

Mark Scheme

Summer 2014

**GCE DESIGN & TECHNOLOGY:
FOOD TECHNOLOGY**

(6FT02/01)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a)	<p>Any two of the following examples from:</p> <ul style="list-style-type: none"> • steam (1) boiling water (1) • abrasion (1) • lye (1) caustic soda (1) • acid solutions (1) • peeling plates (1) • hand / manual (1) • Tumbler (1) <p>Do not accept scrubbing / brushing / knife peeling</p> <p style="text-align: right;">(2 x 1)</p>	(2)
1(b)	<p>Any two of the following reasons from:</p> <ul style="list-style-type: none"> • inactivates enzymes (1) • prevents discolouration (1) • expels trapped air (1) • shrinks the product (1) • removes moisture (1) • reduces bacterial population (1) • improves texture of some products (1) • improves colour of some products (1) • improves taste of some products (1) <p>Do not accept cleaning</p> <p style="text-align: right;">(2 x 1)</p>	(2)
1(c)(i)	<p>One description from:</p> <ul style="list-style-type: none"> • sorting is separation by one physical characteristic (1) such as weight / size / colour (1) <p style="text-align: right;">(1 x 2)</p>	(2)
1(c) (ii)	<p>One description from:</p> <ul style="list-style-type: none"> • grading is separation by quality (1) a number of factors may be considered simultaneously (1) such as free from damage / colour, shape and size /uniformity/ freedom from contamination (1) <p>Accept linked response with example</p> <p style="text-align: right;">(1 x 2)</p>	(2)
Total for question		8

Question Number	Answer	Mark
2(a)	Any two of the following examples from: <ul style="list-style-type: none"> • maltose (1) • sucrose (1) • lactose (1) <p style="text-align: right;">(2 x 1)</p>	(2)
2(b)	Three of the following: <ul style="list-style-type: none"> • cellulose (1) • pectins (1) • hemicellulose (1) • gums (1) • lignin (1) • waxes (1) • cutin (1) • bran (1) <p style="text-align: right;">(3 x 1)</p>	(3)
2(c)	<ul style="list-style-type: none"> • amylose (1) • amylopectin (1) <p style="text-align: right;">(1 x 1)</p>	(1)
2(d)	One description from: <ul style="list-style-type: none"> • starch molecules contract (1) • amylose molecules unwind (1) more likely if starch is high in amylose (1) • reverse of gelatinisation (1) gel breaks down (1) • water is expelled from gel / liquid seeps / separates from structure (1) • this is called syneresis (1) • an irreversible process (1) • often occurs when product is frozen then thawed (1) • often occurs when product is reheated (1) • Structure breaks down (1) <p><i>[Two marks awarded for interlinked responses]</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
2(e)	An outline from the following: <ul style="list-style-type: none"> • use starch high in amylopectin (1) more resistant to retrogradation (1) • starches high in amylose (1) treated to have stability/properties of amylopectin (1) • use of a stabiliser (1) to bind up the water (1) • starch can be modified (1) such as: cross-linked / “spot welding” / stabilised (1) • cross- linking gives increased resistance (1) to effect of heat (1) acid (1) agitation (1) • use of gums / such as: alginate / celluloses / xanthan / pectins / carageenans / tree gums (1) improves freeze/thaw stability (1) prevents syneresis (1) • Amylopectin (1) with amylase (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		10

Question Number	Answer	Mark
3(a)	Any two of the following examples from: <ul style="list-style-type: none"> • carotenes / carotenoids (1) • lycopene (1) • xanthophylls (1) • chlorophyll (1) • haemoglobin (1) • myoglobin (1) • anthocyanins (1) • flavones (1) • tannins (1) <p style="text-align: right;">(2 x 1)</p>	(2)
3(b)	Any two of the following examples from: <ul style="list-style-type: none"> • lower price (1) • consistency of colour (1) • stability during storage (1) • colour strength can be controlled (1) • reliability/known performance during food processing (1) • readily available (1) • very stable in acids and alkali (1) • high level of purity (1) <p style="text-align: right;">(2 x 1)</p>	(2)
3(c)(i)-(iii)	Any two points for each additive from the following: <p>Antioxidants:</p> <ul style="list-style-type: none"> • preserves / extends shelf life (1) of high fat content foods (1) • absorbs oxygen (1) removes oxygen from the product (1) prevents / reduces oxidative rancidity (1) • prevents formation of free radicals (1) by forming stable radicals (1) <p>Emulsifiers:</p> <ul style="list-style-type: none"> • prevent oil and water separating / maintain an emulsion (1) • ensures tiny droplets of oil (1) are dispersed in water (1) to give a stable emulsion (1) • added to bread dough (1) to reduce staling (1) • added to chocolate (1) to stop fats separating (1) forming fat crystals (1) called blooming (1) <p>Flavours:</p> <ul style="list-style-type: none"> • replaces/restores flavours (1) lost during processing (1) • modifies flavours (1) by improving natural flavour (1) or suppressing strong flavours (1) rounds off flavours (1) • enhances flavours (1) stimulates taste buds (1) copy/mimic a natural flavour/ adding a flavour to a product that would otherwise have no taste(1) to create/increase a product (range) (1) <p style="text-align: right;">(3 x 2)</p>	(6)
Total for question		10

Question Number	Answer	Mark
4	<p>Any five of the following examples from:</p> <ul style="list-style-type: none"> • product name / including a brief description of the product (1) this informs the manufacturer as to what the product is (1) • product code (1) identifies information about the product / traceability (1) • name and address of manufacturer / point of contact (1) legal requirement on package / label(1) • list of ingredients (1) including acceptable sources of supply (1) • composition / recipe of product (1) outlines exactly how the product should be made (1) • performance requirements (1) standards to which the finished product must conform/ technical considerations (1) includes: physical / analytical / organoleptic /sensory characteristics microbial standards/ cooking/heating requirements/ tolerances / appearance (1) • nutritional data (1) particularly important if product makes a nutritional claim (1) • product selling weight (1) legal requirement on package / label (1) • packaging details (1) includes both inner and outer packaging (1) • handling and storage requirements (1) prevent physical / chemical / bacterial contamination (1) • minimum durability / shelf life (1) to ensure quality / reduce contamination (1) • health and safety requirements (1) any relevant considerations that apply to the manufacture / handling / storage / use of product/ (1) • Form (1) why is the product shaped /styled as it is (1) e.g. weight/volume/portion size/shape (1) • Function (1) what is the purpose of the product (1) • User requirements (1)who is the target group(1)what qualities make product attractive to potential users(1) special diets (1) • Ingredients/ components requirements (1) how should they perform(1) working characteristics(1) • Scale of production (1) consider suitability for design of product (1) • Costs (1)what factors must be considered (1) • Sustainability (1) how does design/product reflect sustainability issues (1) <p style="text-align: right;">(5 x 2)</p> <p><i>No repetition of marks eg. legal requirement.</i></p>	(10)

Question Number	Answer	Mark
5(a)	<p>Any two of the following examples from:</p> <ul style="list-style-type: none"> • at freezing point (1) bacterial growth is stopped / bacteria are dormant (1) bacteria are NOT killed (1) • below freezing point water is turned to ice/solid (1) unavailable to bacteria (1) • temperature above 72°C (1) food poisoning bacteria are killed (1) food spoilage bacteria are NOT killed (1) • temperature above 120°C (1) ALL bacteria are killed (1) some spores may survive (1) • Keep out of danger zone temperature (5°C to 63°C) (1) <p>Do not accept chilling / temperature ranges reference prevention [MAXIMUM OF TWO MARKS FOR EACH EXAMPLE] (2 x 2)</p>	(4)
5b)	<p>Three points fully explained or any six points from the following examples:</p> <ul style="list-style-type: none"> • floors / walls / ceilings must be non-porous (1) to avoid harbouring of bacteria (1) • all premises must be pest proof (1) use of mesh to cover doors / windows (1) • all equipment / utensils / premises should be easy to clean (1) disassembly / moveable / ease of access essential/ and position of equipment must not allow contamination (1) • adequate / constant supply of clean, hot and cold water (1) to allow for effective cleaning (1) of environment / food/ equipment (1) • raw and cooked facilities must be separate (1) to avoid cross - contamination (1) • containers should be non absorbent (1) to avoid taints (1) • facilities for cooking / storage / holding must be at correct temperature (1) and records checked (1), and maintained (1) in good repair (1) • waste to be deposited in closable containers (1) provision for separating / disposing of waste must be in a different part of the premises (1) • separate lockers / toilets / changing facilities for staff (1) must be separate from food prep. area (1) not lead directly into food rooms (1) • adequate hand washing facilities (1) and sanitiser must be provided (1) hygienic drying facilities (1) • a first aid kit should be available (1) with blue coloured waterproof plasters (1) • sufficient natural(1) or artificial light (1) to perform tasks safely (1) • natural (1) or mechanical ventilation (1) to ensure flow of air (1) prevent inhalation of contaminants (1) • adequate draining facilities (1) to ensure safe removal of chemicals / contaminated water/effluence (1) • all premises checks need to be recorded (1) to safeguard owner (1) • good manufacturing practice (1) adhering to food legislation e.g. Food Safety Act 1990/Food Safety Regulations 1995 / HACCP(1) <p style="text-align: right;">(6 x 1)</p> <p><i>[Do not accept examples of personal hygiene]</i></p>	(6)

	Total for question	10
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Question Number	Answer	Mark
6(a)	<p>Any two of the following:</p> <ul style="list-style-type: none"> • Caramelisation (1) • Non-enzymic browning / maillard reaction (1) • Enzymic browning (1) • Dextrinisation (1) • Oxidation (1) <p style="text-align: right;">(2 x 1)</p>	(2)
6(b)(i)	<p>Any one of the following examples from:</p> <ul style="list-style-type: none"> • secondary/tertiary structure is altered (1) but primary structure is unchanged (1) • caused by various physical (1) / chemical (1) means such as heat (1) acids (1) alkalis (1) heavy metals (1) salt (1) ethanol (1) agitation (1) enzymes (1) • the molecule unfolds and changes shape (1) involves breakage of cross-links (1) but the sequence of amino acids remains the same (1) • usually irreversible (1) properties of protein alter (1) eg less soluble (1) more viscous (1) can be more/less digestible (1) • unfolded molecules bond / clump together (1) causes protein to harden /set (1) known as coagulation (1) <p style="text-align: right;">(1 x 2)</p>	(2)
6(b)(ii)	<ul style="list-style-type: none"> • essential amino acids (1) cannot be synthesised by the body (1) must be obtained from nutrient protein (1) • protein quality of a food (1) determined by number of essential amino acids it contains (1) • high biological value foods (1) provide body with all essential amino acids (1) • low biological value foods (1) provide body with some essential amino acids (1) • combining two LBV proteins/ complementary proteins (1) improves biological value (1) <p>Accept statement and linked response</p> <p style="text-align: right;">(1 x 2)</p>	(2)
6(c)	<p>One point described for each:</p> <p>(i)Structural:</p> <ul style="list-style-type: none"> • growth and maintenance / repair (1) of cellular structure / of cells which includes: muscles / bones / connective tissue /skin / blood cells / glands / organs / hair / nails (1) • the coiling of the protein molecules results in either a rigid structure e.g. nails / bones (1) or an elastic structure e.g. skin / hair (1) • protein in tissues is constantly being broken down and must be replaced (1) by amino acids (1) 	

	<p>(ii)Physiological:</p> <ul style="list-style-type: none"> • necessary for the formation of enzymes (1) essential for maintaining chemical reactions / all biological processes to take place (1) for example digestion (1) • forms hormones (1) which control process such as: metabolic rate / blood glucose levels (1) • forms anti-bodies (1) plays key role in the functioning of the immune system (1) • blood proteins (1) exerts an osmotic effect on cells / keeps body fluids in balance (1) • haemoglobin (1) is a transporting protein / carries oxygen in the body (1) • essential in blood clotting (1) fibrin / forms a mesh to prevent blood flow (1) • excess protein (1) is a source of energy (1) <p style="text-align: right;">(2x 2)</p>	(4)
	Total for question	(10)

Question Number	Answer	Mark
7(a)	<p>Any eight points from the following examples:</p> <ul style="list-style-type: none"> • cleaning of raw material (1) remove contaminants / remove inedible parts (1) • food is graded(1) ensure correct quality (1) • size reduction may be necessary before blanching (1) blanching of contents (1) • consistent size of ingredients (1) to ensure even heat penetration (1) • filling by weight or volume while hot (1) sometimes addition of brine / sauce / sugar syrup required when filling (1) • cans heated (to 95⁰C)(1)/forms partial vacuum(1) when lid is on (1) • sealing - double seam formed (1)vacuum applied (1) air drawn out of can (1), creates hermetic (airtight) seal (1) • washed to remove contents spilt from can (1) • heat processed (1)placed in retorts (1) steam added (1) air driven out (1) • cans are sterilised (1) to eliminate bacteria(clostridium botulinum)(1) and spores (1) • temperature of 121° required (1) held for correct time (1) • compressed air supplied (1) at start of cooling process (1) • cooling by spraying with cold water (1) cooled in chlorinated water /clean, sterile water(1) • cans must be cooled slowly (1)pressure gradually reduced (1) to prevent buckling (1) • cooled to 38° (1) then dried by warmth of can (1) avoids rusting (1) • labelling (1) can be printed before the process (1) <p>Maximum of 4 marks for simplistic list / bullet points</p> <p style="text-align: right;">(8 x 1)</p>	(8)
7(b)	<p>Any two of the following examples from:</p> <ul style="list-style-type: none"> • Insufficient sterilisation (1) presence of heat resistant / anaerobic spores (1)produce gas / hydrogen (1) results in cans bulging / bursting (1) blown can (1) spores can produce toxic substances (1) • Insufficient heat treatment (1)(<i>Bacillus stearothermophilus</i>) / some bacteria (1) may survive / grow anaerobically (1) produce souring / ferment the food (1) affect / undesirable taste (1) • natural acids in some foods (1) results in bulging (1) corrosion (1) discolouration (1) eg acids in canned tomatoes (1) • poor seams / can defects / improperly sealed (1) allows leakage of contents (1) • unsatisfactory sealing (1) (contaminated)water may be drawn into can (1) bacteria can enter (1) / produce gas / carbon dioxide (1) contents appear slimy / frothy (1) • (<i>Clostridium nigrificans</i>) / some bacteria can blacken food contents (1) in under-processed non-acidic foods (1) • Dented cans or damaged lacquer and will result in rust / corrosion (1) <p style="text-align: right;">(2 x 2)</p>	(4)

	<i>No repetition of marks eg. bulging / seam bursting.</i>	
	Total for question	(12)
	Total marks for Paper	70