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Mark Scheme (Results)

June 2011

GCE Design and Technology:
Food Technology (6FT02).

Paper 01: Design and Technology
in Practice.

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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.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

  i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that means is clear

  ii) select and use a form and style of writing appropriate to purpose and to comp0lex subject matter

  iii) organise information clearly and coherently, using specialist vocabulary when appropriate

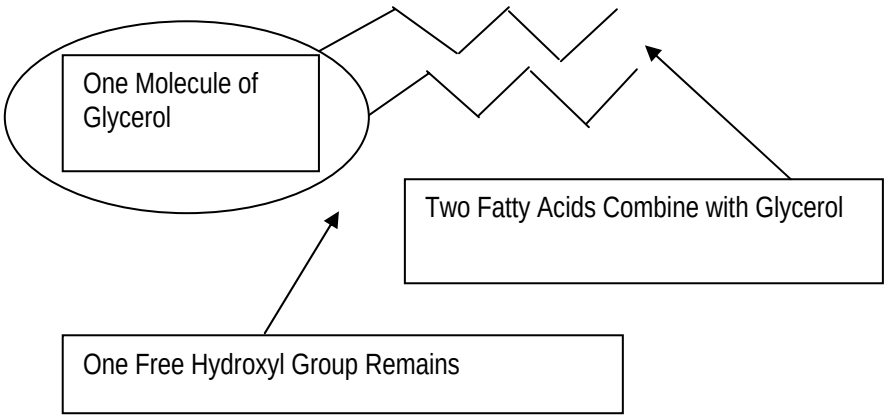
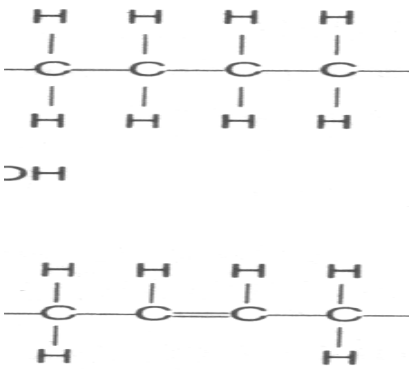
Question Number	Answer	Mark
1(a)	**Two** main methods of cleaning raw materials after harvesting, up to a maximum of **two** marks: • Dry / without using water **(1)** • Wet / using water **(1)** • Screening / sieving **(1)** • Aspiration **(1)** **(2 x 1)**	**(2)**
1(b)	Any **two** from the following reasons why contamination of raw food materials may be on the increase, up to a maximum of **two** marks: • Mechanisation of harvesting / machine picks up physical contaminants **(1)** • Increase in use of fertilizers / herbicides / pesticides / increase in chemical contamination **(1)** • Parts of machinery falling off / oil falling onto raw food **(1)** • Contaminated water supply in some areas **(1)** **(2 x 1)**	**(2)**
1(c)	Any **four** from the following outline on the floatation washing process, up to a maximum of **four** marks: • Raw food material passes through a number of weirs **(1)** • Raw food material is forced under water by slowly rotation paddles **(1)** • Contamination falls to bottom of weirs **(1)** • Clean raw food material is removed on a bucket conveyor **(1)** *Candidates may mention:* • System depends on a difference in buoyancy in water **(1)** between the raw food material and the contaminants **(1)** **(4 x 1)**	**(4)**
	Total for question	**8**

Question Number	Answer	Mark
2(a)	Any **two** from the following saccharides which are reducing sugars, up to a maximum of **two** marks: • Glucose **(1)** • Fructose **(1)** • Lactose **(1)** • Maltose **(1)** **(2 x 1)**	**(2)**
2(b)	**Three** from the following outline on how a reducing sugar is determined, up to a maximum of **three** marks: • Boiling up solution of sugar with Fehling's solution **(1)** • Has the ability to break down Fehling's solution **(1)** • To form a brick red precipitate **(1)** • Sugar contains a reducing group / potential aldehyde group / CHO **(1)** (Also allow Benedict's solution instead of Fehlings, with the same colour change. Gaillard reaction and levels of sweetness not relevant) **(3 x 1)**	**(3)**
2(c)	Any **three** marks from the following explanation on the term caramelisation, up to a maximum of **three** marks: • Sugar / sugar solution heated to a very high temperature **(1)** • Non-enzymic browning reaction **(1)** • A browning reaction in the absence of amino acid or proteins **(1)** *Candidates may mention:* • On heating sugar molecules break down **(1)** • Recombine to form reaction products / brown coloured polymers **(1)** **(3 x 1)**	**(3)**
	Total for question	**8**

Question Number	Answer	Mark
3(a)	Any **three** from the following different substances that have the ability to form gels, up to a maximum of **three** marks: *Accept substance or named food material.* • Carbohydrate / starch based / e.g. flour, corn flour, rice flour **(1)** • Protein based / e.g. gelatine, eggs **(1)** • Gums / alginates / e.g. xanthan, agar, tragacanth **(1)** • Pectin **(1)** *Can be different substances from the same group.* **(3 x 1)**	**(3)**
3(b)	**Three** from the following outline on the requirements that ensure a firm jam can be achieved, up to a maximum of **three** marks: • Sufficient amount of sugar / 65-68% **(1)** • Amount of pectin **(1)** • Molecular weight of pectin **(1)** • Methyl groups contained in pectin **(1)** • pH **(1)** • Equal weight of sugar and fruit **(1)** • Correct boiling temperature must be reached **(1)** **(3 x 1)**	**(3)**
3(c)	Any **two** from the following explanation on the use of xanthan gum in two named products, up to a maximum of **four** marks: Sauces: • Thixotropic properties /thins on shearing / thickens when standing **(1)** • Allows for ease of removal from container **(1)** • Provides excellent mouthfeel **(1)** • Allows rapid flavour release **(1)** Allow: stabiliser (1), prevents syneresis (1) Canned food: • Viscosity control / thickness control/holds water **(1)** • Ease of pumping and filling / aids processing **(1)** • Faster heat penetration **(1)** Allow: stops separation (1), slows retrogradation (1) **(2 x 2)**	**(4)**
	Total for question	**10**

Question Number	Answer	Mark
4(a)	Any **four** from the following factors that can affect the occurrence of food spoilage, up to a maximum of **four** marks: • Initial bacterial load **(1)** • Incorrect storage conditions can affect the rate of spoilage **(1)** • Moisture levels/water activity **(1)** • pH conditions **(1)** • Oxygen requirements **(1)** • Cross contamination of foods over a period of time due to bacterial load **(1)** **(4 x1)**	**(4)**
4(b) **QWC (i)**	Any **three** from the following explanation on how food preservation can prevent or retard the growth of food spoilage organisms, up to a maximum of **six** marks: • Freezing / reduction in temperature **(1)** this stops the growth of micro-organisms but does not kill them **(1)** • Canning / sterilisation / increase in temperature **(1)** kills all micro-organisms **(1)** • Dehydration / removal of moisture **(1)** water activity reduced to below the moisture level requirements **(1)** • Chemical substances / preservatives / pickling **(1)** depending on chemical used, creates conditions unsuitable for growth, e.g. too acidic, moisture reduction, **(1)** • Use of sugar or salt **(1)** reduces water activity **(1)** Allow: **(3 x 2)** Pasteurisation (1) reduces spoilage organisms (1); Chilling (1) slows bacterial growth (1); Smoking (1) coats food with anti-microbial substances (1); Irradiation (1) damages DNA killing organisms (1)	**(6)**
	Total for question	**10**

Question Number	Answer	Mark
5(a) **QWC(iii)**	Any **five** from the following general principles for producing food product specifications, up to a maximum of **ten** marks: • Specifications should embrace ALL aspects of the product **(1)** from raw material procurement through to distribution **(1)** • Product and process specifications should reflect the customer's / user groups requirements **(1)** in precise measurable terms e.g. appearance, flavour etc. **(1)** • Product and process specifications should meet the requirements of any government legislation **(1)** minimum compositional standards, additives, chemical, microbiological quality criteria and packaging material **(1)** • All specifications must be realistic and achievable **(1)** within the normal limits of people, machinery and materials **(1)** • Where possible realistic tolerances **(1)** should be placed on all relevant quality parameters **(1)** • The critical points in the process should be identified **(1)** where maximum sampling and testing need to be carried out **(1).** A HACCP flow diagram should be included **(1)** • Finished product inspection should be reduced to the minimum level compatible **(1)** with the confidence justified by the raw material and process controls **(1)** • Alternative procedures and quality contingency plans should be drawn up **(1)** to take account of, e.g. unavailability of a specific raw material **(1)** • Product specifications should be kept under constant review **(1)** effective management control / good manufacturing practice **(1)** NB: Details of the content of a specification is not required. **(5 x 2)**	**(10)**
	Total for question	**10**

Question Number	Answer	Mark
6(a)	Description of the structure of a diglyceride: • One molecule of glycerol **(1)** • Combined with two fatty acids **(1)** • One free OH (hydroxyl) group will remain **(1)**  **(3 x 1)**	**(3)**
6(b)	**Two** from the following description of the chemical nature of saturated and unsaturated fatty acids, up to a maximum of **four** marks: Saturated fatty acids: • the hydrocarbon chain is saturated with hydrogen **(1)** single bonds only in hydrocarbon chain **(1)** Unsaturated fatty acids: • the hydrocarbon chain is **not** saturated with hydrogen **(1)** one or more double bonds in hydrocarbon chain **(1)** Annotated sketch  **(Proudlove R.K. The Science and Technology of Food. 2001)** **(2 x 2)**	**(4)**

6(c) **QWC(ii)**	Any **five** from the following discussion on the importance of essential fatty acids in the diet, up to a maximum of **five** marks: • Cannot be made in the body and so must be supplied by food to avoid deficiency diseases **(1)** • Forms part of the structure of all cell membranes **(1)** • Helps in the regulation of cholesterol metabolism **(1)** • Provides the raw materials from which the hormones / known as prostaglandins are made **(1)** • Assists with the clotting of blood **(1)** • Required for normal brain development / especially during foetal life and early infancy **(1)** *Candidates may mention:* • Most vegetable oils / some fish oils / vegetables / fruit / nuts / cereals / fat spreads / meat and meat products are good sources **(1)** Allow; naming any of three essential fatty acids: arachidonic, linoleic or linolenic (1) **(5 x 1)**	**(5)**
	Total for question	**(12)**

Question Number	Answer	Mark
7(a) **QWC(iii)**	Any **three** from the following discussion on the requirements which must be considered to achieve sterility in a canned food product, up to a maximum of **six** marks: • Nature of product determines rate of heat penetration **(1)** as liquid / solid / size of pieces affect sterilisation temperature / holding time **(1)** • Liquid products heat up more quickly by convection **(1)** so require a shorter holding time **(1)** • Solid products heat up more slowly by conduction **(1)** so require a longer holding time **(1)** • Cold point must reach correct temperature **(1)** to ensure all contents have reached sterilisation temperature **(1)** • 12D process ensures that bacterial population is acceptable **(1)** to reduce risk of food poisoning **(1)** • At a minimum *Clostridium botulinum* must be destroyed **(1)** as it is a lethal poison and the spores may survive the heat process / used as an indicator organism **(1)** • No air pockets in retorts **(1)** as temperature will not be reached **(1)** • No air in the can **(1)** as presence of air results in the full temperature not being reached (1) causing bacterial growth / blowing of cans **(1)** • Any defects in seam can result in water being drawn into the can **(1)** which can result in bacterial growth **(1).** Allow; lower pH (1) allows less heat treatment (1) **(3 x 2)** **NB. Basic details of the canning process are not required.**	**(6)**

7(b)	Any **three** from the following explanation of the differences between the heat processes of pasteurisation and sterilisation, up to a maximum of **six** marks: • Pasteurisation is a short heat process – held at holding temperature for 15-20 seconds **(1)** and sterilisation is a long heat process – held at holding temperature for 15 minutes **(1)** • Pasteurisation at low temperature 72°C **(1)** and sterilisation is at high temperature 121-132°C **(1)** • Pasteurisation is used to destroy pathogens / food poisoning bacteria but not food spoilage bacteria **(1)** and sterilisation destroys ALL bacterial cells / destroys both food poisoning and food spoilage bacteria **(1)** • Pasteurisation produces a short shelf life – 7/10 days **(1)** and sterilisation produces a long shelf life – 6 months **(1)** **(3x2)**	**(6)**
	Total for question	**(12)**
	Total marks for paper	**70**

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