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Faculty of Medicine, University of Ruhuna
B.Sc. Medical Laboratory Science Degree Programme
Year End Examination Year 3- 5th Batch, January 2016

Clinical Biochemistry (MLS 3102) –Theory

1st September 2016 Time: 9.00 a.m. -11.00 a.m. **Two hours**

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

Question 1

1.1 Define calibrators (standards) used in laboratory analysis and state their essential properties. ***(15 marks)***

1.2 Write specimen rejection criteria for the following test requests. (16)

1.2.1 Faecal occult blood test

1.2.2 Serum bilirubin

1.2.3 Creatinine clearance

1.2.4 Plasma ACTH

(20 marks)

1.3 Discuss the factors you would consider in selecting an internal quality control (IQC) material for the clinical biochemistry section of a pathology laboratory. ***(30 marks)***

1.4 Briefly discuss the importance of participating in an External Quality Assessment programme (EQA) for a diagnostic clinical laboratory. ***(10 marks)***

1.5 Discuss the advantages and disadvantages of point of care testing (POCT) over automated laboratory analysis. ***(25 marks)***

Question 2

2.1 Briefly describe the biochemical changes observed in the following conditions.

2.1.1 Acute liver failure

2.1.2 Hypogonadism

(20 marks)

2.2 A neonate is admitted to the paediatric ward with fits. He is suspected to have an inherited metabolic disorder.

2.2.1 List **five** first-line biochemical investigations that should be done for this patient.

2.2.2 Describe the sample collection and transport requirements for the tests mentioned in 2.2.1.

(20 marks)

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

2.3.1 Elevated serum phosphate in a patient with chronic kidney disease.

2.3.2 Elevated plasma ACTH in a patient with Addison disease.

2.3.3 Proteinuria in a patient with longstanding diabetes mellitus.

(30 marks)

2.4 Briefly describe the clinical significance of the following tests.

2.4.1 Overnight dexamethasone suppression test.

2.4.2 Glucose tolerance test.

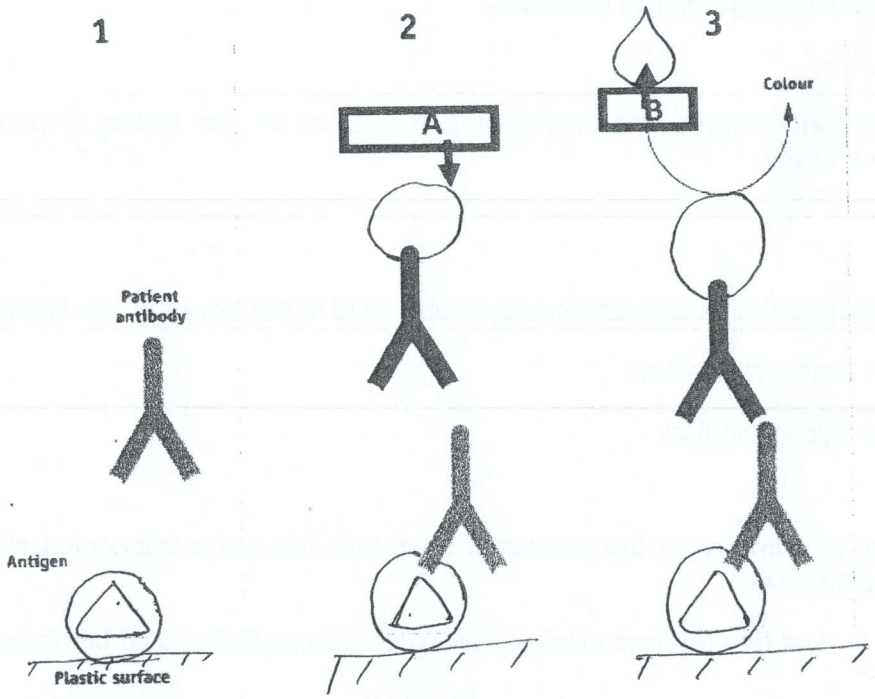
2.4.3 Insulin hypoglycemia test.

(30 marks)

Question 3

3.1 Describe the process of producing monoclonal antibodies. ***(30 marks)***

3.2 Following is a diagram showing the processing steps of an ELISA technique.



3.2.1 Identify the immunoassay technique shown above.

3.2.2 Identify A & B given in the diagram & mention one example for each.

3.2.3 How do you minimize inter-assay drift in the above test procedure?

(25 marks)

3.3 Compare and contrast homogenous and Heterogenous immunoassays. *(20 marks)*

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3.4 Thyroid profile of a 55 year-old female attending the endocrinology clinic at Teaching Hospital Karapitiya is given bellow.

TSH > 100.0 µIU/mL (0.5-4.7 µIU/mL),

fT4- 0.2 ng/dL (0.7-1.8 ng/dL),

3.4.1 Identify the clinical condition.

3.4.2 What are the possible causes for the above mentioned condition?

3.4.3 How do you monitor the above patient after starting treatment?

(25 marks)

Question 4

4.1.1 Draw a schematic diagram of a High Performance Liquid Chromatography (HPLC) apparatus and label the main parts.

4.1.2 List **three** advantages of HPLC over traditional liquid chromatography.

4.1.3 Compare gradient elution and isocratic elution in liquid chromatography.

(35 marks)

4.2 Briefly discuss the following terms in chromatography.

4.2.1 Temperature programming in gas chromatography (GC).

4.2.2 Explain why GC columns are longer than HPLC columns?

4.2.3 When would you prefer an internal standard rather than an external standard in chromatography?

(15 marks)

4.3.1 State the Van Deemter equation and identify the terms.

4.3.2 Draw H Vs U curves and explain how each term contributes for band broadening.

4.3.3 Comment about the separation efficiency of capillary columns over packed columns in gas chromatography. *(50 marks)*