

# GCE 2004

## *June Series*



# Mark Scheme

## Home Economics

### *Unit HEC6*

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*Dr Michael Cresswell Director General*

**Question 1**

(a) PHYSICAL PROPERTIES OF PROTEINS:

- primary structure – order of amino acids in the protein molecule  
secondary structure – linkage of the polypeptide chains with disulphide bridges and hydrogen bonds
- tertiary structure – the folding of the helix chains to give irregular bulky shapes.

CHEMICAL PROPERTIES OF PROTEINS

- constructed from monomers – amino acids
- contain two functional groups – amino group (NH) and a carboxyl group (COOH)

When eggs are heated the proteins in the white and yolk coagulate making eggs suitable for a variety of functions, e.g. thickening sauces (Hollandaise) and curd (lemon); binding (burgers); setting quiches; foaming – egg white proteins unravel and trap air bubbles, mechanical action causes initial denaturation of egg whites. Will collapse unless heat is applied. Coating (Scotch eggs) will form a protective barrier.

**12 marks**

**Criteria Bands**

**1-4 marks**

Weak answer with minimal reference to the chemical and physical properties of proteins which enable eggs to be used in a variety of ways. Candidate may refer to either chemical or physical properties. May mention setting and trapping of air. Specific examples may not be given.

**5-8 marks**

Average answer which will demonstrate some understanding of the chemical and physical properties of eggs and their culinary uses. Candidates at the top end of this band should be able to give three good examples. There will be evidence of sound knowledge and scientific terminology.

**9-12 marks**

Candidates will demonstrate a high level of knowledge and understanding of the physical and chemical properties of egg proteins. At the top of this band candidates should use appropriate scientific terminology and give a range of specific food examples.

(b) NUTRITIONAL BENEFITS:

- HBV (proteins) – growth
- emulsified fat (yolk) – concentrated source of energy, easily digested
- iron (yolk) – for production of O<sub>2</sub> carrying haemoglobin
- vitamins A, D, thiamine and riboflavin – for healthy mucous membranes, strong bones/teeth, for healthy nervous system and metabolism of carbohydrates

**8 marks**

## Criteria Bands

### 1-4 marks

Simple answer which will list nutrients without qualification, e.g. fat without understanding that it is an emulsified form and therefore easier to digest. Maximum marks in this band should only be given if the candidate's answer extends to the function of at least one of the nutrients identified.

### 5-8 marks

High level response which identifies the nutrients and their functions in the body. Candidates at the top end of this band should be able to produce the answer given on the mark scheme if they are to achieve full marks.

#### (c) AT RISK GROUPS:

- pregnant women and their unborn/babies and infants (under 2 years)/elderly people/sick people

**Any 2 groups**

**2 marks**

#### ADVICE:

- do not eat raw eggs/lightly cooked eggs or egg dishes
- salmonella risk
- may cause F.P with associated symptoms
- eggs should be hardboiled (7 mins)/fried (3 mins on each side)

**1 mark**

**1 mark**

**1 mark**

**Any 3 valid points**

**3 marks**

**Total 25 marks**

## Question 2

- (a) Daily diet contains 11 portions of (saturated) fatty, salty and/or sugary foods.

No fruit and only one portion of vegetable

Diet is inadequate. Deficient in iron, calcium, zinc and magnesium as well as vitamins A and C and folic acid. Low levels of dietary fibre.

Answers linked to additional nutritional requirements of pregnant women: extra 6g protein per day, folate, riboflavin, vitamins A, C and D. (Extra energy and thiamine only in last trimester. No recommendation for extra iron and calcium because no menstruation and more effective absorption of calcium.)

**12 marks**

### Criteria Bands

#### 1-4 marks

Simple answer which lacks detail. May identify one or more of the nutrients supplied in **large** (sodium, fat, saturated fat, intrinsic sugars) or **small** (dietary fibre) amounts.

**5-8 marks**

Candidate demonstrates good evaluative skills identifying most of the missing nutrients. Candidate is able to link nutrients which are in excess (sodium, fat and sugar) to specific foods in the menu.

Identified low intake of n.s.p. and most of the deficient nutrients (see mark scheme).

**9-12 marks**

A detailed evaluation which demonstrates a high level of knowledge and understanding of the application of nutrition. High levels of fat, sodium, sugar (extrinsic) have been identified. Candidate observes '5 a day' recommendation is not applied. Appreciates relationship between pregnancy and teenage years in terms of additional nutritional requirements.

Has identified all of the deficient nutrients (see mark scheme).

- (b) Accept any valid suggestions (must specify nutrients found in named foods) which reflect the main healthy eating guidelines relating to **fats, sugars, dietary fibre, sodium, starch, folic acid, '5 a day'**.

39% **energy** from starch, milk sugars and intrinsic sugars

11% by non-intrinsic sugars

35% (max.) from fat

11% (max.) from saturated fat

**7 marks**

- (c) **CONSEQUENCES FOR MOTHER AND BABY:**

- low birth weights
- spina bifida/neural tube defects
- with increased risk of infant mortality
- leading to increased risk of health problems in later life
- mother's long term health is affected – growing foetus draws on her nutrient reserves
- anaemia
- brittle bones/osteoporosis
- dental decay
- obesity
- CHD
- high blood pressure

**Any 6**

**6 marks**

NB Must refer to mother **and** baby for full marks

**Total 25 marks**

**Question 3**

- (a) Knowledge of a range of **commercial processes** expected – pasteurisation, sterilisation, homogenisation, U.H.T, skimming, spray drying, condensation, evaporation.

#### EFFECT ON PALATABILITY:

- flavour – UHT caramelises lactose giving a cooked flavour; reduction of fat content decreases flavour; homogenisation produces creamy flavour.
- appearance – no cream line in skimmed or homogenised, but creamy appearance with sterilisation.
- texture – skimmed is very watery whereas homogenised has a thicker, smoother consistency.

#### EFFECT ON NUTRITIONAL VALUE:

- heat treatment causes loss of thiamin, ascorbic acid, folic acid and B<sub>12</sub>
- skimming reduces fat (energy) content plus vitamins A and D
- evaporation destroys ascorbic acid and thiamine

**8 marks**

#### Criteria Bands

##### 1-4 marks

Simple answer which will address either palatability or nutritional value without relating either to specific commercial processes. May refer to creaminess or loss of vitamins, but will lack detailed understanding.

##### 5-8 marks

Candidates must be able to link commercial processes to changes in palatability and nutritional value of milk. Candidates at the top end of this band should be able discuss vitamin loss, fat reduction and palatability in relation to processes such as U.H.T, skimming, dehydration, etc.

- (b)(i) bacterial cultures – e.g. in yoghurt lactose (1) is fermented (1) to lactic acid (1) at temperature around 42 - 45°C (1)
- (ii) enzymes such as rennin (1) coagulate (1) casein (1) in milk in the process of cheese making
- (iii) acids cause coagulation (1) of casein at isoelectric point, (1) e.g. cottage and curd cheese.

**9 marks**

#### Criteria Bands

##### 1-3 marks

Simple response which shows minimal understanding of the functions of one or two of the substances used in dairy products.

##### 4-6 marks

Candidate is able to explain the function of one or two substances in detail and give a simplistic explanation of the third substance.

### 7-9 marks

Candidate demonstrates a high level of knowledge and understanding of the functions of all the substances. Technical terms are used with confidence.

(c)

- E.U. milk lake
- marketing/advertising, developed and promoted to different groups, e.g. sport and children
- dietary/health interest, e.g. skimmed milks, low fat cheeses, yoghurts, calcium-enriched, soya (vegetarian/allergies) milks
- economic/market forces – switch to supermarkets
- lifestyle changes affecting product sizes
- cultural influences, e.g. Greek yoghurts
- new developments, e.g. bio yoghurts Yakult/Actimel

**8 marks**

### Criteria Bands

#### 1-4 marks

Simple answer which addresses 4 of the reasons superficially or one or two reasons in some detail.

#### 5-8 marks

Sound answer which addresses at least three of the reasons in some depth. In order to achieve full marks candidates should be aware of at least 4 of the possible reasons and be able to discuss these.

**Total 25 marks**

### Question 4

(a) REASONS FOR THE ADVICE

- to increase intake of n.s.p and thus reduce the risk of developing bowel-related diseases
- to increase intake of both vitamins, especially ascorbic acid and folate and minerals, e.g. calcium, potassium, magnesium, iron, iodine
- to increase intake of anti-oxidant vitamins such as beta carotene and ascorbic acid – mop up free radicals.
- low in sodium – blood pressure
- intrinsic sugars less damaging to teeth
- low in energy/fat

**Any 4 relevant points**

#### INTERESTING WAYS TO ACHIEVE 5 A DAY

Fruit juices, especially orange juice;

Smoothies;

A variety of salads such as green, coleslaw, Waldorf, carrot and raisin, fresh fruit salad;

fruit crumbles;  
vegetable soups;  
vegetable curries/lasagnes;  
sprinkling dried or fresh fruit on breakfast cereal.  
**Any 8 interesting examples for different meals**

**8 marks**

(b) CHARACTERISTICS OF **RAW** FRUIT AND VEGETABLES:

- variety of COLOUR – useful to make meals look appetising/stimulates the flow of digestive juices, e.g. fruit salads, green salads, carrot salads, Waldorf salads and as a garnish
- variety of FLAVOUR – sweet, sharp/acidic/tart. Contrasts, e.g. sweet and sour
- variety of TEXTURE – fleshy/soft/crunchy/succulent/seedy, e.g. plums, bananas, apples, celery, peaches, blackberries
- high nsp content/high satiety value
- no cooking, therefore little loss of ascorbic acid
- quick and easy to prepare/convenient

**Any 5 valid points which are justified**

**5 marks**

(c) CHANGES THAT OCCUR DURING THE **PREPARATION** AND COOKING OF FRUIT AND VEGETABLES

- peeling and trimming will reduce purchased weight
- oxidation of vitamin C (oxidase) after preparation – tear not cut
- plunge into boiling water to reduce destruction of Vitamin C
- alkalies preserve green colour but destroy Vitamin C
- keeping vegetables warm causes further loss of Vitamin C
- cellular tissue/nsp is softened
- starch is gelatinised
- enzymic browning (polyphenol oxidase)
- pectin released

**12 marks**

**Criteria Bands**

**1-4 marks**

Weak answer which makes minimal reference to changes either during preparation or cooking. May refer to vitamins in general but will have little understanding of scientific principles which affect the stability of ascorbic acid.

**5-8 marks**

Average answer which will demonstrate a good knowledge of the scientific principles which bring about changes during the preparation cooking and of fruit and vegetables. Candidates should be able to explain at least 4 of these.



**9-12 marks**

High level response which shows a clear and detailed understanding of most of the possible changes which can take place during the preparation and cooking of fruit and vegetables. Scientific terminology will be used where relevant.