



2013 HSC Food Technology Marking Guidelines

Section I

Multiple-choice Answer Key

Question	Answer
1	C
2	B
3	C
4	C
5	D
6	B
7	A
8	D
9	A
10	B
11	B
12	B
13	C
14	A
15	A
16	A
17	B
18	B
19	C
20	D

Section II

Question 21 (a)

Criteria	Marks
<ul style="list-style-type: none"> Correctly recognises and names a range of domestic and industrial processing equipment used in food production. Uses appropriate examples 	3
<ul style="list-style-type: none"> Correctly recognises and names some domestic and industrial processing equipment used in food production 	2
<ul style="list-style-type: none"> Correctly recognises and names a domestic or industrial piece of equipment used in food production 	1

Answers could include:

Grinding and milling	<ul style="list-style-type: none"> Coffee bean grinder Mortar and pestle Blender Food processor 	Roller mill Hammer mill
Heating	Oven Microwave oven	<ul style="list-style-type: none"> Tubular heat exchanger Plate heat exchanger Tunnel ovens Microwave ovens
Freezing	Chest freezer Ice-cream maker	<ul style="list-style-type: none"> Air blast freezers Plate freezers Immersion freezers

Question 21 (b)

Criteria	Marks
• Provides a range of advantages of using a fully automated production system compared to a manual system	3
• Recognises and names advantages of using a fully automated production system	2
• General information on production systems	1

Sample answer:

Fully automated production systems generally result in products which better comply with product specifications and at a lower cost than manual systems. The output is more likely to be higher than manual operations and machines can operate on a 24-hour basis. Tasks, which are repetitive or dangerous, can be undertaken and therefore there is a reduced risk of worker injury, which may occur in manual operations. Automatic shut downs can be installed to ensure that safety margins are maintained. Manual systems are more susceptible to human error.

Question 21 (c)

Criteria	Marks
• Makes evident a relationship between the characteristics of equipment and large-scale food production systems	5
• Provides characteristics and features of equipment used in large-scale food production systems	3-4
• Sketches in general terms the characteristics and/or features of equipment used in large-scale food production systems	2
• General information on large-scale food production systems/equipment	1

Sample answer:

This equipment needs to be able to cope with large volumes typical of food production systems. It should fit with other machinery to ensure there is no break in the production line. It should be made of stainless steel which is inert and will not react with food products or corrode and is able to withstand the high temperatures used in food processing. Stainless steel can also be easily sterilised to ensure food safety. It should be able to withstand high levels of vibration, with no loose parts, which could contaminate foods. Large-scale equipment must be durable and easy to maintain to prevent any delays due to malfunction. Appropriate safeguards and shut down mechanisms should be incorporated to ensure worker safety.

Question 22 (a)

Criteria	Marks
<ul style="list-style-type: none">• Puts forward a variety of ways in which the production of ONE food in the meal plan might affect the environment.	3
<ul style="list-style-type: none">• Recognises and names way/s the production of ONE food in the meal plan might affect the environment	2
<ul style="list-style-type: none">• General information on environmental impact	1

Sample answer:

Food selected: Rolled Oats

The use of pesticides and fertilisers may result in runoff into waterways affecting river systems. The use of non-renewable energy sources to power farming equipment, manufacturing technologies and transport will increase the carbon footprint. Packaging materials will contribute to landfill and litter.

Question 22 (b)

Criteria	Marks
<ul style="list-style-type: none"> Shows a relationship between modifications to the meal plan and the enhancement of the overall nutritional value appropriate to a specific group 	5–6
<ul style="list-style-type: none"> Provides characteristics and features of modifications to the meal plan to enhance the overall nutritional value appropriate to a specific group 	3–4
<ul style="list-style-type: none"> Provides general information on modifications to enhance overall nutritional value 	1–2

Sample answer:

Groups studied could include Aboriginal and Torres Strait Islanders, adolescent girls, athletes, elderly, pregnant and lactating women, vegetarians.

Group: Adolescent Girls

Although the diet does provide a good balance of nutrients, some modifications would enhance the overall nutritional quality of the meal plan. Dietary needs for adolescent girls include a low saturated fat intake, high iron, protein, calcium, complex carbohydrates and B-group vitamins.

The breakfast food items could see the whole milk replaced with low fat milk to reduce the fat content and replace the orange juice with a whole piece of fruit such as a banana which will provide fibre and potassium. These food items provide a high satiety value because of their low GI status. The oats portion size could be reduced to prevent excessive energy intake.

To meet these dietary needs it would be beneficial to substitute the white wrap for lunch with a wholemeal wrap, this would increase the fibre and complex carbohydrate intake. The soft drink could be replaced with water to decrease the sugar intake.

The whole-egg mayonnaise could be replaced with avocado to provide essential fatty acids. The fried rice could be replaced with steamed brown or wild rice and the addition of green leafy vegetables would increase the B-group vitamins in the diet. The 400g of chicken wings could be reduced to a smaller portion size to reduce the intake of fat. Alternatively the chicken wings could be substituted with 120g of lean red meat to increase the iron content to boost the iron levels. Low iron intake can result in anaemia, which is a common concern for adolescent girls.

The frozen yoghurt portion could be reduced and replaced with a low fat variety with the addition of fresh fruit, such as berries, to improve the vitamin intake. Replacing the chips as a snack with nuts or a low fat cheese would also improve the nutritional quality of the menu, in particular calcium intake which is important for building maximum bone density.

Question 23 (a)

Criteria	Marks
• States the meaning and identifies essential qualities of active non-nutrients	2
• Recognises and names a quality of active non-nutrients	1

Sample answer:

Active non-nutrients are substances that are not essential for life but which can enhance the functioning of the body or contribute to the promotion of good health.

Question 23 (b)

Criteria	Marks
• Identifies issues and provides points for and/or against the role of a range of specific active non-nutrients in the diet	4
• Provides characteristics and features of the role of specific active non-nutrient/s • OR • Sketches in general terms the role of specific active non-nutrient/s	2–3
• Provides general information on the role of active non-nutrient/s	1

Sample answer:

Adequate active non-nutrients can be found in a balanced diet. There is limited justification for the use of supplementation.

Phytochemicals include antioxidants and phyto-oestrogens. Antioxidants may assist in cholesterol control and neutralise free radicals and/or possibly reduce the risk of cancer. However, there has been recent discussion regarding the negative impact of antioxidants on the treatment of cancer patients and some doctors are now advising against their use at this time. Phyto-oestrogens reduce the symptoms of menopause and reduce the risks of some cancers stimulated by sex hormones.

While there has been some conflicting evidence, Omega-3 fatty acids are generally thought to aid in the correct functioning of the cardiovascular system, normal brain development and function.

Dietary fibre is important to bowel health and adequate consumption is essential to preventing constipation. This in turn can have an impact on the development of conditions such as diverticulitis, colon cancer and the management of diabetes.

Probiotics are another active non-nutrient found in yoghurt that can have a positive impact on bowel health by promoting healthy gut flora.

Question 24

Criteria	Marks
• Makes the relationship between advisory groups and the effect they have on the Australian food industry. Uses appropriate examples	5–6
• Provides characteristics and features of advisory group/s. Provides examples	3–4
• Provides general information on advisory groups	1–2

Sample answer:

Advisory groups are independent organisations that assist government in developing policies. They provide advice on current issues affecting the various sectors in modifying and adapting legislation so that it supports the sectors of the food industry.

Some advisory groups work at a national level. For example, the Australian Citrus Growers Incorporated represents all citrus growers throughout Australia. Some issues that have been lobbied for include financial assistance for farmers during drought, as well as methods for managing pests such as fruit fly.

At a state level, the NSW Food Authority ensures food safety from the farm to the plate within NSW. Not only do they inspect premises for implementation of hygiene legislation, but they also provide advice and education on issues relating to the production and sale of food and consumer health. In 2010, the NSW Food Authority developed an information kit advising and educating food outlets on anaphylaxis. The need for all staff to be informed in the importance of preparing food and advising customers of menu items to avoid reactions related to allergies was also addressed.

The National Heart Foundation and the National Health and Medical Research Council advise the Government on appropriate nutrition policy to promote the health of Australians. The food industry responds by producing foods reflecting this policy.

The Australian Quarantine Inspection Service provides feedback to assist in the formulation of policy regarding the importing and exporting of food. This has an impact on food available for processing and manufacturing.

Question 25 (a)

Criteria	Marks
<ul style="list-style-type: none"> Provides reason/s in favour of a price structure that could be used to successfully market a <i>me-too</i> chicken rice cracker 	2
<ul style="list-style-type: none"> General information on pricing 	1

Sample answer:

Penetration pricing could be used. By introducing the product at a lower price than that of their competitors, the product has the opportunity to obtain a foothold in the market. It is a useful strategy, as the price point draws the consumer to the product, rather than other expensive marketing strategies or promotional campaigns.

Question 25 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides characteristics and features of the advantages and disadvantages of developing a <i>me-too</i> food product 	4
<ul style="list-style-type: none"> Sketches in general terms advantages and/or disadvantages of developing a <i>me-too</i> food product 	2–3
<ul style="list-style-type: none"> General information on <i>me-too</i> food products 	1

Sample answer:

An advantage of developing a *me-too* food product is that the original manufacturer has already identified a need in the market for the product. They have also completed the research and development, which is an expensive part of the process.

Disadvantages of introducing a *me-too* product into the marketplace can include an expensive investment for the manufacturer in terms of equipment, training and raw materials. It can be difficult to attract market share away from an established product, and may result in the *me-too* product failing. To prevent this the manufacturer of the *me-too* must use aggressive and often expensive marketing strategies to compete with the original product. Manufacturers who regularly produce *me-too* products may be labelled as lacking in innovation.

Question 26 (a)

Criteria	Marks
<ul style="list-style-type: none"> Provides characteristics and features of methods used by the organisation to implement quality assurance 	3
<ul style="list-style-type: none"> Sketches in general terms a method/s applied by the organisation to provide quality assurance 	2
<ul style="list-style-type: none"> Provides general information on quality assurance 	1

Sample answer:

Name of organisation: Bega Cheese

HACCP is an international quality assurance program adopted by many organisations, including Bega Cheese, to assist in ensuring quality is maintained throughout the production process. The program identifies critical control points in food production and methods of reducing the risk of food hazards.

Other methods of quality assurance implemented by manufacturers include good manufacturing process, customer complaint processing and money back guarantees.

Question 26 (b)

Criteria	Marks
<ul style="list-style-type: none"> Makes the relationship between ways in which an organisation within the Australian food industry contributes to the Australian economy 	4
<ul style="list-style-type: none"> Provides characteristics and features of way/s in which an organisation within the Australian food industry contributes to the Australian economy 	2–3
<ul style="list-style-type: none"> General information on the contribution of the Australian food industry to the economy 	1

Sample answer:

Name of organisation: Bega Cheese

Bega Cheese provides employment opportunities to the Australian population particularly in the agriculture and fisheries and food manufacture/processing sector. This money in turn gets circulated in the Australian economy. It can provide employment in both rural and urban areas and can have a flow-on effect to other industries such as transportation, packaging and marketing. The establishment of an organisation, such as Bega Cheese, in a small country town, encourages the development of infrastructure and further benefits the economy.

Australian-owned companies, such as Bega Cheese, can contribute to gross domestic product and impact positively on the balance of trade. They provide training opportunities for staff which can be transferred to other industries and therefore contribute to economic profit.

Question 27 (a)

Criteria	Marks
<ul style="list-style-type: none"> Sketches in general terms TWO appropriate product specifications for the new hot drink range 	2
<ul style="list-style-type: none"> Sketches in general terms ONE appropriate product specification for the new hot drink range OR <ul style="list-style-type: none"> Recognises and names TWO appropriate product specifications for the new hot drink range 	1

Sample answer:

The company has a reputation for environmental responsibility and therefore their choice of packaging will specify the use of biodegradable and/or recycable materials. Similarly, organics and locally sourced products should be used. Their consideration for health will be reflected in the specification of caffeine free products.

Question 27 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides characteristics and features of issues to be considered when conducting a feasibility study for the new hot drink range 	3
<ul style="list-style-type: none"> Sketches in general terms issues to be considered when conducting a feasibility study for the new hot drink range 	2
<ul style="list-style-type: none"> General information on a feasibility study 	1

Sample answer:

The purpose of a feasibility study is to determine whether the new hot drink range will be profitable for Sam's Smoothies and if its manufacture is technologically viable. It includes a financial feasibility study to assess the anticipated financial return on the investment.

A technical feasibility assessment of resources available in relation to the anticipated requirements should be conducted. The nature of Sam's Smoothies and the proposed new product means that there will be substantial investment in technology and training.

Section III

Question 28 (a)

Criteria	Marks
<ul style="list-style-type: none"> Sketches in general terms an emerging technology in ONE sector of the Australian food industry 	2
<ul style="list-style-type: none"> Recognises and names an emerging technology OR Provides general information about a technology 	1

Answers could include:

Emerging technologies in the Australian food industry may include:

- Biotechnology in genetically modified foods
- Ecologically sustainable production methods, such as organic farming
- Pulsed electric field (PEF) technology
- High Pressure Processing (HPP)
- Nanotechnology

Biotechnology is the transfer of genes from one organism to another to provide desirable characteristics. For example, GM canola in the Agriculture and Fisheries sector.

Question 28 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides characteristics and features of the risks associated with using the emerging technology 	3
<ul style="list-style-type: none"> Sketches in general terms the risks associated with using the emerging technology OR Provides characteristics and features of a risk associated with using the emerging technology 	2
<ul style="list-style-type: none"> General information on an associated risk 	1

Sample answer:

There are general risks associated with biotechnology. New organisms could upset a delicately balanced ecosystem. It can be risky if the new organism breeds with other organisms in the environment. It might be risky if the newly developed organism has survival advantages over naturally occurring organisms.

Investment may not be recouped due to lack of consumer acceptance or investment costs associated with new technology.

Long term health implications of the use of biotechnology are unknown.

Question 28 (c)

Criteria	Marks
<ul style="list-style-type: none"> Shows the relationship between a range of internal and external factors that affect the success of using emerging technologies in the development and production of new food products 	9–10
<ul style="list-style-type: none"> Provides characteristics and features of internal and external factors that affect the success of using emerging technologies in the development and production of new food products 	7–8
<ul style="list-style-type: none"> Sketches in general terms internal and external factors that affect the success of using emerging technologies in the development and production of new food products 	5–6
<ul style="list-style-type: none"> Sketches in general terms internal and/or external factors that affect emerging technologies in the development and production of food products 	3–4
<ul style="list-style-type: none"> General information on internal or external factors in food product development 	1–2

Answers could include:

Examples of emerging technologies may include:

- Biotechnology in genetically modified foods
- Ecologically sustainable production methods
- Pulsed electric field (PEF) technology
- High Pressure Processing (HPP)
- Nanotechnology

Internal and external factors that affect the success of adopting emerging technologies in the development and production of new food products.

Internal factor	Example/s
Personnel expertise	Skill levels Transferable skills Importance of education and training Flexibility
Production facilities	Importance of level of production facilities Small volume/one-off, batch production, mass production Storage Distribution

Internal factor	Example/s
Financial position	Stability of the company Balance between expenditure and profit Investment Resource management Product quality Market share/competition
Company image	Influenced by: Reputation Quality Marketing strategies Packaging Price

External factor	Example/s
Political	Federal, State and Local government and legislation Wage scales Income tax systems Education and training Zoning laws and planning permits Tariff barriers Trade restrictions Lobby groups New government elected Community influences Working conditions, including wage scales
Economic	Change in inflation rates Change in interest rates Exchange rates Tax rates Import/Export tariffs State of the economy – recession, expansion, boom, contraction (economic cycle) Natural disasters
Technological	Extrusion techniques New packaging technology Genetic engineering Automated equipment Biosensors Robotics Cost of technology Improved productivity Relationship between level of production and technology used

External factor	Example/s
Ecological	Pollution – waterways, atmosphere Land degradation Waste disposal Conservation of natural resources Biodegradability of packaging Use of pesticides Recycling Greenhouse gases Farming procedures ‘Clean Green’ image

Section IV

Question 29

Criteria	Marks
<ul style="list-style-type: none"> • Draws out and relates the implications of the effect of food preservation processes on the health of Australians • Presents a logical and cohesive response using appropriate terminology and relevant examples 	13–15
<ul style="list-style-type: none"> • Shows a relationship between food preservation processes and the effect on the health of Australians • Provides a logical and cohesive response and/or uses appropriate terminology and/or relevant examples 	10–12
<ul style="list-style-type: none"> • Provides characteristics and features of food preservation processes that affect the health of Australians • Provides a logical and cohesive response and/or uses some appropriate terminology and/or some relevant examples 	7–9
<ul style="list-style-type: none"> • Sketches in general terms food preservation process/es and/or the effect on the health of Australians 	4–6
<ul style="list-style-type: none"> • Provides general information on food preservation processes that affect the health of Australians 	1–3

Sample answer:

Food preservation is essential to providing a safe, consistent and reliable food supply to the Australian population. Without adequate food preservation there would be food shortages and diseases of under nutrition such as osteoporosis, rickets and goitre would increase.

Food preservation such as cold storage allows food to be transported across the wide distances and through varying climatic conditions without loss of quality. Vitamins such as C which are particularly sensitive to heat and light would be lost if temperatures were to exceed 4 degrees Celsius. This may result in an increase in scurvy within the Australian population.

Microorganisms flourish in temperatures above 4 degrees Celsius and the incidence of food poisoning, without the hurdle of reduced temperature or other techniques which inhibit their growth such as dehydration, would increase dramatically. This would be a particular concern for many products but particularly in meat, poultry and dairy products.

Preservation helps to ensure that food is kept in an acceptable form for the consumer and therefore they are more likely to eat a range of foods and receive a variety of nutrients essential to good health. For example frozen foods mean that a range of vegetables can be consumed throughout the year to ensure adequate nutrient intake. Freezing preserves the food by reducing the temperature to below –18 degrees Celsius thereby creating conditions at which microorganisms are inactive. Freezing also facilitates the storage of entire meals making it convenient for busy families who without it may be more likely to consume take away foods which are high in fat, salt and sugar and low in fibre.

In some cases, preservation makes the food too appealing and over consumption of foods can lead to the development of disorders of overnutrition including obesity, heart disease and dental caries. Examples of this are jams which rely on the use of sugar as a preservative and dehydrated foods which have the moisture removed, eg dried fruit, to prevent microbial growth but also reduce volume, making it easier to over consume. High levels of consumption

of dairy products, such as butter, cream and cheese which are preserved through the removal of water can lead to a diet high in fat which in turn contributes to the development of overnutrition disorders such as obesity and cardiovascular disease.

Foods which are preserved through the addition of chemicals can have a negative impact on health. A large consumption of smoked foods and those with added nitrates has been linked to the development of particular cancers. The addition of salt to sauces and brine solutions can be linked to the development of hypertension.

There has been speculation about the use of preservatives and their impact on health. In particular in relation to the development of allergies and intolerances.

Processes such as canning and bottling rely on heat to destroy microorganisms. The heating process can result in the loss of heat sensitive vitamins and loss of fibre. These products traditionally have additional added salt and/or sugar, which may contribute to disorders of overnutrition. Consumer concerns regarding health have seen a reduction in these practices.

Modern preservation techniques such as sous vide and active packaging ensure that there is limited change to the nutritional value of the food and that individuals are able to access a safe and wholesome food supply.

Food Technology

2013 HSC Examination Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	Types of food product development (syl pg: 23)	H1.3
2	1	Driver of food product development (syl pg: 23)	H1.3
3	1	Role of community organisations (syl pg: 25)	H2.1
4	1	Prototype testing (syl pg: 23)	H4.1
5	1	Food preservation (syl pg: 21)	H4.2
6	1	Environmental impact – AFI (syl pg: 19)	H1.4
7	1	Quality management (syl pg: 21)	H1.1
8	1	Career opportunities (syl pg: 19)	H3.1
9	1	Supplements (syl pg: 25)	H3.2
10	1	Legislation (syl pg: 19)	H1.2
11	1	Under/over nutrition (syl pg: 25)	H2.1
12	1	Food additives (syl pg: 21)	H1.1
13	1	Packaging (syl pg: 21)	H1.1
14	1	Marketing plans – distribution (syl pg: 23)	H1.3
15	1	Marketing plans – promotion (syl pg: 23)	H1.3
16	1	Ethical issues (syl pg: 25)	H2.1
17	1	Processes that transform raw materials (syl pg:21)	H1.1
18	1	AFI sectors (syl pg: 19)	H1.2
19	1	Storage and distribution (syl pg: 21)	H1.1
20	1	Nutritionally modified foods (syl pg: 25)	H2.1

Section II

Question	Marks	Content	Syllabus outcomes
21 (a)	3	Processing equipment (syl pg: 21)	H1.1
21 (b)	3	Production systems – automation (syl pg: 21)	H1.1
21 (c)	5	Characteristics of equipment (syl pg: 21)	H1.1
22 (a)	3	Environmental issues in AFI (syl pg: 19)	H1.4
22 (b)	6	Plan diets for nutritional requirements (syl pg: 25)	H5.1
23 (a)	2	Active non-nutrients (syl pg: 25)	H2.1
23 (b)	4	Active non-nutrients (syl pg: 25)	H2.1
24	6	Advisory groups (syl pg: 19)	H1.2
25 (a)	2	Marketing Plan – price structure (syl pg: 23)	H1.3
25 (b)	4	Types of food product development (syl pg: 23)	H1.3
26 (a)	3	Quality management considerations (syl pg: 21)	H1.1
26 (b)	4	Aspect of the AFI – economy (syl pg: 19)	H3.1
27 (a)	2	Product specification (syl pg: 23)	H4.1
27 (b)	3	Feasibility study (syl pg: 23)	H4.1

Section III

Question	Marks	Content	Syllabus outcomes
28 (a)	2	Emerging technologies (syl pg: 19)	H1.2
28 (b)	3	Potential risks and benefits (syl pg: 19)	H1.2
28 (c)	10	Internal and external factors (syl pg: 23)	H1.3

Section IV

Question	Marks	Content	Syllabus outcomes
29	15	Food preservation (syl pg: 21) Consequences of malnutrition (syl pg: 25)	H4.2 H2.1