each to be provided. Part C required brief discussion as to why specifications must be agreed between buyer and seller. Part D required a brief discussion as to why tolerances should be clearly stated.

2. *Overall comment on students' performance, quality of answers and how students could answer better in the future*
   Candidate performance was mixed. Some could not describe the differences between quality control, definitions of critical and minor defects were good but struggled with major defects. Discussions on importance of specifications to be agreement were often limited.