NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF CLINICAL HEALTH SCIENCES

QUALIFICATION: BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	**LEVEL:** 6
COURSE CODE: CLC611S	**COURSE NAME:** CLINICAL CHEMISTRY 2A
SESSION: JULY 23	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 105

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**MS CARA MIA DUNAISKI**
MODERATOR:	**DR MUNYARADZI MUKESI**

INSTRUCTIONS
1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. CALCULATOR

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)

SECTION A [20] [20]

QUESTION 1 [10]

Identify each of the following and only write the question number and corresponding answer.

1.1 The mode of chromatographic separation based on competition between the sample and the mobile phase for adsorptive sites on a solid stationary phase. (1)

1.2 A formal recognition that a laboratory is competent to perform specified tests or measurements. (1)

1.3 Identify the type if cuvette used in the visible range of the electromagnetic spectra. (1)

1.4 Test measured using freezing point depression. (1)

1.5 Photodetector which requires no external power source. (1)

1.6 Type of water acceptable for most analytical requirements. (1)

1.7 The electrode which tip is permeable only to CO_2 gas. (1)

1.8 Express 45°F in K. (1)

1.9 The strength of the bond between an antigen and an antibody. (1)

1.10 Light scatter resulting from Antigen-Antibody complexes. (1)

QUESTION 2 [10]

Define the following terms:

2.1 Zone electrophoresis (2)

2.2 Specific gravity (2)

2.3 Secondary standard (2)

2.4 Detection limit (2)

2.5 Proficiency test (2)

SECTION B [35]

QUESTION 3 [20]

Enumerate the following. Please include all working in your answer.

MW: Na – 23, O – 16, Cl – 35.5, H – 1, C - 12

3.1 The analyte concentration in a sample is 1500 mg/dL. The sample was diluted in a series as follows (table 1):

Table 1. Sample dilution protocol

Tube #	Dilution
Tube 1	1:5
Tube 2	1:2
Tube 3	1:4
Tube 4	1:5
Tube 5	1:10

3.1.1 What is the dilution factor in the final tube (tube 5)? (2)

3.1.2 What is the concentration of sample in each tube? (10)

3.2 How do you prepare 775ml of a 0.5% (w/v) solution of NaOH? (2)

3.3 You need to make a 1:5 dilution of a solution. You need 10 ml of the diluted solution. How much initial sample and diluent should you use? (2)

3.4 If I leave 750 mL of 0.50 M NaCl solution uncovered on a windowsill and 150 mL of the solvent evaporates, what will the new concentration of the NaCl solution be? (2)

3.5 If I have 340 mL of a 0.5 M HCl solution, what will the concentration be if I add 560 mL more water to it? (2)

QUESTION 4 [15]

Presented below are the results of daily quality control for serum amylase measurement (figure 1). The control range is 60-90U/L (+/- 2SD).

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Conc. (µmol/L)	55	95	65	70	80	95	77	80	85	72	66	78	71	77	56	59	81	95	59	81

Figure 1. Daily quality control for serum amylase measurement

4.1 Plot a Levey-Jennings chart of the data above (Graph paper is attached at the end of the question paper). (5)

4.2 Identify **TEN** Westgard rules violated in this graph. (10)

SECTION C [50]

QUESTION 5 [10]

Describe how thin layer chromatography may be used in identifying an amino acid suspected to be present in a urine sample.

QUESTION 6 [10]

The image below represents a normal serum electrophoresis pattern. Briefly outline the process of how the image is generated from a patient's whole blood sample.

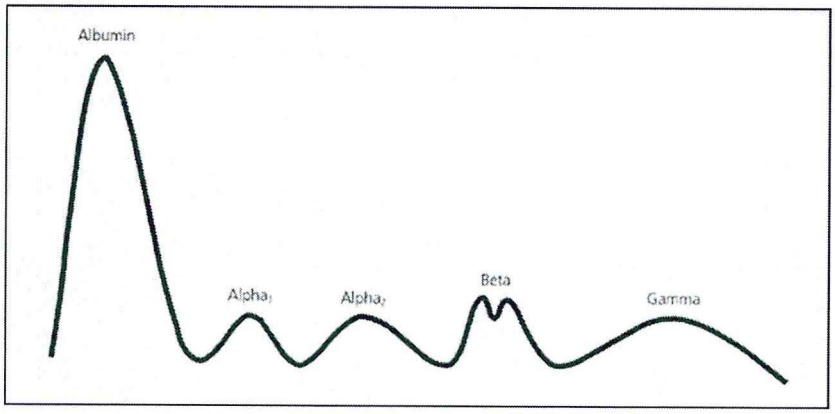

Figure 1. Normal serum electrophoretic pattern

QUESTION 7 [10]

Analyse the table below (table 2) and briefly discuss the main activities in each area which contribute to the overall error rate.

Table 2. Approximate errors in the main areas in the laboratory and related activities in each area.

Area	Pre-analytic	Analytic	Post-analytic
Error rate	45%	15%	38%

QUESTION 8 [10]

The clinical chemistry laboratory is highly automated with sophisticated equipment performing numerous tasks. Briefly describe the advantages of automation in the clinical chemistry section.

QUESTION 9 [10]

The laboratory manager has asked you to introduce a new lot of controls. Discuss the steps involved in incorporating a new lot number or new QC control.

END OF EXAMINATION