

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Autumn Examinations 2015

Module Title: Nutritional Analysis

Module Code: BIOL7018

School: Science and Informatics

Programme Title(s): Bachelor of Science (Honours) Herbal Science – Year 2
Bachelor of Science (Honours) Nutrition and Health Science – Year 2
Bachelor of Science Applied Biosciences – Year 2

Programmes Code(s): SHERB_8_Y2
SNHSC_8_Y2
SBIOS_7_Y2

External Examiner(s): Prof. O. Corcoran, Dr. T. O Connor

Internal Examiner(s): Dr. Aoife McCarthy

Instructions:

Section A: Short Questions: Answer **all** questions in a separate answer book (50 marks)

Section B: Long Questions: Answer **question one and one other** question in a separate answer book (50 marks)

Duration: 2 hours

Sitting: Autumn 2015

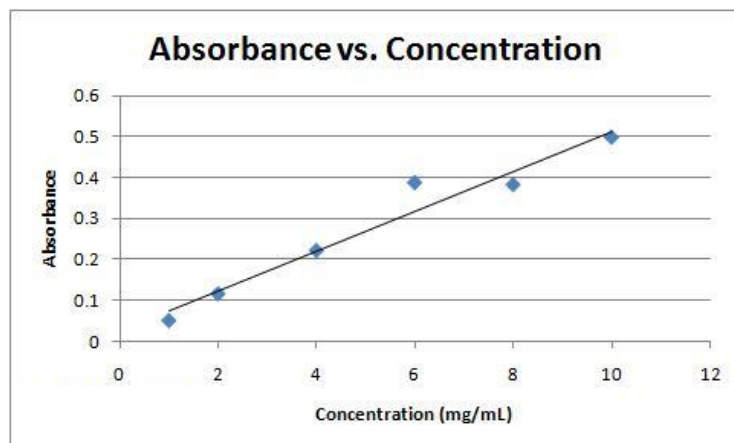
Requirements for this examination: Calculator

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination. If in doubt please contact an Invigilator.

Section A: Short questions. Answer all questions in a separate answer book. [50 marks]

1. What is a non-essential nutrient? (1 mark)
2. List **two** functions of protein in human nutrition. (2 marks)
3. Distinguish between macronutrients and micronutrients in nutrition. (2 marks)
4. State the main function of the following micronutrients in health. (2 marks)
 - i. Sodium
 - ii. Selenium
 - iii. Vitamin E
 - iv. B- vitamins
 - v. Vitamin K
5. Consider the following graph of protein concentration (mg/ml) versus absorbance.
 - i. Name **one** method used to analyse the protein content of food that would involve construction of a standard curve similar to that shown in the graph below.
 - ii. What piece of laboratory equipment is required to obtain the absorbance values plotted in this graph?

(2 marks)



6. Calculate the energy content of a 50g serving of a food containing 5g protein, 30g carbohydrate and 2g fat per 100g. Show all calculations clearly. (2 marks)
7. What is bioavailability? (2 marks)

8. Give **one** example of an inhibitor of absorption that has a beneficial effect on health. (1 mark)
9. What do the following abbreviations stand for, in terms of nutrition recommendations:
- i. RDA
 - ii. EAR
 - iii. UL
- (3 marks)
10. What percentage of total energy (kcal) consumed should come from
- i. Carbohydrate
 - ii. Protein
 - iii. Fat
- (3 marks)
11. State **three** factors affecting individual nutritional requirements. (3 marks)
12. Children have higher RDAs for certain nutrients. List **two** such nutrients. (2 marks)
- 13.
- i. Use the Mifflin-St.Jeor equation for females (given below) to calculate the resting energy expenditure (REE) for Jane, a 33-year old female with weight 68kg and height 1.76m. Show all calculations clearly. (2 marks)
- $$\text{REE females (kcal/day)} = (9.99 \times \text{weight (kg)}) + (6.25 \times \text{height (cm)}) - (4.92 \times \text{age (yrs)}) - 161$$
- ii. Jane is sedentary. Calculate Jane's estimated energy requirement (EER). Show formula used and all calculations clearly. (2 marks)
 - iii. Calculate Jane's daily protein requirement, based on her weight of 68kg. Show formula used and all calculations clearly. (2 marks)
14. Joe is a 54-year old male with weight 240 lb and height 180cm. Calculate **and** classify Joe's body mass index (BMI). Show formula used and all calculations clearly. (3 marks)
15. What are the waist-hip ratio (WHR) cut-off points for males and females and what do they indicate? (3 marks)
16. What anthropometric measurement can be used to measure percent body fat? (1 mark)

17. What is the effect (increase or decrease) of iron deficiency anaemia on (i) serum iron and (ii) transferrin saturation? (1 mark)
18. Which dietary assessment method is considered the “gold standard”? (1 mark)
19. What technique can be used to measure basal metabolic rate (BMR) of an individual? (1 mark)
20. List **two** protein-energy malnutrition (PEM) disease states. (2 marks)
21. Name **one** natural and **one** process-induced toxin in food. (2 marks)
22. Briefly outline what you understand by the term “HACCP”. (2 marks)
23. Is “traffic-light labelling” purely reductive, purely evaluative or hybrid labelling? Give a reason for your answer. (3 marks)

Section B: Long questions. Answer question one and one other question in a separate answer book.

[50 marks]

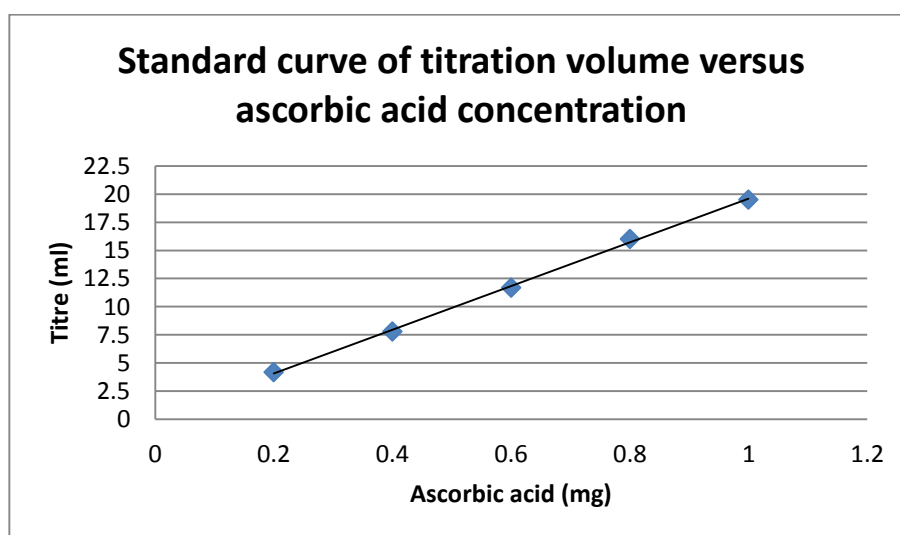
Q1. Compulsory

(a) "Calorimetry is the science that calculates the heat release from metabolism".

- i) Briefly discuss the use of calorimetry to determine the energy content of food. (6 marks)
- ii) Outline the difference between 'heat of combustion' values and 'Atwater factors'. (4 marks)
- iii) Calculate the biological energy value of a food containing 20g fat, 7g protein and 73g carbohydrate per 100g. (5 marks)

(b)

- i) Briefly outline an experiment that could be carried out to determine the ascorbic acid content of orange juice. (5 marks)
- ii) Below is a standard curve from an experiment to analyse the ascorbic acid content of foods. An orange juice sample (1 ml) had an end-point titration volume of 7.5ml. Using the standard curve given, determine
 - the concentration of ascorbic acid (mg) in the sample analysed (1 mark)
 - the concentration of ascorbic acid in 100 ml of orange juice (2 marks)
 - the percent of the vitamin C RDA (60 mg/day) provided by one serving (160 ml) of the orange juice tested (2 marks)



- Q2.** Discuss the importance of lipid in nutrition under the following headings:
- Functions of lipid in the human diet (14 marks)
 - Recommended lipid intakes for adults (3 marks)
 - Consequences of lipid excess (8 marks)
- Q3.** Write a detailed evaluation of the **three** dietary assessment methods available for analysing nutritional status. (25 marks)
- Q4.** “No nutrient is absorbed and utilised to the full extent that it is consumed.”
- i. Distinguish between absolute and relative bioavailability (4 marks)
 - ii. Discuss enhancers and inhibitors of nutrient absorption (6 marks)
 - iii. Briefly describe how bioaccessibility **and** bioavailability can be analysed in vitro (10 marks)
 - iv. A study was conducted to measure the protein efficiency ratio (PER) of a sample. Ten weanling rats were used in both the casein (standard) and sample groups. The PER for the casein (standard group) was calculated to be 3.3. The sample group had an average initial weight of 65g, average final weight of 158g and an average protein intake 22g.
Calculate the PER **and** the true PER of the sample product. (4 marks)
What can we conclude about the sample product, based on the true PER? (1 mark)
Show formula used and all calculations clearly.