

**UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL SCIENCES & AGRIBUSINESS
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATION: NOVEMBER 2011
SUBJECT, COURSE & CODE: NUTRITION 124, P2
LIFECYCLE AND MACRONUTRIENTS**

DURATION: 3 HOURS

TOTAL MARKS: 160

**External Examiner: Ms N Wiles
Internal Examiner: Dr K Pillay**

**NOTE: THIS EXAM PAPER CONSISTS OF FOUR (4) PAGES PLUS A QUESTION AND ANSWER BOOKLET (11 PAGES), WHICH MUST BE HANDED IN. PLEASE MAKE SURE THAT YOU HAVE ALL THE PAGES.
PLEASE ANSWER SECTION A, B and C.
PLEASE WRITE LEGIBLY AND ANSWER ALL QUESTIONS IN INK. ANSWERS WRITTEN IN PENCIL WILL NOT BE MARKED.**

SECTION A	See separate booklet	(70 MARKS)
SECTION B	MACRONUTRIENTS	(30 MARKS)
SECTION C	LIFECYCLE NUTRITION	(60 MARKS)
SECTION B	MACRONUTRIENTS	30 MARKS

ANSWER ALL OF THE FOLLOWING THREE (3) QUESTIONS.

PLEASE START EACH QUESTION ON A NEW PAGE

QUESTION 1

1.1 Discuss adaptive thermogenesis as a component of energy expenditure. [10]

TOTAL MARKS = 10

QUESTION 2

2.1 Discuss the health benefits of dietary fibre in terms of gastrointestinal tract health, cancer and weight management. [10]

TOTAL MARKS = 10

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QUESTION 3

3.1 Discuss the role of protein in acid-base balance, immunity and transport. [10]

TOTAL MARKS = 10

END OF SECTION B

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SECTION C

LIFECYCLE NUTRITION

60 MARKS

ANSWER ALL OF THE FOLLOWING THREE (3) QUESTIONS.

PLEASE START EACH QUESTION ON A NEW PAGE

QUESTION 4

4.1 Miss A is in her second trimester of pregnancy. She is referred to you for nutritional advice. Miss A is a smoker and is still smoking during pregnancy. She is also not taking her iron and folate supplements as prescribed by the Doctor. Miss A had a pre-pregnancy Body Mass Index (BMI) of 27.2 Kg/m². Thus far she has gained a total of 13 Kg.

4.1.1 Explain what you would tell Miss A to convince her to stop smoking. [5]

4.1.2 Discuss the importance of the micronutrients, iron and folate during pregnancy. [12]

4.1.3 Comment on her weight gain. [3]

TOTAL MARKS = 20

QUESTION 5

You have been asked to give a talk to a group of first year medical students on healthy eating and good nutrition for teenagers.

5.1 You will start the talk by giving an outline of the main micronutrients required by teenagers.

Provide a detailed outline of the points that you will cover on this topic. [6]

5.2 You have been asked to discuss the typical food habits and diets of teenagers.

Provide a detailed outline of the points that you will cover on this topic. [14]

TOTAL MARKS = 20

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QUESTION 6

6.1 Discuss the physiological changes in the elderly that affects their nutritional status.

TOTAL MARKS = 20

END OF SECTION C

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4. Which of the following statements on energy is false?
- A. The energy value of a food item as obtained from the bomb calorimeter is called Gross Energy
 - B. Digestible energy is the difference between Gross Energy and Faecal Energy
 - C. Gross Energy is the energy that is available for use by the body
 - D. Metabolisable energy is the difference between Digestible Energy and Urine Energy
5. If a person wants to maximise their energy expenditure through the thermic effect of foods, which macronutrient should they consume the most of?
- A. Protein
 - B. Fat
 - C. Carbohydrate
 - D. Alcohol
6. Which of the following would not indicate satiety?
- A. Release of endorphins
 - B. Gastrointestinal distension
 - C. Increased production of serotonin
 - D. Presence of nutrients (glucose, amino acids and fatty acids) in the bloodstream
7. If a person consumes 6350 kJ and is in energy balance or equilibrium how much energy would be spent on the thermic effect of food?
- A. 318 kJ - 635 kJ
 - B. 445 kJ – 635 kJ
 - C. 1588 kJ – 2540 kJ
 - D. 3810 kJ – 4445 kJ

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Carbohydrates (1 X 4)

8. A hydrolysis reaction involving the disaccharide sucrose would yield:
- A. Glucose and fructose
 - B. Fructose and maltose
 - C. Glucose and maltose
 - D. Galactose and fructose
9. Which of the following sugar alternatives may produce a laxative effect when consumed in excessive amounts (> 50g/day)?
- A. Sucralose
 - B. Xylitol
 - C. Neotame
 - D. Tagatose
10. Which of the following statements is correct?
- In a diabetic with low blood glucose levels, the role of glucagon is to:
- A. Enhance glycogenolysis
 - B. Enhance glucose uptake by the cells
 - C. Enhance glycogen synthesis
 - D. Reduce gluconeogenesis
11. Which of the following statements on fibre is incorrect?
- A. Fibre helps to alleviate constipation
 - B. Fibre helps to prevent haemorrhoids and diverticula
 - C. Fibre increases transit time
 - D. Fibre increases stool weight

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Protein (1 X 3)

12. If a diet contains 90g protein, what is the nitrogen content of the diet?
- A. 13.8 g Nitrogen
 - B. 14.4 g Nitrogen
 - C. 562.5 g Nitrogen
 - D. 5.3 g Nitrogen
13. In which part of the digestive system does hydrochloric acid convert pepsinogen (inactive) to pepsin?
- A. Mouth
 - B. Large intestine
 - C. Small intestine
 - D. Stomach
14. Which of the following would result from a deficiency of vitamin B6?
- A. All essential amino acids become non-essential
 - B. Deamination cannot take place
 - C. All non-essential amino acids become essential
 - D. Histidine becomes conditionally essential in children

Fat (1 X 3)

15. Humans are not able to synthesise essential fatty acids because:
- A. The body can only insert double bonds after the 9th carbon from the carboxyl end
 - B. The body can only insert double bonds before the 9th carbon from the carboxyl end
 - C. The body can only insert double bonds after the 9th carbon from the omega end
 - D. The body can only insert double bonds before the 9th carbon from the omega end

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16. Which of the following statements is incorrect?
- A. The longer the chain length of a saturated fatty acid the more solid the fat
 - B. Saturated fatty acids melt at a lower temperature because of their linear structure
 - C. The shorter the chain length of a saturated fatty acid the more liquid the fat
 - D. Unsaturated fatty acids melt at a lower temperature because of the presence of double bonds
17. Indicate the correct statement on fatty acids:
- A. A fatty acid consists of a chain of linked carbons flanked by hydrogens with a carboxyl group at the omega end and a methyl group at the alpha end
 - B. A fatty acid consists of a chain of linked hydrogens flanked by carbons with a methyl group at the omega end and a carboxyl group at the alpha end
 - C. A fatty acid consists of a chain of linked carbons flanked by hydrogens with a methyl group at the omega end and an acid group at the alpha end
 - D. A fatty acid consists of a chain of linked hydrogens flanked by carbons with a carboxyl group at the omega end and a methyl group at the alpha end

Alcohol (1 X 3)

18. In a fasting state, peak blood levels are seen within ___ minutes of drinking alcohol.
- A. 30
 - B. 40
 - C. 45
 - D. 60
19. All of the following are short-term effects of alcohol consumption except:
- A. Reduced production of antidiuretic hormone (ADH) by the pituitary gland
 - B. Uninhibited behaviour
 - C. Causes blood vessels to constrict thereby causing loss of body heat and an overall cooling effect on the body
 - D. Impaired psycho motor skills

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20. What is the blood alcohol concentration in a 75 kg male after consumption of 75 g of alcohol?
- A. 0.05%
 - B. 0.02%
 - C. 0.1%
 - D. 0.2%

END OF MULTIPLE CHOICE QUESTIONS

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2. CALCULATIONS

30 MARKS

This question is based on the following information:

Name: Miss X Physical Activity Level (PAL): 1.2
Gender: Female
Age: 24 years old
Weight: 86 Kg

- 2.1 Calculate the daily energy requirement using the Scholfield Equation for Basal Metabolic Rate (BMR) as follows: **[3]**

$(14.8 W + 487) \times 4.186$, where W = Weight in Kg

- 2.2 A 24-hour recall was taken from Miss X and revealed that she ate the following:

Breakfast – 6 am

1 cup Whole-wheat Pronutro (Original)
1 cup skim milk
1 tsp white sugar
1 cup of tea with 2 teaspoons sugar (no milk)

Lunch – 1 pm

6 cream crackers
60 g grated cheddar cheese
4 teaspoons low fat margarine
250 ml orange juice

Snack – 3 pm

1 cup fresh fruit (chopped)
2 Tbs cream

Supper – 7 pm

1 cup 2-minute noodles
60 g canned salmon
1 cup cooked mixed vegetable
2 cups raw salad
(lettuce, cucumber, tomato)

Snack – 9 pm

30 g raw pecan nuts
½ cup dried fruit

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2.2.1 Analyse the 24 hour recall using exchanges and complete the table below. [22]

Exchange Group	No. of exchanges	CHO (g)	Protein (g)	Fat (g)	Energy (kJ)
Milk – skim					
Milk – low fat					
Milk – whole					
Meat – very lean					
Meat – lean					
Meat - medium fat					
Meat - high fat					
Starch					
Vegetables					
Fruit					
Fat					
Sugar					
TOTAL:					

2.3 From the analysis of the 24 hour recall, is Miss X meeting her daily energy requirement? [1]

2.4 Justify your answer. [1]

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- 2.5 Calculate her nitrogen requirements using the Recommended Dietary Allowance (RDA) for protein. [3]

END OF CALCULATIONS

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3. SHORT QUESTIONS

20 MARKS

Define the following terms fully:

3.1 Deamination

[2]

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3.2 Exchange system

[2]

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3.3 Phytic acid

[2]

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3.4 Chylomicron [2]

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3.5 Explain why a person with phenylketonuria should not consume the artificial sweetener Aspartame. [3]

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3.6 List 4 (four) body processes that are regulated by eicosanoids. [1/2 X 4 = 2]

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3.7 List 4 (four) micronutrients that may be lacking in a vegetarian diet if it is not properly planned? [½ X 4 = 2]

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3.8 Give 2 (two) examples of alcoholic drinks (with volumes) that would make up a standard drink (equal to 15 g alcohol). [1 X 2 = 2]

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3.9 List the name of the condition that is seen in alcoholics with a Thiamin deficiency? [1]

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3.10 A fatty acid has the following systemic name: 9, 12 cis, cis octadecadienoic acid

Where are the double bonds positioned in this fatty acid according to the systemic name? [2]

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END OF SHORT QUESTIONS

END OF SECTION A