



**PAMIBIA UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

**FACULTY OF HEALTH AND APPLIED SCIENCES**

**DEPARTMENT OF HEALTH SCIENCES**

<b>QUALIFICATION:</b> BACHELOR OF MEDICAL LABORATORY SCIENCES	
<b>QUALIFICATION CODE:</b> 08BMLS	<b>LEVEL:</b> 7
<b>COURSE CODE:</b> CLC711S	<b>COURSE NAME:</b> CLINICAL CHEMISTRY 3
<b>SESSION:</b> JUNE 2019	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	DR MUNYARADZI MUKESI
<b>MODERATOR:</b>	PROF ISHMAEL KASVOSVE

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. NON PROGRAMMABLE CALCULATOR
2. GRAPH PAPER IS PROVIDED

**THIS QUESTION PAPER CONSISTS OF SIX PAGES** (Including this front page)

## SECTION A [30]

### QUESTION 1

[10]

Write short notes on the following:

- 1.1 Faecal fat analysis (5)
- 1.2 Water deprivation test (5)

### QUESTION 2

[10]

Review the following sets of results and answer the questions that follow:

<u>Patient A</u>	<u>Patient B</u>	<u>Ref range</u>
Total Bilirubin: 230umol/L	Total Bilirubin: 45umol/L	24-149
Direct Bilirubin: 1umol/L	Direct Bilirubin: 22umol/L	
Total Protein: 63g/L	Total Protein: 55g/L	65-85
Albumin: 42g/L	Albumin: 30g/L	35-55
ALT: 5U/L	ALT: 800U/L	4-50
AST: 88U/L	AST: 390U/L	5-50
GGT: 40U/L	GGT: 133U/L	5-50
ALP: 80U/L (Ref range:0-249)	ALP: 66U/L (Ref range:60-110U/L)	

- 2.1 Indicate which patient is more likely to suffer from haemolytic disease of the new-born. Motivate your answer. (2)
- 2.2 Which patient is more likely to produce pale stools? Motivate your answer. (2)
- 2.3 Indicate whether the following will be increased, normal, decreased or absent for each of the patients A and B. (2)
- a. Urine urobilinogen
- b. Urine bilirubin
- 2.4 Showing all steps, calculate the corrected calcium for patient B, if the measured calcium is 2.05mmol/L. Report your answer to rounded 2 decimal places. (2)
- 2.5 Assuming that your laboratory performs ionised Ca<sup>++</sup> measurements only, would you correct your calcium measurement? Motivate your answer. (2)

**QUESTION 3****[10]**

Manual total protein assays were performed and the following absorbance readings were obtained:

Patient A:	Absorbance = 0.163
Patient B (1/3 dilution):	Absorbance = 0.125
Control	Absorbance = 0.291
Standard	Absorbance = 0.235    Concentration = 75g/L

- 3.1 Calculate the concentration of total protein for Patient A and B. Round off your final answers to 2 decimal places. (4)
- 3.2 Which patient's result (A or B) is most likely to be observed in a case of: (2)
- a. Multiple myeloma
  - b. Nephrotic syndrome
- 3.3 The package insert of the control states a mean of 72.5g/L and SD=6.25. Showing all calculations, motivate whether or not patient A and B's results can be accepted. (4)

**SECTION B [70]****QUESTION 4****[10]**

A 15 year old boy had numbness and tingling around his mouth and finger tips. The problem was intermittent usually occurring during times of great stress. Aside from his problem, he had been in good health. His physical examination was normal, as were his laboratory results. The total calcium concentration was 2.5 mmol/L, with ionized calcium of 1.2 mmol/L (Reference Range: 2.1 to 2.6 mmol/L and 1.14 to 1.30 mmol/L respectively). After breathing rapidly for about 3 minutes at 30 breaths per minute, he stated that it provoked the episode.

At this time he had increased irritability of his seventh cranial nerve and carpal spasm on oxygen deprivation of his hand both indicating clinical hypocalcaemia.

His plasma calcium concentration during an episode remained at 2.5 mmol/L but his ionized calcium fell to 0.8 mmol/L.

- 4.1 Identify the cause of the presenting problem? (3)
- 4.2 Briefly explain the effect of hyperventilation on ionized calcium concentration? (3)
- 4.3 Predict the expected level of PTH in this patient? Motivate your answer. (4)

**QUESTION 5** **[15]**

A 28 year old man with a long history of intravenous drug abuse and chronic hepatitis B presented with jaundice. Physical examination revealed an anaemic, malnourished man with dependent pitting edema and ascites. He has the following laboratory results:

Analyte	Result	Reference range
Total serum protein	82	65-85 g/L
Albumin	26	35-55 g/L
Globulins	56	
Calcium	1.68	2.1-2.6 mmol/L
Urea	1.6	2.5-8.6 mmol/L
Creatinine	90	60-110 µmol/L
Total bilirubin	60	10-40 µmol/L
AST	200	5-50 U/L
ALT	350	4-50 U/L
ALP	180	60-110 U/L
LDH	300	100-200 U/L
PT	Prolonged which does not correct with vitamin K administration	
FBC	Macrocytic anaemia with hypersegmented neutrophils, mild neutropaenia and mild thrombocytopenia	
Urinalysis	Positive for bilirubin	

5.1 Discuss the clinical significance of the abnormal liver function tests. (15)

**QUESTION 6** [10]

Using the thyroid gland as an example, explain the following methods of hormone assessment:

6.1 Direct static (2)

6.2 Direct dynamic (4)

6.3 Indirect (4)

**QUESTION 7** [10]

Tumour markers are, at the most, just an adjunct to diagnosis, and establishing a diagnosis on the basis of tumour markers alone (especially a single result) is fraught with pitfalls. In reality an ideal tumour marker does not exist. Discuss the characteristics of a good tumour marker and explain why the tenets you have chosen are important. (10)

**QUESTION 8** [15]

Discuss the analytic methods used in measurement of drugs of abuse in patient urine or serum samples and their limitations. (15)

**QUESTION 9** [10]

Presented below are the results of daily quality control for serum amylase measurement. The control range is 60-90U/L (+/- 2SD).

Day	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	1	1	1	2
(U/L)	55	95	65	70	80	95	77	80	85	72	66	78	71	77	56	59	81	95	89

- 9.1 Plot a Levey-Jennings chart of the data above on the graph paper provided. (5)
- 9.2 Identify **TEN** QC rules violated in this graph. (5)

**TOTAL 100 MARKS**  
**END OF EXAMINATION**