



Faculty of Medicine, University of Ruhuna
B.Sc. Medical Laboratory Science
Year End Examination Year 3- 4th Batch, January 2016

Clinical Biochemistry (MLS 3102) –Theory

29th January 2016

9.00 am to 11.00 am

Two hours

Answer ALL FOUR questions.
Answer each question in a separate booklet.

Question 1

1.1 Compare and contrast the internal quality control and external quality assessment programmes in clinical biochemistry.

(30 marks)

1.2 Explain the steps you would take to assure the quality of the pre and post-analytical phases of thyroid hormone analysis.

(40 marks)

1.3 Discuss the factors you would consider in purchasing a general biochemistry analyzer to the laboratory.

(30 marks)

Question 2

2.1 Explain briefly the biochemical changes observed in the following conditions.

2.1.1 Acute renal failure

2.1.2 Rickets

(40 marks)

2.2 Explain the pathological basis for the observed biochemical changes in the following patients.

2.2.1 Detectable serum thyroglobulin in a patient who had undergone thyroidectomy

2.2.2 Moderate elevation of serum alanine transaminase in a 25 year-old male

2.2.3 Marked elevation of serum TSH in a newborn baby

(30 marks)



2.3 Describe briefly the clinical significance of measuring

2.3.1 albumin/creatinine ratio

2.3.2 serum PSA

2.3.3 HbA1c

(30 marks)

Question 3

3.1 Describe briefly the principle of measuring the following analytes in serum.

3.1.1 Alanine aminotransferase (ALT).

3.1.2 Total calcium

(20 marks)

3.2

3.2.1 Draw a labeled diagram of an electrophoretic system.

3.2.2 What is the principle behind the above technique?

3.2.3 Briefly describe the methods for visualizing separated molecules in electrophoresis.

(30 marks)

3.3

3.3.1 Define osmolality.

3.3.2 Name three "colligative properties" of solutions.

3.3.3 State the principle of osmometry based on one of the colligative properties mentioned above.

(30 marks)

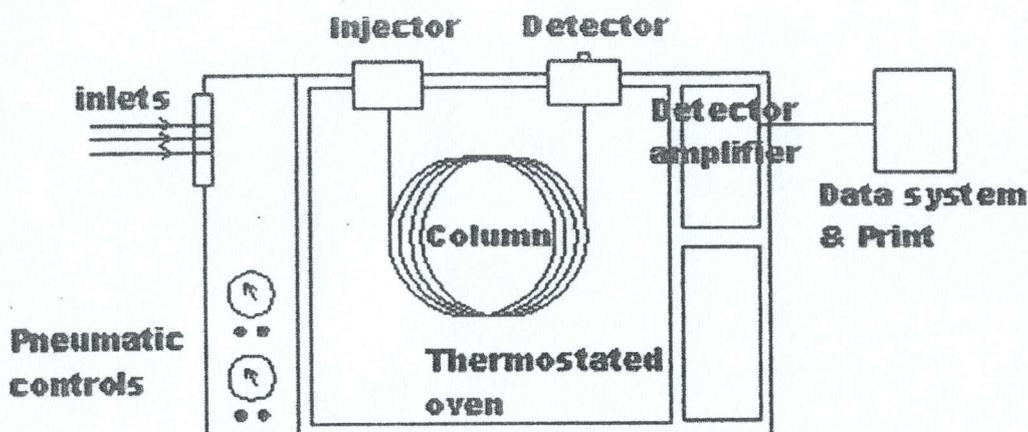
3.4

3.4.1 What is an electrochemical cell?

3.4.2 Draw a labeled schematic diagram of a potentiometric electrode system for measurement of pH.

(20 marks)

Question 4



4.1 The schematic diagram shows one of the instruments used in chromatography.

4.1.1 Name the instrument given in the diagram. (4 marks)

4.1.2 Name three detectors used in this chromatographic technique. (9 marks)

4.1.3 Give two mobile phases used in this chromatographic technique. (8 marks)

4.1.4 Name the three distinct regions in a mass spectrometer. (9 marks)

(Total 30 marks)

4.2 Briefly explain the following terms in chromatography.

4.2.1 Efficiency

4.2.2 Resolution

4.2.3 Temperature programming in column oven

4.2.4 Gradient elution in the mobile phase

(40 marks)

4.3 The Van Deemter equation is given below.

$$H = A + B/\mu + C\mu$$

4.3.1 Give the physical process predominately represented by each term given as A, B/ μ and C μ

4.3.2 If the gas chromatographic separation is carried out with an open tubular column (capillary column), which of the above term of the Van Deemter equation would drop out? Explain your answer.

4.3.3 Draw H vs U curves for both liquid chromatography (LC) and gas chromatography (GC) methods separately and indicate U_{opt} and H_{min} .

(30 marks)

