CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2016

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): **Professor Olivia Corcoran, Dr. Tom O'Connor**

Internal Examiner(s): **Dr. Aoife McCarthy**

Instructions:
Section A: *Short Questions:* Answer **all** questions in the space provided (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 2016

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 <u>all</u> questions in the space provided. All questions carry equal marks. [50 marks]

1. What is a conditionally essential nutrient?

2. List **two** functions of lipids in human nutrition.

i.

ii.

3. A 25 mL sample of hydrochloric acid (HCl) was diluted to a final volume of 250 mL in a volumetric flask. A 10 ml sample of the diluted HCl was titrated with 43.56 mL of 0.1023 M NaOH. What was the original concentration (mole/L) of the HCl? Note: $HCl + NaOH \rightarrow NaCl + H_2O$

4. Two compounds (A: polar, B: non-polar) in solution were injected into a reversed-phase high performance liquid chromatography (HPLC) apparatus. Which compound (A or B) will pass through the column more quickly? Give a reason for your answer.

5. Calculate the energy content (per 100g), using Atwater factors, of a food containing 3.5g fat, 0.8g protein and 13g carbohydrate and 1g salt per 50g.

6.

i. Name **one** quantitative method used to analyse the protein content of a food sample.

ii. State the main piece of equipment required for this method.

7. Distinguish between absolute and relative bioavailability.

8. Give **one** example of a physiological factor that can affect nutrient absorption. State the physiological factor, the effect on nutrient absorption and a specific example.

9. Give **one** benefit and **one** limitation of *in vivo* methods of bioaccessibility and bioavailability measurement.

Benefit :

_____

_____

Limitation:

_____

_____

10. What do the following abbreviations stand for, in terms of nutrition recommendations?

i. RDA _____

ii. EAR _____

iii. UL _____

iv. AI _____

11. State the Acceptable Macronutrient Distribution Range(AMDR) for each of the macronutrients.

i.

ii.

iii.

12. State **four** factors affecting individual nutritional requirements.

i.

ii.

iii.

iv.

13. Ms. O'Leary is a sedentary 22-year old female with weight 65kg and height 1.65m. The Harris-Benedict equation for females is given below.

REE females (kcal/day) = (weight (kg) x 9.56) + (height (cm) x 1.85) – (age (yrs) x 4.68) + 655.10

i. Calculate Ms. O'Leary's resting energy expenditure. Show all calculations clearly.

ii. Calculate Ms. O'Leary's estimated energy requirement (EER). Show formula used and all calculations clearly.

14. State the body mass index (BMI) cut-off points for the classifications outlined below.

Underweight _____

Normal weight _____

Overweight _____

Obese _____

15. Outline the indirect method used to measure

i. height of an 8-month old child. _____

ii. height of a wheelchair-bound individual. _____

16.

i. What does the waist-hip ratio (WHR) indicate?

ii. Barry's waist circumference is 91cm and his hip circumference is 112cm. What is Barry's WHR and what does it mean? Show formula used and all calculations clearly.

17. What is the effect (increase or decrease) of iron deficiency anaemia on total iron binding capacity, and transferrin saturation?

Total iron binding capacity _____

Transferrin saturation _____

18. Write a short note on Menke's disease.

19. Distinguish between static and functional biochemical tests and give a specific example of each.

20. State **one** advantage and **one** disadvantage of a 24-hour dietary recall as a dietary assessment method.

Advantage

_____

_____

Disadvantage

_____

_____

21. State a technique that can be used to measure lean body mass of an individual?

22. Write a short note on Marasmus.

23. Define the term “hunger”.

24. State **two** negative health effects of nitrites.

i.

ii.

25. Define LD_{50}.

Section B: Long questions. Answer question one and one other question in a separate answer book. [50 marks]

Q1. Compulsory

(a) Outline the use of the bomb calorimeter to determine the energy content of food. Use a labelled diagram to illustrate your answer. (13 marks)

(b) A 4g sample of egg was combusted in a bomb calorimeter. The volume of water in the Dewar flask was 1600ml and the recorded temperature rise was 2°C. Calculate the heat of combustion (kcal/100g) of 100g of the egg sample, assuming the hydrothermal equivalent =700cal/degree. (6 marks)

(c) A complexometric titration was carried out to determine the calcium (Ca) level in mineral water. 10ml of mineral water was titrated with 0.05M EDTA. The titre was 10.9ml. Calculate the calcium concentration (mg/L) of the mineral water. *Note the molecular weight of calcium is 40g mol^{-1}).* (6 marks)

Q2. Discuss the importance of protein in nutrition under the following headings:

- Functions of protein in the human diet (14 marks)
- Recommended protein intakes for adults (3 marks)
- Consequences of protein excess (8 marks)

Q3. Write a detailed evaluation of anthropometric measurements available for analysing nutritional status of adults. (25 marks)

Q4. Discuss, with reference to examples, external factors that can affect nutrient absorption. (25 marks)