UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION

MARCH 2025 SEMESTER

COURSE CODE	:	HGB20103
COURSE TITLE	:	PRINCIPLES OF HUMAN NUTRITION
PROGRAMME NAME	:	BACHELOR OF ENVIRONMENTAL HEALTH (HONS)
DATE	:	04 JULY 2025
TIME	:	3:00PM - 6:00PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 16 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. A healthcare provider educates a patient with constipation to increase intake of whole grains, legumes, fruits, and vegetables. The specific type of carbohydrate beneficial for this condition is _____.

   A. monosaccharides

   B. starch

   C. soluble fiber

   D. disaccharides

2. While reviewing a diet plan, a nutritionist notes that one of her clients is consuming high amounts of sugary soft drinks and processed snacks. She explains that excessive intake of these carbohydrates may contribute to weight gain. The main reason for this is because they _____.

   A. are high in fiber

   B. are thermogenic

   C. contain essential amino acids

   D. provide empty calories with low satiety

3. A diabetic patient is advised to consume more complex carbohydrates to help regulate post-meal blood sugar levels. The characteristic of complex carbohydrates that contributes to this effect is _____.

   A. lack of dietary fiber

   B. rapid absorption in the small intestine

   C. high glycemic index

   D. slower digestion and gradual glucose release

4. A child is born with an inherited enzyme deficiency that prevents proper digestion of lactose. After consuming milk, the child experiences bloating and diarrhea. This condition is most likely due to the lack of _____.

   A. sucrase

   B. lactase

   C. amylase

   D. maltase

5. *A food scientist is analyzing the label of a packaged product that contains starch, sugar, and dietary fiber. He explains to his class that not all carbohydrates contribute to available energy.*
   The carbohydrate component that provides no direct calories and helps in digestion is _____.

   A. sucrose

   B. glucose

   C. starch

   D. dietary fiber

6. Which type of fat is most dangerous to health?

   A. Brown fat

   B. Visceral fat

   C. Essential fat

   D. Subcutaneous fat

7. A person following a strict vegan diet eliminates all animal products, including dairy and eggs. Which of the following nutrients is most likely to be deficient in their diet, requiring supplementation or careful dietary planning?

   A. Dietary fiber

   B. Iron from plant-based sources.

   C. Vitamin C

   D. Vitamin B12

8. Which of the following vitamins helps in calcium absorption?

   A. Vitamin A

   B. Vitamin C

   C. Vitamin K

   D. Vitamin D

9. Which organ is primarily responsible for nutrient absorption?

   A. Liver

   B. Large intestine

   C. Small intestine

   D. Stomach

10. Which of the following is an example of an essential fatty acid?

    A. Omega-3

    B. Saturated fat

    C. Cholesterol

    D. Trans fat

11. What is the recommended daily intake of water for an average adult?

A. 1 liter

B. 2-3 liters

C. 500 mL

D. 5 liters

12. A food scientist is analyzing the label of a packaged product that contains starch, sugar, and dietary fiber. He explains to his class that not all carbohydrates contribute to available energy. The carbohydrate component that provides **no direct calories** and helps in digestion is _____.

A. dietary fiber

B. glucose

C. starch

D. sucrose

13. A 45-year-old man is advised to reduce his intake of simple sugars after being diagnosed with prediabetes. His nutritionist explains that some carbohydrates are absorbed quickly and spike blood sugar levels. Among the following, the carbohydrate that is most rapidly absorbed and has the highest glycemic impact is _____.

A. lactose

B. galactose

C. fructose

D. glucose

14. After a meal, the body enters a state where insulin promotes the storage of nutrients. This phase of metabolism is characterized by synthesis and storage rather than breakdown. This state is known as _____.

A. anabolic state

B. post-absorptive state

C. starvation response

D. catabolic state

15. During a nutrition class, students learn that different macronutrients yield different amounts of energy. The macronutrient that provides the highest energy per gram is _____.

A. proteins

B. alcohol

C. carbohydrates

D. fats

16. Following intense physical activity, a person experiences muscle soreness due to the accumulation of lactic acid. This acid is produced during a form of metabolism that lacks sufficient oxygen. The process responsible for this effect is _____.

A. protein catabolism

B. aerobic metabolism of fatty acids

C. beta-oxidation of lipids

D. anaerobic glycolysis

17. An individual has been following a ketogenic diet, severely restricting carbohydrates. Over time, their body adapts by producing ketone bodies as an alternative energy source. The primary substrate used to generate ketone bodies is _____.

    A. amino acids

    B. glucose

    C. fatty acids

    D. lactate

18. A person consumes a meal rich in carbohydrates. Over the next few hours, their body converts glucose into glycogen for storage in the liver and muscles. This process is known as _____.

    A. lipolysis

    B. gluconeogenesis

    C. glycogenolysis

    D. glycogenesis

19. A nutritionist is evaluating the total energy expenditure (TEE) of her client. She explains that it includes basal metabolic rate (BMR), physical activity, and the thermic effect of food. Among these components, the one that typically accounts for the largest portion of daily energy use is _____.

    A. physical activity

    B. basal metabolic rate

    C. resting energy expenditure

    D. thermic effect of food

20. During prolonged fasting, the liver initiates a process to maintain blood glucose levels using non-carbohydrate sources such as amino acids. This metabolic pathway is referred to as _____.

A. ketogenesis

B. glycogenolysis

C. gluconeogenesis

D. glycolysis

21. A 30-year-old athlete is undergoing a high-intensity training program. During exercise, his body rapidly breaks down glucose in the absence of oxygen. This process is best described as _____.

A. anaerobic glycolysis

B. beta-oxidation

C. gluconeogenesis

D. aerobic glycolysis

22. Individuals with the same BMI may differ significantly due to _____.

A. resting heart rate

B. blood group

C. body composition

D. daily step count

23. Subcutaneous fat is typically stored _____ .

A. within bone marrow

B. inside muscle fibers

C. under the skin

D. around internal organs

24. Identify the component of body composition that includes muscles, bones, and organs.

A. Body fat.

B. Water weight.

C. Visceral fat.

D. Lean body mass.

25. How does resistance training affect body composition?.

A. Increases body fat.

B. Increases lean muscle and may decrease fat.

C. Decreases lean muscle mass.

D. Only affects bone density.

26. What is the significance of knowing body composition in clinical and fitness settings?

A. It determines eye-hand coordination.

B. It tracks hair growth.

C. It assesses health risks and physical fitness.

D. It helps measure height.

27. Which factor can directly influence an individual's body composition?

A. Blood type.

B. Number of siblings.

C. Sleep quality.

D. Eye color.

28. What role does essential fat play in the human body?

A. It causes weight gain.

B. It is stored around internal organs.

C. It provides cushioning for bones only.

D. It supports vital body functions like hormone production.

29. Why is BMI not a perfect indicator of body composition?

A. It does not differentiate between fat and muscle mass.

B. It is too expensive to calculate.

C. It can only be used for children.

D. It requires blood samples.

30. Which method is commonly used to assess body composition?

A. Body Mass Index (BMI).

B. Dual-energy X-ray absorptiometry (DEXA).

C. Blood glucose testing.

D. Pulse oximetry.

31. What is considered a healthy body fat percentage for adult males?

A. 30–40%

B. 20–30%

C. 8–19%

D. 5–10%

32. Which of the following components is not the part of body composition?

A. Bone mass.

B. Blood pressure.

C. Lean muscle mass.

D. Body fat.

33. Body composition refer to the _____.

A. shape and size of the body

B. ratio of fat to muscle in the body

C. number of bones in the body

D. total weight of a person

34. A group of college students wants to adopt a healthier lifestyle by improving their diet. Which of the following strategies would be most effective in maintaining a balanced diet and preventing nutrient deficiencies?

A. Skipping meals to reduce calorie intake and maintain a healthy weight.

B. Following extreme diet trends, such as eliminating all fats and carbohydrates.

C. Consuming only processed foods for convenience and energy.

D. Eating a variety of nutrient-dense foods from all food groups.

35. A person is diagnosed with high blood pressure and is advised to follow a diet that supports heart health. Which of the following dietary adjustments would be the most effective in managing blood pressure?

A. Consuming a diet rich in processed foods and saturated fats.

B. Eating more fruits, vegetables, and foods high in potassium while reducing salt intake.

C. Increasing sodium intake to improve hydration levels.

D. Avoiding all carbohydrates to maintain low blood sugar levels.

36. A nutritionist is explaining the concept of the Glycemic Index (GI) and its impact on blood sugar levels. Which of the following statements correctly describes the role of GI in food selection?

A. High GI foods are beneficial for long-lasting energy and satiety.

B. Foods with a low GI cause rapid spikes in blood sugar levels.

C. The Glycemic Index only applies to high-fat foods, not carbohydrates.

D. Low GI foods help in better blood sugar control and sustained energy.

37. A body composition analysis can provide insight into _____ risk.

A. cardiovascular disease

B. hearing loss

C. astigmatism

D. color blindness

38. A pregnant woman is advised to take folic acid supplements. What is the primary reason why folic acid is essential during pregnancy?

A. It prevents dehydration by helping the body retain water.

B. It increases the mother's energy levels by providing additional calories.

C. It helps in the formation of the baby's spinal cord and prevents neural tube defects.

D. It promotes hair and nail growth in the baby.

39. A young athlete wants to improve their endurance and muscle recovery through proper nutrition. Which dietary plan would best support their increased energy demands and muscle repair?

A. Low in all macronutrients to avoid gaining weight.

B. High in saturated fats and processed foods for quick energy.

C. Rich in lean proteins, complex carbohydrates, and healthy fats.

D. High in simple sugars, low in protein, and moderate in fats.

40. During a health seminar, a speaker explains the importance of hydration in the human body. She mentions that dehydration can cause serious health issues. Which of the following symptoms would most likely indicate dehydration?

A. Increased energy levels and improved concentration.

B. Increased saliva production and frequent urination.

C. Weight gain and excessive sweating.

D. Dark-colored urine, dry mouth, and dizziness.

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Bone is constantly being broken down and re-formed through bone remodeling. Illustrate and explain the process of bone remodeling.

(20 marks)

Question 2

Fat-soluble vitamins are essential nutrients that dissolve in fats and are stored in the body's fatty tissues and liver. They play vital roles in maintaining overall health. Among the fat-soluble vitamins, vitamin A and vitamin K are particularly crucial for vision and blood clotting, respectively.

(a) Vitamin A is a fat-soluble vitamin needed for night vision and healthy eyes. Severe vitamin A deficiency is a world health problem that causes blindness in thousands of children each year. Illustrate and explain how vitamin A involves in the perception of light in sight.

(10 marks)

(b) The K in vitamin K comes from the Danish word for coagulation, *koagulation,* which means blood clotting. Illustrate and explain how vitamin K involves in the blood clotting process.

(10 marks)

Question 3

Minerals play essential roles in human nutrition, ranging from structural functions to metabolic regulation. Answer the following questions related to major and trace elements in human nutrition.

(a) Differentiate between major minerals and trace minerals. Provide two examples of each and discuss the primary function of each example.

(6 marks)

(b) Calcium and phosphorus are critical for bone health.

i. Explain how these two minerals work together to maintain bone integrity.

(3 marks)

ii. Describe the potential health consequences of calcium deficiency in adults.

(2 marks)

(c) Iron is a vital trace mineral in the human body.

i. Outline the process of iron absorption in the body, emphasizing the difference between heme and non-heme iron.

(5 marks)

ii. Identify one dietary factor that enhances iron absorption and one that inhibits it.

(2 marks)

(d) Zinc is involved in numerous metabolic functions.

i. Discuss two physiological roles of zinc and the consequences of zinc deficiency.

(2 marks)

Question 4

Macronutrients play a vital role in energy provision, metabolic regulation, and maintaining overall health.

(a) Carbohydrates are the primary source of energy in the human diet.

i. Explain the process of carbohydrate digestion and absorption, including the role of enzymes and key metabolic pathways.

(6 marks)

(b) Proteins are essential for muscle synthesis and repair.

i. Discuss the concept of protein quality, including the differences between complete and incomplete proteins.

(4 marks)

ii. Provide two examples of complete proteins and two examples of incomplete proteins.

(2 marks)

(c) Fats are often categorized based on their chemical structure.

i. Compare and contrast saturated fats, unsaturated fats, and trans fats, including their sources and impact on cardiovascular health.

(6 marks)

(d) Explain the concept of the Acceptable Macronutrient Distribution Range (AMDR) and its significance in dietary planning.

(2 marks)

END OF EXAMINATION PAPER