Candidate Number……

AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES

NSLS102: CLINICAL CHEMISTRY I

END OF SEMESTER FINAL EXAMINATIONS

NOVEMBER 2023

LECTURER: MR G. MALUNGA

DURATION: 3 HOURS

INSTRUCTIONS

1. Write your candidate number on the space provided on top of each page
2. Answer **all** questions in sections A on the question paper.
3. Answer **all** questions in section B on separate answer sheets provided.
4. Answer any **3** questions in section C on separate answer sheets provided
5. Mark allocation for each question is indicated at the end of the question
6. Credit will be given for logical, systematic and neat presentations in sections B and C

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SECTION A: MULTIPLE CHOICE [40MARKS]

- **Answer all questions by encircling the correct response T for TRUE or F for FALSE for each statement in all the questions**
- **Each correct response is allocated half mark**

1. Concerning chemistry analyzers which are used in a diagnostic laboratory

T F a) Nephelometers measure scattered light
T F b) Fluorometers measure emitted light
T F c) Spectrophotometers measure transmitted light
T F d) Flame photometers measure absorbed light

2. Carbohydrates which give a positive Benedict's test include

T F a) Fructose
T F b) Lactose
T F c) Maltose
T F d) Sucrose

3. Hypoglycaemia is caused by

T F a) Alcoholism
T F b) Insulinoma
T F c) Low intake of sugar
T F d) Diarrhoea

4. Methods for determining protein concentration include

T F a) Spectrophotometry
T F b) Biuret assay
T F c) Immunoprecipitation
T F d) Western blot

5. Beer-Lambert's Law may be expressed as

T F a) Log (1/T)
T F b) A=abc
T F c) $(I_o/I_T) \times 100$
T F d) C = abc

6. The following refers to The Urea Cycle

T F a) It only takes place in the liver
T F b) NH_4^+ reacts with HCO_3^-
T F c) Citrulline reacts with Aspartic acid to form Arginosuccinic acid
T F d) Uric acid is also a product of the cycle

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7. Measurement of albumin may be used to

T F a) evaluate liver function
T F b) assess nutrition status
T F c) determine phosphate balance
T F d) aid in the diagnosis of heart disease

8. Hypoproteinaemia is caused by

T F a) Severe sepsis
T F b) Paraproteinaemia
T F c) Humoral immunodeficiency
T F d) Chronic renal failure

9. The following refer to lipoproteins

T F a) Chylomicrons deliver triglycerides from the intestines to the liver
T F b) VLDL transport triglycerides from body cells to the liver
T F c) LDL is also known as good cholesterol
T F d) HDL is only made in the liver

10. The different classes of enzymes and their examples are as shown below

		Class	**Example**
T	F	a) Hydrolases	Aldolase
T	F	b) Oxidoreductases	Lactate dehydrogenase
T	F	c) Lyases	Lipase
T	F	d) Transferases	AST

11. The following refers to enzymes

T F a) An apoenzyme is made up of a holoenzyme and a cofactor.
T F b) Serum ALP measurements are specific to liver diseases
T F c) NAD absorbs light at 340nm but not NADH.
T F c) All enzymes exhibit absolute specificity

12. The following enzymes are involved in Glycolysis

T F a) Phosphoglucoisomerase
T F b) Enolase
T F c) Fumarase
T F d) Transketolase

13. The following tests aid in the diagnosis of diabetes mellitus

T F a) Urinalysis
T F b) Fasting blood glucose
T F c) Glycated haemoglobin
T F d) Oral glucose tolerance test

14. Denaturation of proteins mainly affects the following bonds

T F a) Peptide bonds
T F b) Hydrogen bonds
T F c) Van der Waal's forces
T F d) Ionic bonds

15. Hypoproteinaemia can be caused by
T F a) Dehydration
T F b) Paraproteinaemia
T F c) Septicaemia
T F d) Liver disease

16. The following are negative acute phase proteins
T F a) Haptoglobulin
T F b) Ceruloplasmin
T F c) α1-antitrypsin
T F d) C-reactive protein

17. Cholesterol is used to synthesize
T F a) Vitamin D
T F b) Progesterone
T F c) Bile acids
T F d) Insulin

18. During bilirubin metabolism
T F a) urobilinogen is formed in the kidneys
T F b) conjugated bilirubin is not reabsorbed from the intestines
T F c) biliary obstruction results in an increase in serum bilirubin
T F d) hepatitis causes elevated serum levels of both conjugated and unconjugated bilirubin

19. The lipid profile results associated with cardiovascular disease include
T F a) ↑VLDL
T F b) ↑TG
T F c) ↓HDL
T F d) ↓IDL

20. Concerning bilirubin measurement
T F a) bilirubin reacts with the diazo compound through a redox reaction
T F b) the diazo compound reacts directly with conjugated bilirubin
T F c) the accelerator converts unconjugated bilirubin into conjugated bilirubin
T F d) unconjugated bilirubin can be measured on its own

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SECTION B [20 MARKS]

Answer all questions on separate answer sheets provided

1. State one major use of each of the following lipoproteins in the body
   a) Chylomicrons [1]
   b) HDL-C [1]
   c) VLDL-C [1]
   d) LDL-C [1]
   e) IDL-C [1]
2. List any 5 causes of hyperglycaemia. [5]
3. State any 5 functions of plasma proteins.[5]
4. List any 5 laboratory methods for detecting proteins in body fluids. [5]

SECTION C [75 marks]

Answer any 3 questions from this section on separate answer sheets provided. Each question carries 25 marks.

1. Write a detailed account of the laboratory investigation of hyperlipidaemia. [25]

2. Describe the principles of the Glucose Oxidase and Hexokinase methods for measurement of blood glucose. [25]

3. Describe the excretion of bilirubin. [25]

4. Discuss the clinical significance of measuring the following enzymes in the blood
   a) Creatine kinase [10]
   b) Lactate dehydrogenase [15]

5. Describe the detailed structure and function of a Flame Photometer. [25]