edexcel
advancing learning, changing lives

Mark Scheme (Results)
Summer 2007

GCE

GCE Design & Technology (6154/01)

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

Food Technology (6154/01)					
Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q01a			**Name TWO types of contamination commonly found in freshly harvested vegetable crops.**		
1	(a)		**Candidates may give any TWO Contaminations from the following:** • Soil (1) • Sand (1) • leaves (1) • stones (1) • insects (1) • animals (1) • metal particles (1) • chemicals (1) • weed seeds (1) *(any other sensible contaminant such as oil from machinery acceptable)*	2x1	**(2)**
6154_01_Q01b			**Give ONE advantage and one disadvantage of dry cleaning methods used for root vegetables.**		
1	(b)		**Any advantage from:** • Cheap (1) • fairly efficient (1) • No disposal of contaminated water (1) **Any disadvantage from:** • Risk of recontamination with dust (1) • Risk of product damage (1)	1x1 1x1	**(2)**

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q01c			**Name ONE method of wet cleaning vegetable, and describe the process.**		
1	(c)		**Candidates may give any method of wet cleaning from:** • soaking (1) • spraying (1) • flotation systems (1)	1x1	
			Description of method making reference to three of the following points: **<u>Soaking:</u>** • standing in clean water (1) • efficiency increased by moving product or agitating water (1) • water can be warmed (1) OR **<u>Spraying:</u>** • small volume of water (1) • high pressure (1) • force of water removes contamination not just washing effect (1) OR **<u>Flotation:</u>** • Depends on difference in buoyancy in water between product and contaminants (1) • Product passes through weirs (1) • product forced under the water by rotating paddles (1)	3x1	**(4)**
					(Total 8 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q02a			**Give TWO reasons for peeling vegetables.**		
2	(a)		**Candidates may give any TWO reasons for peeling from:** • To remove unwanted peel and outer layers (1) • To remove damaged or bruised tissue (1) • To make sure products palatable (1)	2x1	**(2)**
6154_01_Q02b			**Explain ONE disadvantage of peeling vegetables.**		
2	(b)		**Candidates may give an Explanation that makes reference to:** • May lead to discolouration due to browning reactions (1) • Will lead to weight loss of product (1)	2x1	**(2)**

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q02c			**Name ONE commercially used method of peeling vegetables, and describe the process involved.**		
2	(c)		**Candidates may give any commercially used method from:** • steam peeling (1) or boiling water (1) • lye peeling (1) • abrasive peeling (1)	1x1	
			Description of process making reference to the three of the following points: **<u>Steam peeling or boiling water</u>** • product heated in steam (1) • expansion of air under peel (1) • peel or skin loosened (1) • peel removed by blast of cold water (1) **OR** **<u>Lye peeling:</u>** • uses lye [caustic soda] (1) • lye breaks down cementing material between cells (1) • lye neutralised by water or acid (1) • peel removed by brushes (1) **OR** **<u>Abrasive peeling:</u>** • rotate in drum (1) • rub against abrasive surface (1) • skin ruptured (1) • water to wash away peel (1)	3x1	**(4)**
					(Total 8 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q03a			**Give TWO methods used by marketing organisations to gather information on food purchasing.**		
3	(a)		**Candidates may give any TWO methods from:** • questionnaires (1) • focus groups (1) • market surveys (1) Only answers. Accept any recognizable spelling (phonetic) of answers above.	2x1	**(2)**
6154_01_Q03b			**Describe a consumer lifestyle that is recognized by marketing organisations.**		
3	(b)	(i)	**Candidates may give a description of a consumer lifestyle that makes reference to two of the following points:** • Environmentally-conscious (1) and active consumer rights supporter(1) • Professional couple (1) with no children(1) • Large family (1) inner city (1) or single parent (1) *(some flexibility is possible within groups of consumers with similar backgrounds)*	2x1	**(2)**

Question number			*Question / Expected answers*	*Mark allocation*	
			Describe how food purchasing decisions are dictated by consumer lifestyles.		
3	(b)	(ii)	**Candidates may give a description that makes reference to four of the following points:** *4 points within each type: Points are not interchangeable.* **Type(1)** • seek budget lines (1) • fresh produce (1) • no meat products (1) • purchase more cheese, eggs and pulses (1) • also low salt, high fibre and healthy foods. (1) **OR** **Type(2)** • seek branded premium goods (1) • high-value added prepared products (1) • ready meals (1) • no price conscious lines (1) • few tinned or heavily processed products (1) • more wine (1) **OR** **Type(3)** • seek cheapest items (1) • bulky carbohydrates (1) • tinned products (1) • low fibre (1) • few fresh fruit and vegetables (1)	4x1	**(4)**
					(Total 8 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q04ai			**Explain why the following are used in this product. Hydrogenated vegetable oil (in the chips).**		
4	(a)	(i)	**Candidates may give an explanation that makes reference to:** • Used for heat transfer (1) • when cooking chips in an oven (1)	2x1	**(2)**
6154_01_Q04aii			**Explain why the following are used in this product. Modified starch.**		
4	(a)	(ii)	**Candidates may give an explanation that makes reference to:** • Stabilised to stop water separation (1) • after freezing then thawing (1)	2x1	**(2)**
6154_01_Q04aiii			**Explain why the following are used in this product. Raising agents: Sodium bicarbonate and disodium phosphate.**		
4	(a)	(iii)	**Candidates may give an explanation that makes reference to:** • Used to produce carbon dioxide (1) • to produce a lighter batter (1)	2x1	**(2)**
6154_01_Q04b			**Describe the effect that Dextrose has on the batter, and explain how it achieves this effect.**		
4	(b)		**Candidates may give description and explanation that makes reference to four of the following points:** • needed to produce an even brown colour in the batter during cooking (1) • to encourage the Maillard reaction / non-enzymatic browning (1) • involves reaction between the dextrose and small amounts of protein (1) • colour produced quickly during short cooking period (1)	4x1	**(4)**
					(Total 10 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q05a			**Name TWO stabilizers commonly used in food products.**		
5	(a)		**Candidates may give any TWO stabilizers fro the following:** • alginates (1) • carageenan (1) • xanthan (1) • pectins (1) • celluloses (1) • guar gum (1) • tragacanth (1) • agar (1) • locust bean gum (1) • gum arabic (1) Only answers.	2x1	**(2)**
6154_01_Q05b			**Explain how a stabiliser can help an emulsifier achieve a more stable emulsion of oil in water.**		
5	(b)		**Candidates may give an explanation that makes reference to four of the following points:** • absorbing large quantities of water (1) • binding the water into a stable form (1) • by forming a three-dimensional network (1) • there is then less water to be emulsified with the oil (1) • prevents coalescence of oil droplets (1)	4x1	**(4)**
6154_01_Q05c			**Explain why a stabilizer is used in the formulation of an ice-cream mix.**		
5	(c)		**Candidates may give an explanation that makes reference to four of the following points:** • to absorb any free water (1) • to prevent the formation of large , crunchy ice crystals during the freezing process (1) • to achieve gradual thawing during consumption (1) • to prevent drip during the consumption of the ice-cream (1)	4x1	**(4)**
					(Total 10 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q06ai			**Describe the process of hardening fats and oils.**		
6	(a)	(i)	**Candidates may give a description that makes reference to two of the following points:** • hydrogen gas is bubbled through oil or fat (1) • need the presence of a nickel catalyst (1) • need to be heated (1)	2x1	**(2)**
6154_01_Q06aii			**Explain what happens in the fat or oil during the hardening process.**		
6	(a)	(ii)	**Candidates may give an explanation that makes reference to two of the following points:** • hydrogen is added to double bonds (1) • loss of double bonds raises melting point of the oil (1) • oil becomes more saturated (1)	2x1	**(2)**
6154_01_Q06b			**Describe what occurs in oils as they become rancid in the presence of air.**		
6	(b)		**Candidates may give a description that makes reference to four of the following points:** • caused by the slow uptake of oxygen (1) • which is related to the level of unsaturation of a fat (number of double bonds) (1) • it involves the production of free radicals (1) • end products have rancid smell (1)	4x1	**(4)**

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q06c			**Outline the FOUR ways a manufacturer can prevent oils and fats becoming rancid.**		
6	(c)		Candidates may give any **FOUR** preventions from: • most efficient way is to use antioxidants which absorb oxygen (1) • or remove free radicals (in form of stable radicals) (1) • ensure fat does not come in contact with factors which accelerate rancidity such as UV light (1) • or metals(copper or iron) (1) • Hydrogenate the oil to reduce the number of double bonds (1) • Remove oxygen by vacuum packing or modified atmosphere packing (1) *Do not accept any other answers*	4x1	**(4)**
					(Total 12 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q07a			**Name <u>FOUR</u> stages in the growth of micro-organisms.**		
7	(a)		**Candidates may give FOUR stages in the growth of micro-organisms:** • lag phase (1) • log or exponential phase (1) • stationary phase (1) • death (1) Only answers.	4x1	**(4)**
6154_01_Q07b			**Explain how TWO external factors influence the growth of micro-organisms.**		
7	(b)		**Candidates may give explanations of TWO external factors from:** • Micro-organisms grow in specific temperature ranges (1) outside the range growth is inhibited (1) • Micro-organisms require different levels of available water (1) bacteria need high levels (1) moulds can grow with little moisture (1) • Organisms have a preference for certain pH conditions (1) many prefer neutral conditions (1) • Some organisms grow in the presence of air or oxygen *(aerobic)* (1) some will grow in the absence of air or oxygen *(anaerobic)* (1)	2x1 2x1	**(4)**

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q07c			**Identify ONE factor which controls the growth of micro-organisms and explain how it is used in the preservation of food products.**		
7	(c)		**Candidates may give any ONE factor identified from:** • Temperature: (1) • Moisture: (1) • pH: (1) • Air/oxygen (1)	1x1	
			Candidates may give explanation of factor that makes reference to: **<u>Temperature:</u>** • product heated above the growth range of the organism such as canning (1) • must destroy most spores to achieve preservation (1) • temperature is kept below growth range as in freezing (1) **OR** **<u>Moisture:</u>** • water reduced by drying (1) • insufficient water for microbial growth (1) • water made unavailable to organisms by use of substances such as salt or sugar (1)		
			OR **<u>pH:</u>** • product's pH is lowered by addition of acid (1) • fermented to produce acid in the product, such as lactic acid (1) • low pH needed to maintain preservation effect of undissociated weak acids (1) **OR** **<u>Air/oxygen:</u>** • Air and oxygen are excluded (1) • essential to efficient packaging such as vacuum packing (1) • alternatively oxygen permeability of packaging minimises growth of micro-organisms which grow in absence of air [anaerobic organisms] (1)	3x1	**(4)**
					(Total 12 marks)

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q08a			**State the THREE stages which occur in the freezing of food.**		
8	(a)		**Candidates may give THREE stages of freezing:** • pre-cooling (1) • ice-formation (1) • tempering (1) Only answers. Candidates may give an explanation but reward answer if reference made to answers above.	3x1	**(3)**
6154_01_Q08b			**Describe the differences between the basic processes of chilling and freezing.**		
8	(b)		**Candidates may give a description that makes reference to:** Chilling involves: • reduction in temperature to retard microbial and enzyme activity (1) • without ice formation (1) • temperature -1 to +8C Freezing involves: • converting all available water to ice (1) • making water unavailable to micro-organisms (1) • temperature -18 to -30C	4x1	**(4)**

Question number			*Question / Expected answers*	*Mark allocation*	
6154_01_Q08c			**Discuss how a food product is affected by the speed at which it is frozen.**		
8	(c)		**Candidates may give a discussion that makes reference to five of the following points:** • fast freezing produces small ice crystals (1) • there is little movement of water from cells in the product during fast freezing (1) • slow freezing allows large ice crystals to grow between cells (1) • slow freezing causes migration of water from the cells (1) • slow freezing leads to damage of food product (1)	5x1	**(5)**
					(Total 12 marks)
					TOTAL FOR PAPER: 80 MARKS