

**UNIVERSITY OF KWAZULU-NATAL**  
**SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES**  
**DISCIPLINE OF DIETETICS AND HUMAN NUTRITION**  
**EXAMINATION: NOVEMBER 2012**  
**SUBJECT, COURSE & CODE: NUTRITION 124, P2**  
**LIFECYCLE AND MACRONUTRIENTS**

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**DURATION: 3 HOURS**

**TOTAL MARKS: 160**

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

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**NOTE: THIS EXAM PAPER CONSISTS OF FOUR (4) PAGES PLUS A QUESTION AND ANSWER BOOKLET (12 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.**

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

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<b>SECTION B</b>	<b>MACRONUTRIENTS</b>	<b>30 MARKS</b>
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**ANSWER ALL OF THE FOLLOWING THREE (3) QUESTIONS.**

**PLEASE START EACH QUESTION ON A NEW PAGE**

**QUESTION 1**

Discuss the thermic effect of food as a component of energy expenditure. [10]

**TOTAL MARKS = 10**

**QUESTION 2**

2.1 Does sugar cause heart disease? Discuss this controversy surrounding sugar. [4]

2.2 Give practical tips on how alcohol should be consumed to minimise the effect of alcohol on the brain. [5]

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2.3 What is the name of the cluster of thiamin-deficiency symptoms that is seen in chronic alcoholism? [1]

**TOTAL MARKS = 10**

**QUESTION 3**

Explain why the dangers and complications of marasmus and kwashiorkor can be potentially life threatening. [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**

Mrs B is a 32 year old woman who is pregnant for the first time and is in the third trimester of pregnancy. She was overweight at the start of the pregnancy.

- 4.1 How much weight should she gain in total during the pregnancy? [1]
- 4.2 What are some of the complications that could arise in Mrs B as a result of her being overweight during pregnancy? [4]
- 4.3 Mrs B has been experiencing severe heartburn in the third trimester.
- 4.3.1 What are the causes of heartburn in pregnancy? [3]
- 4.3.2 Discuss the dietary management of heartburn. [6]
- 4.4 Mrs B is not keen to breastfeed her baby because she sees it as being inconvenient. Explain the benefits of breastfeeding for the mother in order to motivate her to breastfeed. [4]
- 4.5 Mrs B has read in a pregnancy magazine that vitamin B6 may be used to help to manage nausea in pregnancy. She would like to take vitamin B6 but is not sure about the dose.
- Give the dose of vitamin B6 that may be used to treat nausea. [2]

**TOTAL MARKS = 20**

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**QUESTION 5**

A mother comes to the clinic with her 6 month old baby. The baby has been exclusively breastfed and is now ready for solids.

- 5.1 Outline the physical signs that should be present to indicate that the baby is ready for solids. [4]
- 5.2 Discuss the problems that may arise if solids are introduced too early to the baby. [5]
- 5.3 Diarrhoea is a common health problem in infants.  
Explain what diarrhoea is and how it should be treated. [9]
- 5.4 The mother asks you if she can give her baby honey.  
What response would you give her? [2]

**TOTAL MARKS = 20**

**QUESTION 6**

You are the Dietitian/Nutritionist working in an old age home and you have observed that the elderly patients in the home are not consuming enough fluids and are at risk of dehydration.

- 6.1 Outline some of the practical approaches that you could take to improve fluid intake in the elderly. [9]
- 6.2 Many of the elderly patients at the old age home have been complaining of constipation.

What are some of the causes of constipation in the elderly and outline the practical advice that you could give to the elderly to help with the constipation. [11]

**TOTAL MARKS = 20**

**END OF SECTION C**



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3. Which of the following foods has the highest carbohydrate content?
- A. 2 french fried potatoes
  - B. 6 cream crackers
  - C. 3 cups of popcorn
  - D. 2 bread rolls

**Energy (1 X 4)**

4. In which of the following cases is Basal Metabolic Rate (BMR) increased?
- A. Elderly
  - B. Infancy
  - C. Obesity
  - D. Starvation
5. If a person wants to minimise their energy expenditure through the thermic effect of foods, which macronutrient should they consume the most?
- A. Protein
  - B. Fat
  - C. Carbohydrate
  - D. Alcohol
6. Which of the following is the incorrect statement on eating behaviour?
- A. When the satiety centre is stimulated, eating stops
  - B. Damage to the satiety centre can lead to obesity
  - C. When the feeding centre is stimulated, eating increases
  - D. Damage to the feeding centre can lead to obesity

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7. Which of the following does not shut off hunger when it is released?
- A. Cholecystokinin
  - B. Peptide YY
  - C. Cortisol
  - D. Glucagon-like peptide-1

**Carbohydrates (1 X 4)**

8. Fructose is also known as \_\_\_\_\_?
- A. Blood sugar
  - B. Levulose
  - C. Milk sugar
  - D. Table sugar
9. Which of the following may result from an excessive intake of dietary fibre?
- A. Mineral deficiency
  - B. Increased gastrointestinal transit time
  - C. Haemorrhoids
  - D. Dental caries
10. Which of the following statements is correct?  
In a diabetic with high blood glucose levels, the role of insulin is to:
- A. Enhance glycogenolysis
  - B. Enhance glucose uptake by the cells
  - C. Enhance glucose synthesis
  - D. Enhance gluconeogenesis

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11. Which of the following sugar alternatives must carry a warning for people with phenylketonuria (PKU)?
- A. Sucralose
  - B. Neotame
  - C. Aspartame
  - D. Acesulfame-K

**Protein (1 X 3)**

12. Which of the following amino acids becomes conditionally essential during times of metabolic stress?
- A. Arginine
  - B. Taurine
  - C. Tyrosine
  - D. Histidine
13. A lack of \_\_\_\_ can cause prolonged bleeding times.
- A. Lipoprotein
  - B. Globulin
  - C. Albumin
  - D. Prothrombin
14. Vitamin B6 is required for \_\_\_\_\_ reactions.
- A. Condensation
  - B. Transamination
  - C. Deamination
  - D. Hydrolysis

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**Fat (1 X 3)**

15. Which of the following 18 carbon fatty acids has two double bonds?
- A. Linoleic acid
  - B. Stearic acid
  - C. Oleic acid
  - D. Linolenic acid
16. Humans are not able to synthesise essential fatty acids because:
- A. The body can only insert double bonds after the 9<sup>th</sup> carbon from the alpha end
  - B. The body can only insert double bonds after the 9<sup>th</sup> carbon from the omega end
  - D. The body can only insert double bonds before the 9<sup>th</sup> carbon from the alpha end
  - C. The body can only insert double bonds before the 9<sup>th</sup> carbon from the omega end
17. Fats containing \_\_\_\_\_ fatty acids are the most likely to become rancid.
- A. Saturated
  - B. Monounsaturated
  - C. Polyunsaturated
  - D. None of the above

**Alcohol (1 X 3)**

18. Identify the incorrect statement on alcohol:
- A. 10% of alcohol leaves the body through the breath and urine
  - B. Alcohol reduces the production of antidiuretic hormone
  - C. Chronic alcohol abuse can lead to high homocysteine levels
  - D. Alcohol causes blood vessels to constrict which results in a loss of body heat

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19. In South Africa, what is the legal blood alcohol limit for all drivers?
- A. < 0.5 g alcohol per 100 ml of blood
  - B. < 0.02 g alcohol per 100 ml of blood
  - C. < 0.05 g alcohol per 100 ml of blood
  - D. < 0.2 g alcohol per 100 ml of blood
20. At which site in the gastrointestinal tract does the enzyme alcohol dehydrogenase break down alcohol?
- A. Stomach
  - B. Small intestine
  - C. Liver
  - D. Large intestine

**END OF MULTIPLE CHOICE QUESTIONS**

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**2. CALCULATIONS**

**30 MARKS**

This question is based on the following information:

Name:	Mr Y	Physical Activity Level (PAL):	1.3
Gender:	Male		
Age:	54 years old		
Weight:	89 Kg		
Height:	1.76 m		

- 2.1 Calculate the daily energy requirement in kJ for Mr Y using the Harris Benedict Equation for Basal Metabolic Rate (BMR) as follows: [3]

$$66.5 + 13.8W + 5 H - 6.8 A$$

Where W = weight in kg  
H = height in cm  
A = age in years

- 2.2 Calculate the protein and nitrogen requirements for Mr Y using the Recommended Dietary Allowance (RDA). [3]

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2.3 A 24-hour recall was taken from Mr Y and it revealed that he ate the following:

**Breakfast: 7 am**

1 cup Strawberry Pops cereal  
200 ml skim milk  
1 teaspoon white sugar in cereal

**Snack: 10 am**

250 ml apple juice  
50 g pecan nuts (raw), unsalted

**Lunch: 12:30 pm**

1 brown bread roll  
60 g tuna canned in water (drained)  
1 cup salad (lettuce, cucumber, tomato)  
3 tablespoons reduced-fat mayonnaise

**Snack: 3pm**

1 cup popcorn  
1 cup of coffee with 3 teaspoons sugar and 50 ml skim milk

**Supper: 7:30 pm**

1 cup white rice  
½ cup baked beans  
90 g grilled pork sausage  
½ cup grilled sweet potato  
1 cup ice cream

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Analyse the 24 hour recall using exchanges and complete the table below.

[22]

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

2.4 From the analysis of the 24 hour recall, is Mr Y meeting his daily energy requirement? [1]

2.5 Justify your answer. [1]

**END OF CALCULATIONS**

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**3. SHORT QUESTIONS 20 MARKS**

3.1 List the two (2) drives that influence the desire to eat. [½ X 2 = 1]

.....

.....

3.2 Which two (2) chemical elements are used to measure energy expenditure using doubly labeled water? [½ X 2 = 1]

.....

.....

3.3 List the three (3) gases that are produced when soluble fibres are fermented by bacteria. [½ X 3 = 1½]

.....

.....

3.4 Give the WHO/FAO recommendation for added sugar. [1]

.....

3.5 List the two (2) amino acids found in aspartame. [½ X 2 = 1]

.....

.....

3.6 What is the biological value of fish and beef? [1]

.....

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3.7 Which essential amino acid is lacking in gelatine? [1]

.....

3.8 List the three (3) aims of treatment in the management of severe protein energy malnutrition (PEM). [ $\frac{1}{2} \times 3 = 1\frac{1}{2}$ ]

.....

.....

.....

3.9 Give the shorthand notation for a fatty acid that has 20 carbons and 3 double bonds. [1]

.....

3.10 List two (2) examples of saturated fats that are liquid at room temperature. [ $\frac{1}{2} \times 2 = 1$ ]

.....

.....

.....

3.11 List two (2) antioxidants that are used in the food industry to prevent rancidity. [1 X 2 = 2]

.....

.....

.....

3.12 List two (2) symptoms of fatty acid deficiency. [ $\frac{1}{2} \times 2 = 1$ ]

.....

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3.13 Name two (2) fatty acids that are derived from linolenic acid. [1 X 2 = 2]

.....

.....

3.14 Give the reaction that takes place in step 1 of the breakdown of alcohol by alcohol dehydrogenase. [1]

.....

3.15 List four (4) facial characteristics seen in fetal alcohol syndrome, specifically related to the eyes. [ $\frac{1}{2}$  X 4 = 2]

.....

.....

.....

.....

3.16 Give the two (2) chemical names for alcohol. [ $\frac{1}{2}$  X 2 = 1]

.....

.....

**END OF SHORT QUESTIONS**

**END OF SECTION A**