"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

DEPARTMENT OF HEALTH SCIENCES

BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS

NSLS102: CLINICAL CHEMISTRY

END OF FIRST SEMESTER FINAL EXAMINATIONS

LECTURER: DR K. MHANDIRE

DURATION: 3 HOURS

INSTRUCTIONS

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

SECTION A (40 MARKS)

20 multiple choice (True/False) questions with 4 alternatives per question

Each correct response carries half a mark

All questions are compulsory

1. Concerning DNA,

    a) Adenine and guanine are purines

    b) PRPP is the main precursor of purine synthesis

    c) Presence of tumour increases uric acid levels

    d) Gout and psedogout are both caused by hyperuricaemia

2. In a clinical chemistry laboratory

    a) Haemolysed samples are a source of error

    b) Incorrectly labelling a sample is a pre-analytical error

    c) Quality control is not a requirement

    d) Accuracy, but not precision is required for all results

3. The following hormones reduce blood glucose levels (T/F)

    a) Growth hormone

    b) Epinephrine

    c) Parathyroid hormone

    d) Corticosteroids

4. Risk factors for developing diabetes mellitus are;
    a) Pregnancy
    b) Male gender
    c) Obesity
    d) Alcohol consumption

5. Tests elevated in plasma within **48 hours** of a myocardial infarction are
    a) CK-MB
    b) Myoglobin
    c) Haemoglobin
    d) Lactate dehydrogenase

6. The following statements are true about enzymes
    a) The M form of LDH is predominantly found in white skeletal muscle.
    b) The H of LDH form exhibits a strong negative charge and will migrate towards the positive terminal.
    c) Creatine kinase is associated with regeneration and storage of ATP in muscle
    d) Electrophoresis is the reference method for creatine kinase isoenzyme determination.

7. The following statements are true about electrophoresis

    a) DNA carries a net negative charge and will migrate to the positive terminal.

    b) SDS PAGE separates proteins based on molecular weight and charge.

    c) Temperature and viscosity of buffer may affect rate of migration.

    d) Increased concentration of buffer ions hinders migration of substances.

8. In spectrophotometry

    a) Incident light is stronger than transmitted light

    b) Monochromators measure absorbed light

    c) Transmittance is directly proportional to concentration of the analyte

    d) DNA concentrations can be measured

9. The following are secreted into the small intestines

    a) Pepsin

    b) Lipases

    c) Gastrin

    d) Chymotrypsin

10. Elevation of the following enzyme levels in circulation indicate hepatic damage

    a) AST

    b) GGT

    c) ALT

    d) ALP

11. Tests for detection of gastrointestinal disorders are,

    a) Xylose breath test

    b) Creatinine

    c) Faecal fat test

    d) Plasma amylase

12. In bilirubin metabolism

    a) Haemolysis elevates conjugated bilirubin only

    b) Stercobilin is excreted through the kidneys

    c) Urine urobilinogen levels rise in post hepatic obstruction

    d) Conjugated bilirubin is also known as direct bilirubin

13. The following processes increase blood glucose levels

    a) Gluconeogenesis

    b) Glycolysis

    c) Glycogenolysis

    d) Glycogenesis

14. Concerning proteins

    a) Aminotransferases reduce the activation energy during transamination

    b) Deamination leads to formation of ammonia

    c) Ammonia levels can be directly measured in urine

    d) Positive nitrogen balance is required in childhood

15. In cholesterol synthesis

a) HMG CoA is the rate limiting component

b) Acetyl coA and acetoacetyl coA are the precursors of HMG-CoA

c) The Krebs cycle is involved

d) Genetic defects may lead to familial hypercholestrolanaemia

16. The following hormones are elevated in pregnancy

a) Somatostatin

b) Prolactin

c) Oestrogens

d) HCG

17. Liver function tests include

a) Plasma albumin

b) Serum calcium

c) Acid phosphatase

d) 5’ nucleotidase test

18. In enzyme catalysed reactions,

a) Both enzyme and substrate are in excess in a zero order reactions

b) A large Km indicates the need for high substrate concentrations to achieve maximum reaction velocity

c) At Vmax, all enzyme molecules are involved in enzyme-substrate complex formation

d) Change in pH from the optimum does not affect Vmax

19. Concerning nucleic acids,

a) RNA is more stable than DNA at room temperature

b) mRNA is single stranded, but tRNA is not

c) Pyrimidines consist of two rings

d) Translation takes place in the nucleus

20. Human specimens processed in a Chemical Pathology laboratory include

a) Faeces

b) Plasma

c) Cerebrospinal fluid

d) Urine

SECTION B (20 MARKS)

Short answer questions

All questions are compulsory

1. Complete all the empty cells the table with a matching response [20]

Test	**Disorder (disease)**	**Specimen**
Uric acid		
	Pregnancy	
Aspartate aminotransferase		
Total cholesterol		
Creatinine		
	Jaundice	
		Faeces
Albumin		
	Acute pancreatitis	
		Fasting plasma

SECTION C (75 MARKS)

Answer any 3 questions
Each question carries 25 marks
Start each question on a new page.

1. Discuss the diagnostic utility of the following enzymes

   a) Creatine kinase (CK) [10]

   b) Alanine aminotransferase (ALT) [5]

   c) Gamma glutamyl transferase (GGT) [5]

   d) Serum amylase [5]

2. a) Describe the digestion of dietary fats. [15]

   b) State the principle of each of the following tests

      i) Triolein breath test [5]

      ii) Para-aminobenzoic acid test (PABA). [5]

3. Citing relevant examples, discuss the pre-analytical, analytical and post analytical factors that are likely to influence test results in a Chemical Pathology laboratory, and their redress. [25]

4. a) Outline the laboratory diagnosis of diabetes mellitus. [15]

   b) With the aid of a diagram, illustrate the regulation of plasma glucose [10]

5. a) Describe the principle and set up of spectrophotometry [15]

   b) Describe the characteristics and roles of the following lipoproteins in lipid metabolism

      i. Chylomicrons [5]

      ii. Low density lipoproteins (LDL) [5]

END OF PAPER