Faculty of Allied Health Sciences, University of Ruhuna
Department of Medical Laboratory Science
Year-End Examination, Year 3 -7th Batch

Clinical Biochemistry (MLS 3102) – Theory (SEQ)

10th May 2018 Time: 9.00 a.m. to 11.00 a.m. Duration: 2 hours

Answer all four questions

Question 1

1.1 You are appointed to a Pathology Laboratory serving the North Central Province as a Medical Laboratory Technician. The Pathologist requests you to set up the serum creatinine assay on the new automated analyser which is an open system.

Explain how you would address the following technical issues in setting up the assay.

1.1.1 Metrological traceability of creatinine results (15 marks)
1.1.2 Accuracy and precision of creatinine results (30 marks)
1.1.3 Reporting of creatinine results (10 marks)

1.2 Discuss the significance and practical implications of the following during venous blood collection for biochemical tests.

1.2.1 Patient identification and labeling (15 marks)
1.2.2 Tube draw order (15 marks)

1.3 You have been appointed to a Pathology Laboratory in a Teaching Hospital accredited with ISO 15189 standard. The Chemical Pathologist requests you to maintain the equipment file for the newly acquired automated immunoassay analyser.
List the documents/records that should be included in this file. (15 marks)

Question-2

2.1 Briefly describe biochemical changes observed in the following conditions.

2.1.1 Acute pancreatitis
2.1.2 Acromegaly
2.1.3 Grave's disease (30 marks)

2.2 Briefly describe the clinical significance of the following tests.

2.2.1 Serum ALT
2.2.2 Urea breath test
2.2.3 Urine bilirubin (30 marks)

2.3.1. Name serum electrolytes which are commonly requested. (10 marks)

2.3.2. Describe the pre-analytical factors which can result in an erroneous serum electrolyte report. (30 marks)

Question-3

3.1

3.1.1 Briefly describe the principle and the instrumentation of serum protein electrophoresis. (25 marks)

3.1.2 State **two** types of supporting media used for serum protein electrophoresis and briefly describe their function. (20 marks)

3.1.3 List five factors that would affect migration of ions in electrophoresis. (10 marks)

3.1.4 Serum proteins were analyzed using an electrophoretic technique in a patient diagnosed with nephrotic syndrome. Predict the bands that you would observe in his readout of electrophoresis and explain the clinical basis of your prediction. (15 marks)

3.2

3.2.1 Draw and label the schematic diagram of an ion-selective electrode (ISE) (15 marks)

3.2.2 A blood sample was received to the laboratory for analysis of electrolytes from a patient diagnosed with multiple-myeloma. State the method of ISE you would select for this analysis and explain your answer. (15 marks)

Question-4

4.1

4.1.1 Define the term resolution in chromatography. (5 marks)

4.1.2 Briefly describe **two** approaches you would follow to optimize resolution in chromatography. (20 marks)

4.1.3 State the Van Deemter equation and describe how mobile phase flow rate would affect resolution. (30 marks)

4.1.4. Describe how separation is achieved in following applications of chromatography.

a. Analysis of haemoglobin variants using cation exchange column

b. Separation of a mixture of proteins using size exclusion chromatography

c. Separation of plant pigments using a silica gel column. (30 marks)

4.2 State the three main parts of a mass spectrometer and briefly describe the function of each part. (15 marks)