



**AFRICA**  
**UNIVERSITY**  
*A United Methodist-Related Institution*

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**COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES**

**DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES**

**BACHEOR OF MEDICAL LABORATORY SCIENCES HONOURS**

**NSLS403: CHEMICAL PATHOLOGY**

**END OF SEMESTER FINAL EXAMINATIONS**

**APRIL 2025**

**LECTURERS: PROF C.C EZEALA AND MR G. MALUNGA**

**DURATION: 3 HOURS**

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***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

**SECTION A : MULTIPLE CHOICE [ 40 MARKS ]**

- 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. Which of the following is a characteristic feature of Type 1 Diabetes Mellitus?**

- T F a) Insulin resistance  
T F b) Autoimmune destruction of pancreatic beta cells  
T F c) Onset typically after 40 years of age  
T F d) Ketoacidosis

**2. Which enzyme/s is/are used to assess cholestasis?**

- T F a) GGT  
T F b) AST  
T F c) ALT  
T F d) ALP

**3. Which of the following laboratory findings are consistent with diabetic ketoacidosis (DKA)?**

- T F a) Elevated blood glucose, low bicarbonate, and elevated ketones  
T F b) Low blood glucose, high bicarbonate, and low ketones  
T F c) Normal blood glucose, low bicarbonate, and elevated ketones  
T F d) Elevated blood glucose, high bicarbonate, and elevated ketones

**4. Nephrotic syndrome is associated with the following**

- T F a) Hypoalbuminaemia  
T F b) Oedema  
T F c) Glycosuria  
T F d) Hyperlipidaemia

**5. Dehydration can be caused by**

- T F a) Burns  
T F b) Cardiovascular disease  
T F c) Malaria  
T F d) Diabetes

**6. Which serum protein/s is/are primarily responsible for maintaining oncotic pressure in blood vessels?**

- T F a) Alpha-1 antitrypsin
- T F b) Albumin
- T F c) Transferrin
- T F d) Celuroplasmin

**7. Which of the following is a cause of hypergammaglobulinemia?**

- T F a) Chronic liver disease
- T F b) Nephrotic syndrome
- T F c) Malnutrition
- T F d) Severe burns

**8. Which tumor marker is used to monitor hepatocellular carcinoma and germ cell tumors?**

- T F a) CEA
- T F b) AFP
- T F c) CA19-9
- T F d) hCG

**9. The following are inborn errors of carbohydrate metabolism**

- T F a) Galactosemia
- T F b) Cori's Disease
- T F c) Lesch-Nyhan syndrome
- T F d) Maple Syrup Urine Disease

**10. Symptoms of untreated phenylketonuria include**

- T F a) Eczema
- T F b) Lethargy
- T F c) Hyperactivity
- T F d) Dark pigment

**11. Lactate Dehydrogenase (LDH) is a non-specific marker that can be elevated in**

- T F a) Myocardial infarction
- T F b) Hemolysis

**CANDIDATE NUMBER.....**

T F c) Liver disease

T F d) Renal failure

**12. Jaundice is mainly caused by**

T F a) Decreased conjugation of bilirubin by liver cells

T F b) Biliary obstruction

T F c) Bilharzia

T F d) Gastritis

**13. Biochemical markers of Folate deficiency include**

T F a) LDH

T F b) Vitamin B12

T F c) Folic acid

T F d) Serum iron

**14. Which of the following is a characteristic of an ideal tumor marker?**

T F a) High sensitivity and specificity

T F b) Low cost and ease of measurement

T F c) Elevated only in malignant conditions

T F d) Correlation with tumor burden

**15. The following conditions are classified as intra-renal disorders**

T F a) Tubular obstruction

T F b) Interstitial nephritis

T F c) Urethral obstruction

T F d) Renovascular obstruction

**16. Which of the following hormone/s is/are primarily responsible for increasing serum calcium levels?**

T F a) Calcitonin

T F b) Parathyroid hormone

T F c) Thyroxine

T F d) Calcitriol

**17. The following are secondary causes of hyperlipidaemia**

**CANDIDATE NUMBER.....**

- T F a) Monoclonal gammothy
- T F b) Nephrotic syndrome
- T F c) Osteoporosis
- T F d) Hypothyroidism

**18. Which of the following is a characteristic feature of osteomalacia?**

- T F a) Increased bone density
- T F b) Decreased serum alkaline phosphatase
- T F c) Defective bone mineralization
- T F d) Elevated serum calcium

**19. Inborn errors of metabolism?**

- T F a) are always autosomal dominant disorders
- T F b) result from defects in biochemical pathways
- T F c) are acquired during adulthood
- T F d) They are caused by environmental factors

**20. Which of the following laboratory findings would you likely find in a patient with osteoporosis?**

- T F a) Elevated serum calcium
- T F b) Decreased serum phosphorus
- T F c) Normal alkaline phosphatase
- T F d) Increased urinary calcium excretion

**SECTION B [20 MARKS]**

**Answer all questions on separate answer sheets provided**

1. State any 5 symptoms of Type 2 Diabetes Mellitus.[5]
2. Outline the clinical usefulness of the following enzymes
  - a) ALP [3]
  - b) Serum amylase. [2]
3. A young woman is admitted to a hospital 8 hours after taking an overdose of aspirin. The following laboratory results were obtained.

	<b>Result</b>	<b>Reference range</b>
Na <sup>+</sup>	140 mmol/l	(135 - 145)
K <sup>+</sup>	4.7 mmol/l	(3.5 - 5.5)
Cl <sup>-</sup>	110 mmol/l	(97 - 107)
HCO <sub>3</sub> <sup>-</sup>	11.0 mmol/l	(22 - 26)
pH	7.48	(7.35 - 7.45)
pCO <sub>2</sub>	2.0 kPa	(4.66 - 6.38)

- a) Comment on the patient's biochemical data. [3]
- b) What is the possible cause for this clinical presentation? [1]
- 4. State the laboratory tests that could be done in a bone disease investigation. [5]
- 5. State any 5 biochemical results associated with chronic renal failure. [5]

**SECTION C [60 marks]**

**Answer any 3 questions from this section on separate answer sheets provided**

- 1. A 45-year-old male with diabetes mellitus presents with nausea, vomiting, and abdominal pain. He has a fruity odour in his breath. Blood was collected and the following laboratory findings were obtained:

	<b>Result</b>	<b>Reference Range</b>
pH	7.20	7.35 - 7.45
PCO <sub>2</sub>	25 mmHg	35 - 45
HCO <sub>3</sub> <sup>-</sup>	12 mmol/L	22 - 26
Anion gap	25 mmol/L	14 - 20

Provide a detailed clinical interpretation of the patient's laboratory data. [20]

- 2. Give a detailed account of the regulation of Calcium and Phosphate in the body.[20]
- 3. Discuss the biochemical features of jaundice. [20]
- 4. Discuss the laboratory diagnosis and management of coronary artery diseases. [20]
- 5. Explain the biochemical changes that occur during the progression from acute renal failure to chronic renal failure. [20]