

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

DURATION: 3 HOURS

TOTAL MARKS: 160

External Examiner: Dr N Wiles

Internal Examiner: Dr K Pillay

NOTE: THIS EXAM PAPER CONSISTS OF SIX (6) PAGES PLUS AN ANSWER BOOKLET (11 PAGES), WHICH MUST BE HANDED IN.

PLEASE MAKE SURE THAT YOU HAVE ALL PAGES.

PLEASE ANSWER SECTIONS A, B AND C.

PLEASE WRITE LEGIBLY AND ANSWER ALL QUESTIONS IN INK.

ANSWERS WRITTEN IN PENCIL WILL NOT BE MARKED.

SECTION A 50 MARKS

SECTION B 80 MARKS

SECTION C 30 MARKS

PLEASE ANSWER ALL OF THE QUESTIONS BELOW.

START EACH QUESTION ON A NEW PAGE

SECTION B

QUESTION 2

- 2.1 Discuss the role of vitamin A in **cell differentiation** and **growth and development**. [10]
- 2.2 Explain why a lack of thiamin pyrophosphate can halt protein synthesis. [4]
- 2.3 An elderly patient with achlorhydria has been prescribed a calcium supplement in the form of calcium carbonate.
 - 2.3.1 Explain **how** and **when** the patient should take the calcium supplement. [3]

UNIVERSITY OF KWAZULU-NATAL
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DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

- 2.3.2 How much calcium does this supplement contain? [1]
- 2.3.3 The Doctor later decides to change her supplement to calcium citrate. How will this affect when she should take her calcium supplement and explain why? [2]

TOTAL = 20 MARKS

QUESTION 3

- 3.1 A patient who is a vegan and consumes a large amount of carrots, butternut and pumpkin is concerned about the fact that the palms of her hand and her skin have turned yellow/orange in colour. She is concerned that she may have jaundice.
- 3.1.1 Explain how one could confirm whether or not she has jaundice using clinical assessment. [4]
- 3.2 Outline the findings of the South African Vitamin A Consultative Study (SAVACG) of 1994 in terms of **iodine status** and **breastfeeding**. [10]
- 3.3 Discuss the strengths of using the food frequency questionnaire method of dietary assessment. [6]

TOTAL = 20 MARKS

QUESTION 4

- 4.1 Frail, elderly patients living in an Old Age Nursing Home have been showing signs of vitamin D deficiency.
- 4.1.1 Give possible reasons why these elderly patients may be at risk for vitamin D deficiency. [6]
- 4.1.2 It has been decided that the vitamin D status of these patients will be confirmed through biochemical tests.
Give the name of the biochemical test that should be used and justify your answer. [7]

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

- 4.2 You have been employed as a research assistant in a laboratory that uses animals to conduct nutrition research.
- 4.2.1 Explain why rats and mice are most commonly used as experimental animals when conducting research. [2]
- 4.2.2 You will be carrying out experiments to learn more about the effect of diet on heart disease.
Explain which animal model would be ideal to use and explain why you would not use rats or mice. [3]
- 4.3 Explain the difference between objective and subjective measurements. [2]

TOTAL = 20 MARKS

QUESTION 5

- 5.1 Explain what effect megadoses of vitamin A and vitamin E can have on blood clotting. [4]
- 5.2 A patient who has been an alcoholic for many years is diagnosed with a folate, vitamin B12 and vitamin B6 deficiency. He also has raised homocysteine levels.
- 5.2.1 Explain why he has raised homocysteine levels. [3]
- 5.2.2 High homocysteine levels increases the risk for developing heart disease.
What are the other possible effects of high homocysteine levels in the body? [2]
- 5.2.3 Will supplementing with folate, vitamin B12 and vitamin B6 help to prevent heart disease? [1]
Justify your answer. [4]

UNIVERSITY OF KWAZULU-NATAL
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DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

5.3 For each of the following nutrients listed below, indicate one laboratory test that could be used to assess nutritional status. [1 X 4 = 4]

- Carbohydrate
- Fat
- Vitamin K
- Iron

5.4 The National Food Consumption Survey-Fortification Baseline (2005) collected two (2) food samples from each household and these were tested for two (2) nutrients.

5.4.1 Name the two (2) food samples collected. [$\frac{1}{2} \times 2=1$]

5.4.2 Name the two (2) nutrients that were tested for in these food samples. [$\frac{1}{2} \times 2=1$]

TOTAL = 20 MARKS

END OF SECTION B

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

SECTION C

30 MARKS

QUESTION 6

Mrs S was diagnosed with chronic renal failure 3 months ago due to a long history of uncontrolled hypertension. Just prior to diagnosis she weighed 84 kg and her current weight is 70 kg. Her height is 1.64 m and she is 58 years old. Clinically she appears pale and has shortness of breath on exertion. She is also complaining of nausea and poor appetite.

Her biochemical data is shown below:

Urea = 44 mmol/L (3.3-6.5 mmol/L)

Creatinine = 1450 μmol/L (60-120 μmol/L)

Haemoglobin = 8.0 g/dL (12.3-17 g/dL)

Sodium = 140 mmol/L (133-146 mmol/L)

Phosphorus = 2.3 mmol/L (0.84-1.4 mmol/L)

- 6.1 Calculate and interpret her percentage weight loss. [3]
- 6.2 Mrs S is at risk of malnutrition.
Use a calculation to draw a conclusion regarding her degree of malnutrition. [3]
- 6.3 A recent blood test revealed that her potassium level is 7.0 mmol/L (3.5-5.3 mmol/L)
What are the possible causes of this blood result? [2]
- 6.4 Mrs S was told by the Dietitian that she should chop her vegetables and soak them in water before cooking to help reduce her potassium levels.
Explain why the Dietitian has given Mrs S this advice. [2]
- 6.5 Explain why hyperkalaemia can be life-threatening. [2]
- 6.6 Identify possible nutritional risk factors in this case. [$\frac{1}{2} \times 6 = 3$]

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SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

6.7 The doctors are concerned about her low haemoglobin levels and decide to give her a blood transfusion.

Explain why patients with chronic renal failure are at risk of low haemoglobin levels. [3]

6.8 Complete a diet plan for Mrs S using the dietary prescription given below. [12]

Total energy = 8035 kJ

Carbohydrate = 60% of total energy (TE)

Fat = 30% of TE

Protein = 10% of TE

Please make use of all of the following exchanges:

- Low fat milk
- Vegetables
- Fruit
- Starch
- Medium fat meat
- Fat
- Sugar

END OF SECTION C

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

STUDENT NUMBER: _____

SECTION A

MULTIPLE CHOICE QUESTIONS

1 X 30 = 30 MARKS

QUESTION 1

Indicate your answer to each question by placing a circle over the appropriate letter.

Mark allocation as follows:

0 marks if no answer is given

1 mark for each correct answer

- ½ mark for each incorrect answer

Vitamins (1 X 10)

1. All of the following fat soluble vitamins are not readily excreted from the body except for _____.
 - A. Vitamin A
 - B. Vitamin D
 - C. Vitamin E
 - D. Vitamin K

2. Declining nutrient stores can be confirmed using _____.
 - A. Diet history
 - B. Health history
 - C. Laboratory tests
 - D. Physical examination

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

3. The bioavailability of vitamin A is decreased by _____.
- A. Cooking
 - B. Vitamin E
 - C. Dehydration
 - D. Freezing
4. Identify the correct statement:
- A. Cones in the retina translate objects into black and white images
 - B. Cells in the retina contain rhodopsin which is made up of opsin and retinal
 - C. Rods in the retina translate objects into colour images
 - D. Cells in the retina contain rhodopsin which is made up of opsin and retinol
5. Patients on anti-TB medication may require a supplement of _____.
- A. Vitamin A
 - B. Vitamin B6
 - C. Vitamin B12
 - D. Folate
6. The lowest concentrations of vitamin C are found in _____.
- A. White blood cells
 - B. Eyes and brain
 - C. Pituitary gland
 - D. Blood and saliva
7. With which of the following vitamins is the synthetic form less potent than the natural form?

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

- A. Vitamin K
 - B. Vitamin E
 - C. Folate
 - D. Niacin
8. Which of the following is the main storage site for vitamin B6?
- A. Liver
 - B. Red blood cells
 - C. Muscle
 - D. Kidney
9. What percentage of absorbed vitamin K comes from bacterial synthesis in the large intestine?
- A. 5%
 - B. 10%
 - C. 15%
 - D. 20%
10. _____ is the active form of folate.
- A. 5-methyltetrahydrofolate
 - B. Pteridine
 - C. Tetrahydrofolate
 - D. Folate monoglutamate

Water & Minerals (1 X 10)

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

11. Which of the following is seen when there is a loss of 10-12 % body weight due to dehydration?
- A. Thirst and fatigue
 - B. Weakness
 - C. Loss of muscle strength
 - D. Coma
12. A deficiency of phosphorus could also lead to _____.
- A. Microcytic hypochromic anaemia
 - B. Pernicious anaemia
 - C. Haemolytic anaemia
 - D. Megaloblastic macrocytic anaemia
13. Which of the following may reduce risk for osteoporosis?
- A. Slim figure
 - B. Excessive smoking
 - C. Weight bearing exercises
 - D. Irregular menstruation
14. Identify the correct statement on Type 2 (senile) osteoporosis.
- A. Affects women aged 50 to 70 years and involves both cortical and trabecular bone
 - B. Affects men and women 70 years and older and involves trabecular bone in the wrist and spine
 - C. Affects men and women 70 years and older and involves both trabecular bone and cortical bone in the hip
 - D. Affects women 50 to 70 years old and involves trabecular bone in the wrist and spine
15. A deficiency of _____ is most likely to be seen after frequent, prolonged vomiting.
- A. Chloride

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

- B. Calcium
C. Sodium
D. Magnesium
16. High intakes of ____ can inhibit copper absorption.
- A. Manganese
B. Molybdenum
C. Selenium
D. Chromium
17. Hair loss, garlic-odour on breath, nausea, diarrhoea, fatigue, rashes and liver cirrhosis are symptoms associated with ____ toxicity.
- A. Copper
B. Chromium
C. Iodide
D. Selenium
18. What amount of zinc is present in the human body?
- A. 5 g
B. 100 mg
C. 2 – 3 g
D. 10 – 12 g
19. What is the approximate total volume of extracellular fluid in the human body?
- A. 17 litres
B. 25 litres
C. 3 litres
D. 14 litres
20. How much chloride is found in ½ teaspoon of sodium chloride?
- A. 1500 mg
B. 400 mg

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

- C. 3000 mg
- D. 300 mg

Nutritional assessment (1 X 5)

21. _____ is an example of a novel method used to estimate body fat.
- A. Imaging techniques
 - B. Near infrared interactance
 - C. Whole body resistance
 - D. Total body water
22. The Gomez classification which is used to classify malnutrition in children considers the following:
- A. Weight for Height and Height for Age
 - B. Height for Age
 - C. Weight for Height and Weight for Age
 - D. Weight for Age
23. Which of the following components of nutritional assessment makes use of the senses of sight, smell and hearing?
- A. Anthropometry
 - B. Biochemical assessment
 - C. Clinical assessment
 - D. Dietary assessment
24. Which of the following anthropometric measurements would not be valid when used to assess the anthropometric status in a 4 year old child?
- A. Head circumference
 - B. Height
 - C. Weight

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

D. Mid-upper arm circumference

25. Which of the following methods of dietary assessment involves measuring as eaten?
- A. 24 hour recall
 - B. Food record
 - C. Diet history
 - D. Household surveys

Nutrition in South Africa (1 X 5)

26. According to the National Food Consumption Survey (NFCS) of 1999 _____ children were stunted.
- A. 1 in 2
 - B. 1 in 3
 - C. 1 in 4
 - D. 1 in 5
27. Identify the incorrect statement from the South African Vitamin A Consultative Study (SAVACG) of 1994.
- A. Stunting was more evident in rural than urban communities
 - B. Stunting was more evident in children living in traditional or informal type of housing
 - C. Stunting was more evident in those whose mothers were more educated
 - D. Stunting was seen in 1 in 4 children
28. According to the South African Vitamin A Consultative Study (SAVACG) of 1994, _____ children were fully immunised by their first birthday.
- A. 9 out of 10
 - B. 6 out of 10
 - C. 5 out of 10
 - D. 8 out of 10

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DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

29. According to the NFCS Fortification Baseline 2005 _____ households appeared to be food secure.
- A. 1 out of 2
 - B. 1 out of 4
 - C. 1 out of 3
 - D. 1 out of 5
30. In the National Food Consumption Survey (NFCS)-Fortification Baseline (FB) (2005) what was the age group of the children studied?
- A. 6-71 months
 - B. 1-9 years
 - C. 6-23 months
 - D. 2-6 years

END OF MULTIPLE CHOICE QUESTIONS

UNIVERSITY OF KWAZULU-NATAL
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DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

SHORT QUESTIONS

20 MARKS

QUESTION 2

2.1 Give the name of **stage 3** from the WHO stages of the development of xerophthalmia. [1]

.....

2.2 List four (4) good food sources of vitamin K. [$\frac{1}{2} \times 4=2$]

.....

2.3 Which drug increases the breakdown of riboflavin in the liver? [1]

.....

2.4 What amount of niacin can be obtained from 120g of dietary protein? [1]

.....

2.5 Give the name of the protein-bound form of biotin. [1]

.....

2.6 The long-term use of certain drugs can reduce the levels of pyridoxal phosphate.
Name two (2) drugs that have this effect. [$\frac{1}{2} \times 2=1$]

.....

.....

2.7 Calculate the dietary folate equivalents (DFEs) that are obtained from 450 μg of food folate and 300 μg of folic acid from a supplement. [2]

.....

.....

.....

UNIVERSITY OF KWAZULU-NATAL
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DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

2.8 List two (2) enzymes that need zinc for functioning. [$\frac{1}{2} \times 2=1$]

.....

.....

2.9 What is the fluoride content in 1 cup of fluoridated water? [1]

.....

2.10 List four (4) symptoms of manganese toxicity. [$\frac{1}{2} \times 4=2$]

.....

.....

2.11 Give the name of the equipment that is used to measure skinfold thickness. [1]

.....

2.12 List four (4) areas in the body where **girth** measurements can be taken. [$\frac{1}{2} \times 4=2$]

.....

.....

2.13 List two (2) types of studies that can be conducted on whole organisms. [$\frac{1}{2} \times 2=1$]

.....

.....

2.14 Which age group of children was most affected by anaemia and poor iron status in the South African Vitamin A Consultative Study (SAVACG) of 1994? [1]

.....

UNIVERSITY OF KWAZULU-NATAL
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DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
EXAMINATION: JUNE 2013
SUBJECT, COURSE & CODE: NUTR 224 – NUTRITIONAL ASSESSMENT, SA

2.15 What type of study was the National Food Consumption Survey (NFCS) of 1999? [1]

.....

2.16 How many enumerator areas were included in the NFCS Fortification Baseline 2005? [1]

.....

END OF SHORT QUESTIONS