

## GCE Design and Technology: Food Technology – Cross referencing

*The textbook to refer to is: The Science and Technology of Foods, 4<sup>th</sup> Edition – ISBN: 1899527206*

### Unit 2: Knowledge and Understanding of Food Materials, Products and Processing

#### 2.1 Classification of materials and components

Sec = Book section, Ch = chapter in that section

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p>The chemical nature and fundamental properties of a number of food components will be reviewed. Chemical structures and complex formulae will not normally be used.</p> <p>Carbohydrates – sugars, comparison of monosaccharides and disaccharides. Reducing sugars. Sweetness levels. Simple and complex polysaccharides. Nature of fibre.</p>	Sec 1/Ch 2 P4 – 20
<p>Fats and oils – range of constituent fatty acids, polyunsaturated fatty acids (PUFA). Monoglycerides, and diglycerides, use as emulsifying agents. Rancidity and use of antioxidants.</p>	Sec 1/Ch 3 P21 – 35
<p>Proteins – review of structures. Types of amino acids. Properties including concept of iso-electric point. Biological value of proteins.</p>	Sec 1/Ch 4 P36 – 47
<p>Sources, classification, formation and structure of materials and components to achieve:</p> <ul style="list-style-type: none"> <li>• colouring</li> </ul>	Sec 1/Ch 7 P62 – 69
<ul style="list-style-type: none"> <li>• flavouring</li> </ul>	Sec 1/Ch 8 P70 – 77
<ul style="list-style-type: none"> <li>• thickening</li> </ul>	Sec 1/Ch 2 P18, 286 – 287
<ul style="list-style-type: none"> <li>• coagulation</li> </ul>	Sec 1/Ch 4 P40, 46
<ul style="list-style-type: none"> <li>• aeration</li> </ul>	Sec 2/Ch 4 P144 – 145
<ul style="list-style-type: none"> <li>• emulsification</li> </ul>	Sec 1/Ch 9 P85 – 86
<ul style="list-style-type: none"> <li>• gelation</li> </ul>	Sec 1/Ch 2 P13 – 14, 286 – 287
<ul style="list-style-type: none"> <li>• binding</li> </ul>	Sec 1/Ch 9 P82 – 83
<ul style="list-style-type: none"> <li>• stabilisation</li> </ul>	Sec 1/Ch 9 P82 – 86
<ul style="list-style-type: none"> <li>• storage-life extenders.</li> </ul>	Sec 1/Ch 9 P88

## 2.2 Working properties of materials and components related to preparing, processing, manipulating and combining

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p>Explanation of the characteristics and functional properties of materials used in food products.</p> <p><b>Carbohydrates</b></p> <p>Working properties in food for:</p> <ul style="list-style-type: none"> <li>• sweetening</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>• thickening</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>• stabilising</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>• involvement in browning reactions.</li> </ul>	<p>Sec 1/Ch 2 P7, 19 Sec 1/Ch 9 P87, 288</p> <hr style="border-top: 1px dashed black;"/> <p>Sec 1/Ch 2 P18, 286 – 287</p> <hr style="border-top: 1px dashed black;"/> <p>Sec 1/Ch 9 P85 – 86</p> <hr style="border-top: 1px dashed black;"/> <p>Sec 1/Ch 2 P44 – 47</p>
<p><b>Fats</b></p> <p>Working properties in foods for:</p> <ul style="list-style-type: none"> <li>• the process of hardening fats and oils by hydrogenation</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>• rancidity and its prevention.</li> </ul>	<p>Sec 1/Ch 3 P24 – 25</p> <hr style="border-top: 1px dashed black;"/> <p>Sec 1/Ch 3 P31 – 33</p>
<p><b>Proteins</b></p> <p>Working properties in food for:</p> <ul style="list-style-type: none"> <li>• gelation</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>• coagulation</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>• denaturation.</li> </ul>	<p>Sec 1/Ch 4 P46</p> <hr style="border-top: 1px dashed black;"/> <p>Sec 1/Ch 4 P40, 46</p> <hr style="border-top: 1px dashed black;"/> <p>Sec 1/Ch 4 P39 – 40</p>

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p><b>Other components</b></p> <p>Texture modifiers – absorption of water, binding water, fat and other constituents, gelling systems. Cross-linking between constituents. Blending with other ingredients, homogenisation and gelation.</p>	<p>Sec 1/Ch 9 P81 – 86</p>
<p>Colours – use as liquids, carrier bases used, blending and mixing into products. Pre-mixing with other ingredients to ensure even mix.</p>	<p>Sec 1/Ch 7 P63 – 69</p>
<p>Flavours – use as liquids, carrier bases used. Powders, liquids added to dry carrier base or spray or freeze dried. Blends of flavours. Spices and herbs. Flavour combinations for canning, freezing and snack foods. Engineered flavours to take account of flavour loss due to heating during processing.</p>	<p>Sec 1/Ch 8 P71 – 77</p>
<p>Stabilising agents – binding-up water, combining with other constituents. Use of gums and hydrocolloids, mixing into products, effects of soluble ingredients. Use in homogenisation and emulsification of products.</p>	<p>Sec 1/Ch 9 P82 – 86</p>
<p>Storage-life extenders – mechanisms of preventing microbial growth. Killing live microbial populations, preventing further contamination. Osmotic effect of sugar and salt in destroying cells. Use of preservatives in snack products, antioxidants in preventing rancidity in fats. Action of weak acids in killing organisms.</p>	<p>Sec 1/Ch 3 P32 Sec 1/Ch 9 P88</p>

## 2.3 Manufacturing processes

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p>Stages in the commercial manufacture of the food product, and understanding of how batch/high volume production is achieved.</p>	<p>Sec 3 P171 – 190</p>
<p><b>Preparation</b></p>	
<p>Initial preparation of ingredients and materials to be used later in the manufacturing process:</p>	
<ul style="list-style-type: none"> <li>• cleaning</li> </ul>	<p>Sec 3/Ch 2 P176 – 178</p>
<ul style="list-style-type: none"> <li>• peeling</li> </ul>	<p>Sec 2/Ch 3 P132, 135</p>
<ul style="list-style-type: none"> <li>• combining</li> </ul>	
<ul style="list-style-type: none"> <li>• sorting</li> </ul>	<p>Sec 3/Ch 2 P179</p>
<ul style="list-style-type: none"> <li>• grading</li> </ul>	<p>Sec 3/Ch 2 P180</p>
<ul style="list-style-type: none"> <li>• size reduction</li> </ul>	<p>Sec 3/Ch 3 P181 – 182</p>
<ul style="list-style-type: none"> <li>• mixing</li> </ul>	<p>Sec 3/Ch 3 P182 – 184</p>
<ul style="list-style-type: none"> <li>• blanching.</li> </ul>	<p>Sec 3/Ch 4 P187 – 188</p>
<p><b>Production process</b></p>	<p>Sec 2/Ch 7 P160 – 170</p>
<p><i>Microbiological considerations</i></p>	
<p>Factors influencing the growth of micro-organisms, including nutrients, temperature, pH and gases. Types of organisms involved with food. How foods are spoiled by microbial growth. Principles of bacterial food poisoning – infections and development of toxins. Food-borne diseases.</p>	

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
Combining of components, alteration to achieve certain characteristics and preservation:	
<ul style="list-style-type: none"> <li>• application of heat in pasteurisation, sterilisation and canning</li> </ul>	Sec 4/Ch 1 P194 – 200
<ul style="list-style-type: none"> <li>• removal or binding of water <ul style="list-style-type: none"> <li>– evaporation</li> <li>– drying</li> <li>– use of salt and sugar</li> </ul> </li> </ul>	Sec 4/Ch 3 P210 – 215
<ul style="list-style-type: none"> <li>• chemical methods <ul style="list-style-type: none"> <li>– use of acids and preservatives</li> </ul> </li> </ul>	Sec 1/Ch 9 P88 – 89
<ul style="list-style-type: none"> <li>• removal of heat in chilling and freezing</li> </ul>	Sec 4/Ch 2 P202 – 209
<ul style="list-style-type: none"> <li>• computer control of process</li> </ul>	Sec 5/Ch 3 P280 – 282
<ul style="list-style-type: none"> <li>• quality control procedures and hazard analysis and critical control point (HACCP).</li> </ul>	Sec 5/Ch 3 P275 – 279
<b>Packaging and distribution</b> Packaging of finished product, storage and distribution systems.	Sec 4/Ch 5 P220 – 225

## 2.4 The consumer and society

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
Introduction to consumer behaviour in general. Consumer rights and social responsibility. Consumer decision making, the purchasing process and consumption experience related to food products. Information gathering, and processing of consumer attitudes and perceptions.	Sec 5/Ch 2 P233 – 236
The individual consumer – characteristics and lifestyle related to buying food. Demographics and lifestyles linked to food marketing. Cultural influences and number of 'eating events' affecting product purchases. Concept of 'grazing' and importance of snack foods in modern lifestyle.	Sec 5/Ch 2 P236 – 243

## Unit 3: Further Study of Food Materials, Products and Processing

### 3.1 Food commodities, chemical composition and application of manufacturing processes

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p>The characteristic composition and basic processing will be covered with particular emphasis on the following:</p> <ul style="list-style-type: none"> <li>meat and fish – muscle structure, conversion of muscle to meat, comparison of the composition of meat and fish</li> </ul>	<p>Sec 2/Ch 2 P111 – 121</p>
<ul style="list-style-type: none"> <li>dairy products – nature of proteins, milk processing, basics of cheese-making, butter manufacture</li> </ul>	<p>Sec 2/Ch 1 P96 – 109</p>
<ul style="list-style-type: none"> <li>fruit and vegetables – respiratory patterns of live products, climacteric fruits. Changes during storage. Critical storage temperatures for tropical products. Chill injury</li> </ul>	<p>Sec 2/Ch 3 P126 – 135</p>
<ul style="list-style-type: none"> <li>cereals – importance of protein content, bread making. Malting process.</li> </ul>	<p>Sec 2/Ch 4 P137 – 148</p>

### 3.2 Microbiological aspects

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p>Review of the patterns of spoilage of food products caused by a range of organisms with particular emphasis on:</p> <ul style="list-style-type: none"> <li>putrefaction of meat. Breakdown of fish tissues and development of odours</li> </ul>	<p>Sec 2/Ch 7 P163 – 164</p> <p>Sec 2/Ch 2 P114 –115, 118 – 119</p>
<ul style="list-style-type: none"> <li>souring of milk and bacterial decomposition of dairy products. Moulds attacks on cheese</li> </ul>	<p>Sec 2/Ch 1 P98 – 99, 106</p>
<ul style="list-style-type: none"> <li>rotting of fruit and vegetables</li> </ul>	<p>Sec 2/Ch 3 P129 – 132</p>
<ul style="list-style-type: none"> <li>cereal product deterioration, influence of moisture content and pests.</li> </ul>	<p>Sec 2/Ch 4 P142, 145</p> <p>Sec 1/Ch 9 P86</p>

### 3.3 Selection of materials

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
<p>Understanding the reasons behind the choice of raw food materials, ingredients or additives to achieve a particular result in a food product.</p> <p>Selecting from a range of materials to:</p> <ul style="list-style-type: none"> <li>• achieve a range of textures                             <ul style="list-style-type: none"> <li>– caused by thickening</li> <li>– gelling or component interaction</li> </ul> </li> </ul>	<p>Sec 1/Ch 2 P18, 13 – 14, 286 – 287 Sec 1/Ch 9 P79 – 86</p>
<ul style="list-style-type: none"> <li>• prevent liquid from pie fillings soaking into the pastry</li> </ul>	<p>Sec 1/Ch 9 P83</p>
<ul style="list-style-type: none"> <li>• thicken a product quickly or slowly</li> </ul>	<p>Sec 1/Ch 9 P82 – 83</p>
<ul style="list-style-type: none"> <li>• achieve rapid heat penetration by delaying thickening of canned products</li> </ul>	<p>Sec 1/Ch 9 P82 – 83</p>
<ul style="list-style-type: none"> <li>• prevent growth of large ice crystals in frozen products</li> </ul>	<p>Sec 1/Ch 9 P82 – 83</p>
<ul style="list-style-type: none"> <li>• achieve loss in viscosity due to agitation (thixotropic)</li> </ul>	<p>Sec 1/Ch 9 P83</p>
<ul style="list-style-type: none"> <li>• obtain rapid flavour release in the mouth.</li> </ul>	<p>Sec 1/Ch 9 P83</p>

### 3.4 Nutrition

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
The provision and role of energy. Review of macro- and micro-nutrients and fibre basic. Nutritional needs of the population. Daily requirements for nutrients. Nutrient content of typical foods.	Sec 1/Ch 6 P53 – 61
Review of the nutritional contribution a range of products make to the diet, with emphasis on energy contribution, protein, fat levels, vitamins, minerals and fibre.	Sec 1/Ch 4 P38

### 3.5 Values issues

Unit Content	Cross reference from new content to textbook – 4 <sup>th</sup> edition
Analysing the need for new products. Factors in society, industry and in the market affecting new food product developments. Consumer evaluation of products. Concept of 'quality of design' – value for money.	Sec 5/Ch 2 P243 – 248
Impact of technical, economic, social, environmental and moral issues on product design, development and manufacture. Consumer awareness and current issues.	Sec 5/Ch 2 P248 – 255
The influence of new technologies and new materials on the developments of new food products.	Sec 5/Ch 2 P255 – 258