

Examiners' Report
June 2012

GCE Design & Technology:
Food Technology 6FT03

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Introduction

This is the third year in which candidates have sat the Food Products, Nutrition and Product Development paper. The focus of this paper is to examine candidates on the knowledge they have developed about a range of food commodities, aspects of nutrition, product development and food innovation. Candidates are required to have a comprehensive knowledge of the main food commodities, their composition, basic processing and typical spoilage patterns.

A sound knowledge of nutrition and its influence on the diet, contemporary lifestyle issues and new product development is particularly important for food technologists.

Similarly, consumer behaviour, demographics, modern lifestyles and sustainable issues have an influence on new product development. It is also important for candidates to be aware of the influence of new technologies and materials on the development of new food products. The coverage of this paper effectively tested the candidates' knowledge and understanding of the topic areas.

The 'ramped' nature of the exam paper and variety of questions styles and command words promoted accessibility to students of all ability levels. Progression and application of knowledge and understanding within the subject area was evident, promoting stretch and challenge opportunities for higher ability candidates. Marks were scored evenly across all areas of the paper, with effective differentiation across the paper.

It was very pleasing to see the depth of detail included in questions which required explanatory answers. Successful candidates were able to demonstrate high level knowledge and understanding in their responses to the questions. It is evident that many centres are teaching the specification well, and training candidates to appropriately recognise and use the stem words which are used to differentiate questions.

Less successful candidates frequently had difficulty in achieving marks in the questions which required explanations. It is not sufficient to simply provide descriptions; underlying explanations also need to be provided at this level. Less successful candidates also misread questions, often giving factually correct material, but not relevant to the question asked.

Centres need to be aware of the necessity to prepare candidates for this exam by ensuring that they have a full understanding of the requirements of different question types: name, state, give, describe, outline, evaluate and explain. Centres must ensure full coverage of the specification as any area could be tested. Application and detail, rather than length, is the key to high marks. Centres should note that the amount of space provided in the booklet for answers, is more than we would expect any answer to take, and not a recommendation of the amount candidates should write. Technical terminology in written answers was significantly better than in previous years, with some outstanding responses particularly in the extended writing tasks.

Question 1 (a)

This was a good example of a 'name' question where candidates were required to identify dairy products produced by reducing water content. Many candidates were successful, with the most common answers being dried, evaporated or condensed milk. Several candidates also correctly identified cheese or butter. Less successful candidates gave responses such as cream. Dried eggs were also cited, but this is not a dairy product.

Question 1 (b)

This question elicited a very good response from candidates, with nearly all being able to explain the term skimmed milk. Many were also able to write about the process, and recognised that the loss of the fat also reduced the fat-soluble vitamins. Some candidates wrote about a loss of nutrients, but at this level, to achieve a mark, candidates need to be specific and identify the nutrients lost.

(b) Explain the term 'skimmed milk'. (3)

- Skimmed Milk is made by removing the fat from whole milk until it is at 0.1% fat content.
- The fat soluble vitamins are also removed.
- Fat is removed in a centrifugal separator.
- It is the lowest fat content of milk you can get.



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Examiner Comments

Full marks were achieved by this candidate. A concise explanation correctly describing the term skimmed milk.

Question 1 (c)

This is a good example of a 'description' question, where candidates could access marks by giving an accurate description of soured milk. Most candidates were able to describe the souring of milk to gain 3 marks. Many candidates also took the opportunity to support their descriptions with explanations which showed excellent understanding of the process.

(c) Describe what happens to milk when it sours.

(3)

Lactobacillus uses lactose as an energy source producing lactic acid this increases the acidity in the milk causing coagulation of the proteins which separates the milk into curds and whey, this creates lumpy sour milk.



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Examiner Comments

This candidate has stated that bacteria converts lactose to lactic acid, lowering the pH, and consequently coagulating the protein, resulting in the separation seen in the milk, the lumpy texture and the acidic, sour taste. Nothing more need be added for full marks. The response demonstrates good understanding.

Question 2 (a)

Most candidates were able to achieve full marks on this question. The most common response for 'source' was milk and dairy products, although some also correctly suggested green leafy vegetables. For the use in the body, most mentioned bones and teeth, with some mentioning muscle contraction or blood clotting. Simple growth and repair was not sufficient for a mark.

Question 2 (b)

A mark was frequently awarded for the correct source of zinc in the diet, but poor knowledge was displayed about the use of zinc as a nutrient. There were lots of vague statements regarding its use, although good answers focused on the role of zinc as a co-enzyme, or being concerned with energy metabolism.

Question 2 (c)

Most candidates could identify a good source of potassium, with 'banana' being the most the common response. As with zinc, many candidates struggled to give a correct response in connection with its nutritional use. Most correct responses focused on the role of potassium in regulating pH and osmotic pressure within cells.

Question 2 (d)

There were several responses where candidates could identify both a source of iodine and use in the body. However, a number of candidates were not able to correctly identify either for this important nutrient.

Question 3 (a)

Where candidates had learnt about chill injury, there were some excellent responses. Very good answers were able to identify that chill injury is a problem for tropical fruits, give temperatures where the fruit's metabolism is disrupted and write about enzyme inactivity and the result of this. Several candidates gave, as an example, bananas turning black in a refrigerator. Some candidates however, focused on the effect of freezing on fruits, and consequently were unable to access marks.

3 (a) Explain the term 'chill injury' with reference to fruit.

(4)

Chill injury occurs to tropical fruit and is when the temperature during storage falls below 15-18°C. This causes the fruit to rot as the enzymes have become inactive due to the cold temperature that the tropical fruit is not used to.



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Examiner Comments

This response earns full marks, as the candidate has correctly identified tropical fruit as the type of fruit affected by chill injury. There is a relevant temperature given, although it would have been better to give as a temperature around 13C, or more precisely a range of temperatures between 10 - 15C. The candidate has also used the term 'rot' and, importantly in this 'explain' question, shown that it is as a result of enzyme inactivity.



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Examiner Tip

Make sure technical terms are used in answers to questions. Because this question obviously alludes to temperatures, make sure specific relevant temperatures are given.

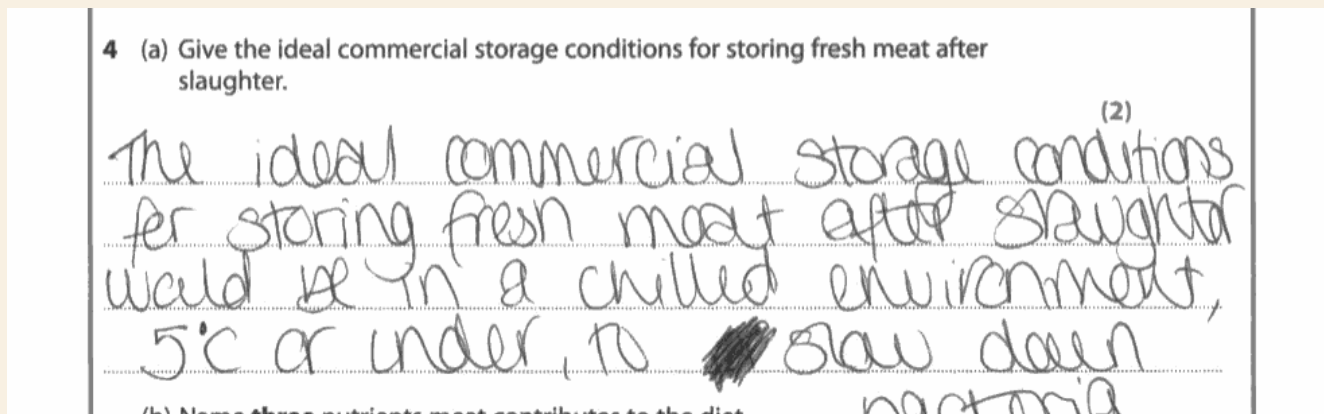
Question 3 (b)

This was a good example of a question which was misread by candidates. Candidates were expected to describe two processes for drying diced vegetables. Many candidates, however, described a process for dicing vegetables. This was allowed where a specific process was described, especially if the need to increase surface area to allow for effective drying was mentioned. Successful candidates accurately described Oven or Tunnel drying or Fluidised-Bed drying. Most mentioned Accelerated Freeze Drying.

However, many candidates struggled with this question. Many mistakenly wrote about sun drying or spray drying. Candidates also often described the effects of the processes, rather than the processes themselves. Many candidates confused the drying process with the freezing process, possibly being confused by the term Accelerated Freeze Drying.

Question 4 (a)

Many candidates gave the straightforward answer, as required and gained full marks. Some candidates over-complicated their response, discussing rigor mortis and hanging meat, but missing the point of the question. Some candidates wrongly focused on freezing the meat. At this level, it is very important that storage temperatures are identified. It is also important that candidates recognise that this is in a commercial context; the question is not asking how meat should be stored in the home.



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Examiner Comments

This concise answer correctly identifies that the context is commercial and gives the correct conditions.



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Examiner Tip

Candidates should be able to transfer knowledge of what happens in a domestic situation to a commercial situation. It is important to read the whole question as the 'after slaughter' element of the question is crucial. The question is not simply asking how meat is stored. Candidates who read it this way frequently wrote about freezing meat and consequently lost marks.

Question 4 (b)

This question was generally very well answered, with most candidates earning full marks. Some candidates went into a lot of detail to show their knowledge of the functions of these nutrients, which is not necessary in a 'name' question. The most frequent correct responses were protein, fat and iron. Many candidates correctly suggested one of the B group vitamins, however could not gain a mark when simply writing 'Vitamin B'. The most frequent wrong answer was 'fibre'.

(b) Name **three** nutrients meat contributes to the diet. (3)

- 1 provides vitamins B
- 2 provides iron
- 3 provides ~~meat~~ (saturated) fat.



ResultsPlus Examiner Comments

This response earns 2 of the 3 marks available by correctly identifying iron and fat. Vitamin B does not gain a mark as it is incorrect, and does not show the level of knowledge required.



ResultsPlus Examiner Tip

Do not be complacent in showing knowledge and understanding. Correct technical terms should be used at all times.

(b) Name **three** nutrients meat contributes to the diet.

(3)

1 Fat

2 Protein

3 Minerals.



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Examiner Comments

This response earns only 2 of the 3 marks, as the candidate has not been specific enough.



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Examiner Tip

At A2 Level, specific minerals, e.g iron or zinc should be given.

Question 4 (c)

Many candidates struggled with this question, often focusing on rigor mortis and changes as muscle turns to meat, rather than focusing on changes in the meat during conditioning (hanging). However, those candidates who correctly identified the conditioning stage were able to explain the changes well, frequently focusing on the effects of active enzyme systems on protein and fat, and the resulting texture and flavour changes.

(c) Explain what happens to meat during ageing or conditioning (hanging).

(5)

After rigor mortis, aging / conditioning occurs. This is when the proteins & fats - larger molecules, are broken down by enzymes to form amino acids and fatty acids. These smaller molecules develop the meat flavour. The Z line also detaches from actin filaments which makes the meat more tender. The connective tissues are still attached at this point so meat still 'stringy'. (Total for Question 4 = 10 marks)



ResultsPlus Examiner Comments

This response correctly identifies that conditioning occurs after rigor mortis. It explains what happens to the large molecules of fat and protein due to enzyme activity, and that this has a resulting impact not only on flavour, but also texture. A good response which demonstrates understanding through explanation.



ResultsPlus Examiner Tip

Make sure the response addresses the correct stage. Here it is conditioning (hanging), not rigor mortis.

Question 5 (a)

Several candidates easily obtained full marks as they were able to identify the energy values of the macro nutrients and therefore complete the simple calculation. However, a number of candidates did not know these values and therefore were unable to achieve any marks on this question. Some candidates showed values as either joules or calories in the same calculation, confusing their answer. This question is derived straight from the specification and is also fundamental to an understanding of nutrition.

Two answers were allowed for the value of carbohydrate - 3.75kcal or 4 kcal/ 16 kj or 17kj. The specification shows the values as 3.75kcal or 16kj, however it is recognised that many reliable sources give the values also as 4kcal and 17kj.

Question 5 (b)

Many candidates were able to explain the concept of energy balance well, and several earned full marks, often using examples to demonstrate understanding. However, a number of less successful candidates understood the question to be asking about a 'balanced diet', and although providing information that was nutritionally correct, were unable to achieve marks as this is not the concept of energy balance. Some candidates discussed obtaining energy from the different macro-nutrients, for instance the benefit of obtaining energy from carbohydrate compared to fat, again, not relevant to this question. Centres should focus on the specification throughout the course to ensure candidates are familiar with the topic areas they will be examined on.

*(b) Discuss the concept of 'energy balance'.

(6)

Negative energy balance is where your food input (carbohydrate, fats, protein and alcohol) is less than your energy output (growth, Physical activity, thermogenesis, BMR) After time this can result in weightloss.

Positive energy balance is where your total input (fats, Carbohydrate, Alcohol, protein) is higher than your output of energy (thermogenesis) growth, Basal metabolic rate and physical activity) Over time this can lead to weight gain.

If you have a balanced energy balance it will help you maintain weight + health diet.



ResultsPlus Examiner Comments

A focused, concise, clear discussion of the concept of energy balance which earns full marks.



ResultsPlus Examiner Tip

Make sure you are answering the question correctly. This question is about 'energy balance'. It is not about a 'balanced diet' which is how some candidates read the question.

Question 6

There were excellent responses to this question, with candidates demonstrating a good understanding of the nature of modified starches and being able to give a good range of products where the different types are used. It was very pleasing to see that this area had been covered well by a number of centres. Candidates who identified different types of modified starch, explaining how they are modified, their resulting properties and then identifying the relevant products these starches are used in, were very successful in earning marks. It was pleasing to see technical terms used well and with high level understanding. Where candidates failed to gain marks, they tended to focus on genetic modification or the modifying of several other ingredients – unfortunately not starch. A number of candidates focused on the use of xanthan gum, and were able to give great detail about its use; however, xanthan gum is not an example of modified starch. Other candidates lost marks by focusing on the gelatinisation process, giving great detail about this; again, this was not relevant to the question.

*6 Review the nature and use of modified starches in food products.

(12)

• Cross linked modified starch, is where phosphate bridges cross starch chains. This starch thickens slowly and becomes very strong. Cross linked modified starch is used in canning products for example canned soup. The starch is easily pourable into the cans, and heat treated meat can pass through before the starch sets.

Ascorbic?

• Acid Modified starch, uses acid, which creates a thick paste, for example it is used in cheese spreads. It also can form a hard gel to make jelly beans. Acid modified starch is strong.

• Stabilised modified starch uses electrically charged starch chains which repel each other. This is used in frozen food products such as sauces on top of potato cakes. Stabilised modified starch has excellent freeze thaw stability, due to the fact it prevents the formation of large ice crystals.

• Pre gelatinised starch is where starch is

spray dried into a powdered form it is used for instant dessert such as angle delight, and is used by adding cold water to rehydrate it and create a thickly textured dessert.



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Examiner Comments

This is a good response where the candidate demonstrates technical knowledge and has correctly identified four different types of modified starch. Good application of knowledge is also shown, in that several different types of food products are cited to show how modified starches are used in the development of new food products.



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Examiner Tip

The answer could be further improved by explaining how the modifications are carried out.

Question 7

Most candidates were very familiar with the cheese making processes. The best answers described and explained the process in detail, demonstrating excellent understanding. High level knowledge and understanding of the process was demonstrated by many candidates, which was very pleasing to see. However, high marks could not be achieved unless good explanations of the processes described were included. Several candidates showed that they could describe the process, but then failed to provide any accompanying explanation. For instance, instead of just saying salt is added, candidates need to say why this is done - for flavour and preservation. Also, instead of just saying that lactic acid is produced, candidates need to go on to say that the drop in pH will coagulate the protein, forming a curd and provide the correct conditions for the rennet to work. Candidates should provide linked answers showing understanding in explanation questions. Less successful candidates decided to write everything they knew about different types of cheese and the different outlets in which cheese could be sold. No marks could be awarded for such information.

7 Describe and explain each stage of the cheese-making process.

(12)

Atttt Cheese is made from milk. Milk is firstly pasturised and homogenized, then placed into a large stainless steel vat, which is coated / surrounded by a water jacket. Starter cultures can then be added, forming lactic acid. It must be now taken great care of to prevent a phage attack on the bacteria which may lead to a cheese of the incorrect consistency and acidity. Colourings may also be added at this stage. Rennet can be added. The mixture is then churned to coagulate the proteins, and it can then be cut into cubes. It can then be turned every 15 minutes for about 2 hours, in which time it should begin to take on a thicker consistency, it is then combined and cut into slabs. ~~The cheese is then ready to be pressed and~~. The mixture may be salted at this stage. The cheese is then ready to be pressed and put into moulds. It is then covered with a cheese cloth or a plastic covering. And it can now be referred to as 'green cheese'. The cheese can then be stored until it has ripened, it may also be aged.

Different cheeses require different types of processing for example soft cheeses such as camembert and brie, have more starter cultures added as they essentially produce mould, and once ripe a soft



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Examiner Comments

This selection from the response demonstrates a good answer to the question. This candidate is obviously very familiar with the cheese making process and can describe it well. To further improve, more detailed explanation could be included, for instance, the candidate could have explained why milk is pasteurised before the starter culture is added.



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Examiner Tip

When the question asks for both descriptions and explanations, take each stage of the process, and ensure both are included. In your plan include two columns, one for description and one for explanation, for each stage of the process. This will ensure both are included. There is so much that could be written for the description of processes, that it could be easy to forget to include the explanation. A plan is vital at this stage in the paper. Most successful candidates included a plan at the start of the question.

7 Describe and explain each stage of the cheese-making process.

(12)

① Pasteurised milk is placed in a large stainless steel vat with an outer water jacket.



② Any colourings & starter culture is added.



③ Vat temperature is held at 25°C, and Lactic Acid is produced.



④ Rennet is added to attack Kappa casein and expose alpha casein to the calcium. This ~~causes~~ ^{clots} the ^{milk} ~~proteins~~ and forms curds & whey. Whey is drained.



⑤ Curd coagulates and forms a solid mass which is cut into cubes.



⑥ Vat temperature is increased to 40°C to squeeze the last of the whey out.



⑦ Curds settle into a firm mass and are cut into slabs.



P.T.O



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Examiner Comments

This response shows several correct stages in the cheese making process, but does not include any explanations.



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Examiner Tip

Make sure you know how to respond to the words in the stem of the question. Here, both 'describe' and 'explain' are required.

Paper Summary

Based on their performance on this paper, candidates should:

- Read the question carefully and identify key words before they start their response. The question must be answered in the intended way.
- Ensure they are prepared by having a full understanding of the requirements of different question types: name, state, give, describe, outline, discuss, explain and evaluate.
- Use technical terms in their responses whenever possible.
- Reflect on where in the specification the question comes from. For instance, those candidates who appreciated that the focus of the modified starch question was new materials and the development of new food products tended to be successful.
- Ensure, where temperature is obviously key in the answer, that specific relevant temperatures are always stated.
- Provide relevant linked explanations to descriptions, or linked examples to demonstrate understanding.
- Plan answers well. There is room in the given answer space for planning which should always be done for the extended writing questions.

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