



"Investing in Africa's Future"

**COLLEGE OF HEALTH, AGRICULTURE AND NATURAL
SCIENCES
DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES**

MLS1201: CLINICAL CHEMISTRY PRACTICAL

END OF SEMESTER FINAL EXAMINATIONS

APRIL 2026

LECTURER: MR G. MALUNGA

DURATION: 3 HOURS

INSTRUCTIONS

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

Mark allocation for each question is indicated in brackets at the end of the question

Credit will be given for logical, systematic and neat presentations

SECTION A: SPOT EXAM [20 MARKS]

Answer all questions in this Section

- 1.** There are 10 stations which have been set up in the laboratory numbered **A** to **J**.

For each station, name the labelled items shown and state their uses [20 Marks]

SECTION B [80 MARKS]

Answer all questions in this Section

Question 1 [35 Marks]

You are provided with urine **M** from a 70 - year old man complaining of painful and frequent urination. Carry out urine biochemistry for the sample using the following procedure:

Procedure

1. Examine closely the appearance of urine **M** and record its appearance on the results section.
2. Mix urine **M** thoroughly and pour it into a conical centrifuge tube to about two thirds full.
3. Take one reagent strip from the provided container and hold it at the end where there are no test pads.
4. Dip the reagent strip into the urine moistening all test pads.
5. Remove the strip from the urine and immediately draw the strip across the edge of the container to remove excess urine;
6. Blot the edge of the strip on absorbent paper and start the timer.
7. After one minute start reading the results of the test pads by comparing the corresponding colours on the strip to those on the chart on the container of the strips.
8. The reading must be done at appropriate time intervals indicated on the chart.
9. Record your results in the spaces provided on the worksheet.
10. Discard the reagent strip and other contaminated materials into a biohazard bin.

RESULTS

(a) Urine appearance..... [2 Marks]

(b) (i) Urine Biochemistry results

Test	Result
Leucocytes.....	
Nitrite.....	
Urobilinogen.....	
Protein.....	
pH.....	
Blood.....	
Specific gravity.....	
Ketones.....	
Bilirubin.....	
Glucose.....	[20 Marks]

(ii) What possible diagnosis can you make from these results.

Support your answer. [5 Marks]

(iii) What further tests may be performed on this sample to confirm your diagnosis? [3 Marks]

(iv) Explain the principle of the urobilinogen test on the urine dipstick. [5 Marks]

Question 2 [45 Marks]

You are provided with a urine sample **G** from a pregnant woman complaining of swollen painful legs and lower abdominal pains. You are required to measure the amount of Total Protein in the urine using the Biuret method outlined below.

A. Preparation of a calibration graph

1. You are provided with a protein standard labelled **S** and its protein concentration is 60g/l. Take 5 test tubes and number them S1 to S5. Pipette

into each tube the volumes of physiologic saline and protein standard indicated in Table 1, to prepare protein standards S1 to S5.

Table 1: Preparation of protein standards

	S1	S2	S3	S4	S5
Physiologic saline /ml	1.25	1.00	0.75	0.50	0.25
Protein standard S /ml	0.25	0.50	0.75	1.00	1.25

2. Mix thoroughly the contents of each test tube.
3. Take another set of 5 test tubes and number them ST1 to ST5. Pipette 1000µl of the Biuret Reagent into each numbered test tube.
4. Add 20µl of the protein standard solution S1 into the Biuret Reagent in test tube numbered ST1. Do respectively for standards S2 to S5.
5. Mix the contents of each test tube numbered ST1 to ST5 and leave for 10 minutes at room temperature.
6. Zero the spectrophotometer with the Biuret Reagent. Remix each test tube and read the absorbance of each tube in a spectrophotometer at a wavelength of 546 nm. Record the absorbance of each tube.

B. Measuring the total protein concentration in the urine sample G

1. Pipette 1000µl of the Biuret Reagent into a clean test tube.
2. Add 20µl of sample **G** to the tube, mix thoroughly and leave for 10 minutes at room temperature.
3. Zero the instrument with the Biuret Reagent. Remix the contents of the tube and read the absorbance of the precipitated protein in a spectrophotometer at a wavelength of 546 nm. Read off the concentration of the urine protein in g/l from the prepared calibration graph.

Results

- a) Calculate the protein concentration of each of the standard solutions numbered S1 to S5. Present the concentrations in a table. [5 Marks]

- b) Record the absorbance of each of the contents in tubes numbered ST1 to ST5. [20 Marks]
- c) Take a sheet of graph paper and prepare a calibration curve by plotting the absorbance of each of the solutions numbered ST1 to ST5 against the concentration of the corresponding protein standard. Draw a straight line passing through the points. [10 Marks]
- d) Record the absorbance of the urine sample **M** and use your calibration curve to determine the concentration of protein in the urine sample **M**. [5 Marks]
- e) Explain the principle of the Biuret Test. [5 Marks]