

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DIETETICS AND HUMAN NUTRITION
EXAMINATION: NOVEMBER 2013
SUBJECT, COURSE & CODE: NUTRITION 124 P2
LIFECYCLE AND MACRONUTRIENTS

DURATION: 3 HOURS

TOTAL MARKS: 160

External Examiner: Prof FJ Veldman
Internal Examiner: Dr K Pillay

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

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)
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SECTION B	MACRONUTRIENTS	(30 MARKS)
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SECTION C	LIFECYCLE NUTRITION	(60 MARKS)
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SECTION B	MACRONUTRIENTS	30 MARKS
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ANSWER ALL OF THE FOLLOWING THREE (3) QUESTIONS.

PLEASE START EACH QUESTION ON A NEW PAGE

QUESTION 1

A fellow student has been reading up on the health benefits of fibre. She has read that fibre can help to prevent diverticulitis and haemorrhoids. However, she has not heard these terms before.

- 1.1 Explain the difference between **diverticulitis** and **haemorrhoids**. [4]
- 1.2 The student has also read that fibre can help to prevent colon cancer but is not sure how this happens. Explain how fibre can help to prevent colon cancer. [4]
- 1.3 Give the student four (4) practical tips on how she can increase her intake of dietary fibre. [$\frac{1}{2} \times 4 = 2$].

TOTAL MARKS = 10

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QUESTION 2

- 2.1 Your neighbour has read that lecithin supplements are good for the body because lecithin is a major component of cell membranes. She is considering taking the supplement as she believes it will make her healthier.
- 2.1.1 Should she take the lecithin supplement? [1]
- 2.1.2 Give reasons for your recommendation. [4]
- 2.2 Hydrogenation is commonly used in the food industry.
Give three (3) ways in which food manufacturer's benefit from using hydrogenation. [3]
- 2.3 Outline the basic chemical structure of an amino acid. [2]

TOTAL MARKS = 10

QUESTION 3

- 3.1 Discuss all the factors that increase basal metabolism or basal metabolic rate. [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 Describe the two infant feeding options that are available to a woman who is pregnant and HIV positive **and** discuss the criteria that should be used when deciding on which option to choose. [14]
- 4.2 Outline the protein requirements for infants. [4]
- 4.3 Explain why honey should not be fed to infants. [2]

TOTAL MARKS = 20

QUESTION 5

Jane is a 28 year old woman who is pregnant for the first time. She is currently in the second trimester of pregnancy. She was underweight at the start of the pregnancy.

- 5.1 How much weight should she gain in total during the pregnancy? [1]
- 5.2 Give two (2) potential risks that may arise if the mother is underweight at the start of the pregnancy. [1 X 2 =2]
- 5.3 Jane is a smoker but had tried to stop smoking during pregnancy. She is finding it difficult to stop altogether and sometimes smokes 1-2 cigarettes in the day. Explain to Jane why she should not smoke during pregnancy. [6]

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- 5.4 Jane has been reading about breastfeeding and has read that **colostrum** is beneficial for the baby.
Explain what colostrum is and why she should feed it to her baby. [7]
- 5.5 Besides smoking, list eight (8) other practices that are incompatible with pregnancy.
[½ X 8 =4]

QUESTION 6

- 6.1 Discuss the physiological changes that take place in the **digestive system** with aging. [20]

TOTAL MARKS = 20

END OF SECTION C

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3. Which of the following items has the highest energy content?

- A. 30 g pork spareribs
- B. 30 g egg white
- C. 30 g fried fish
- D. 30 g tuna (canned in oil-drained)

Energy (1 X 4)

4. The thermic effect of food value for alcohol is:

- A. 5-10%
- B. 0-5%
- C. 20-30%
- D. 15-20%

5. If a person consumes 1850 kJ at lunch what amount of energy will be used on the thermic effect of food for this meal?

- A. 1.850 kJ
- B. 185 kJ
- C. 92.5 kJ
- D. 18.50 kJ

6. Which of the following would not indicate satiety?

- A. Release of cortisol
- B. Gastrointestinal distension
- C. Increased production of serotonin
- D. Nutrient use in the liver

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7. 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

Carbohydrates (1 X 4)

8. In the case of a diabetic with high blood glucose levels the role of insulin is to:
- A. Enhance glycogen synthesis
 - B. Increase gluconeogenesis
 - C. Reduce glucose uptake by cells
 - D. Enhance glycogenolysis
9. Which of the following is not a health benefit of fibre?
- A. Prevents haemorrhoids and diverticula
 - B. Increases transit time
 - C. Increases stool weight
 - D. Alleviates or prevents constipation
10. Which of the following does not happen during prolonged fasting/starvation?
- A. Body protein is broken down into amino acids and then converted into glucose for use by the body
 - B. Body fat is broken down into fatty acids and forms ketone bodies which are used to supply energy to the body
 - C. Body fat is broken down to fatty acids and glucose is produced for use by the body
 - D. Fat takes an alternative pathway and forms ketone bodies which act as an alternative fuel source

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11. Which of the following sugar alternatives is made from sugar that has had 3 hydroxyl groups replaced by chlorine atoms?
- A. Acesulfame-K
 - B. Neotame
 - C. Aspartame
 - D. Sucralose

Protein (1 X 3)

12. In the case of Phenylketonuria, the amino acid Tyrosine can be regarded as the _____ amino acid.
- A. Conditionally essential
 - B. Non-essential
 - C. Essential
 - D. Limiting
13. If a diet contains 120 g of protein, what is the nitrogen content of the diet?
- A. 7.0 g
 - B. 19.2 g
 - C. 7.5 g
 - D. 3.5 g
14. _____ is least likely to result from an excessive intake of animal protein.
- A. Anergy
 - B. Heart disease
 - C. Cancer
 - D. Osteoporosis

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Fat (1 X 3)

15. Which of the following is not an example of an adipokine?
- A. Leptin
 - B. Lecithin
 - C. Resistin
 - D. Visfatin
16. The Dietary Reference Intake (DRI) for linolenic acid is:
- A. <10% of total energy
 - B. 5-10% of total energy
 - D. 0.6-1.2% of total energy
 - C. 20-35% of total energy
17. Humans are not able to synthesise essential fatty acids because:
- A. The body can only insert double bonds after the 9th carbon from the alpha end
 - B. The body can only insert double bonds before the 9th carbon from the alpha 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

Alcohol (1 X 3)

18. Identify the correct statement on alcohol:
- A. Fatty liver as a result of heavy drinking cannot be reversed
 - B. Fibrosis is the first stage of liver deterioration
 - C. Cirrhosis can be reversed with good nutrition and not drinking alcohol
 - D. Liver cells normally use fatty acids as a preferred fuel

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19. In South Africa, what is the legal blood alcohol limit for professional 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. 30 g of alcohol can be obtained from:
- A. 300 ml wine
 - B. 45 ml distilled liquor
 - C. 360 ml regular beer
 - D. 300 ml wine cooler

END OF MULTIPLE CHOICE QUESTIONS

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2. CALCULATIONS

30 MARKS

This question is based on the following information:

Name:	Susan	Physical Activity Level (PAL):	1.2
Gender:	Female		
Age:	22 years old		
Weight:	67 kg		
Height:	1.72 m		

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

$$655 + 9.6 W + 1.8 H - 4.7 A$$

Where W = weight in kg

H = height in cm

A = age in years

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

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2.3 A 24-hour recall was taken from Susan and it revealed the following:

Breakfast: 7 am

1½ cups bran cereal
250 ml whole milk
2 teaspoons white sugar in cereal

Snack: 10 am

3 Provita crackers
20 ml low fat margarine on crackers
1 small orange

Lunch: 12:30 pm

2 french fried potatoes
90 g fried hake
1 cup salad (lettuce, cucumber, tomato)
25 ml reduced-fat salad dressing

Snack: 3pm

1 slice raisin bread
10 ml regular margarine on bread
250 ml grape juice

Supper: 7:30 pm

1 cup cooked pasta
½ cup bean salad (no oil)
90 g grilled chicken breast with skin
½ cup cooked carrots with 10 ml butter added
1 small cupcake with icing

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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:					

2.4 From the analysis of the 24 hour recall, is Susan meeting her RDA for protein? [1]

2.5 Justify your answer. [1]

END OF CALCULATIONS

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3. SHORT QUESTIONS 20 MARKS

3.1 Explain how a bomb calorimeter measures the energy content of a food item? [3]

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3.2 Define the term “kilocalorie”. [2]

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3.3 List the four (4) short chain fatty acids that are produced when soluble fibres are fermented by bacteria. [$\frac{1}{2} \times 4 = 2$]

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3.4 Give the dietary reference intake (DRI) for fibre. [1]

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3.5 What is the energy content (in kJ) per gram of tagatose? [1]

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3.6 List four (4) routes from which nitrogen can be lost from the body [$\frac{1}{2} \times 4 = 2$]

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3.7 What is the World Health Organization (WHO) upper limit recommendation for protein? [1]

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3.8 Which vitamin is only found in animal sources and should be obtained from fortified foods or supplements by vegetarians? [1]

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3.9 Give the name of the micronutrient that can be synthesised in the body from cholesterol and has a very similar structure to cholesterol. [1]

.....

3.10 Give two (2) terms to describe the transport of cholesterol from tissues to the liver. [1 X 2 = 2]

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3.11 List two (2) major risk factors for coronary heart disease (CHD) that cannot be changed [$\frac{1}{2} \times 2 = 1$]

.....

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3.12 List two (2) plant oils that are good sources of monounsaturated fatty acids. [$\frac{1}{2} \times 2 = 1$]

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

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3.14 List two (2) facial characteristics seen in fetal alcohol syndrome, specifically related to the **lips**. [$\frac{1}{2} \times 2 = 1$]

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END OF SHORT QUESTIONS

END OF SECTION A