

UNIVERSITY OF JAFFNA
BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES
FIRST YEAR SECOND SEMESTER EXAMINATION - OCTOBER 2020

MLSCB 1275 CLINICAL BIOCHEMISTRY I

Date: 06.10.2020

Duration: 2 Hours

Paper II

Answer All Eight Questions.

Answer Each Question on Separate Answer Book

1. 1.1 Cerebrospinal fluid (CSF) analysis is a group of tests that helps to diagnose diseases and conditions affecting the brain and spinal cord.
 - 1.1.1 Mention the order in which the CSF to be collected for the microbiological, chemical and immunological and cell counting and the respective storage conditions. (15 Marks)
 - 1.1.2 List four causes of xanthochromia in a CSF sample. (20 Marks)
 - 1.1.3 Mention the laboratory findings in CSF of a patient with viral meningitis. (20 Marks)

- 1.2 Faecal Occult Blood Test (FOBT) is a laboratory test, to check the stool samples for hidden (occult) blood.
 - 1.2.1 Briefly explain the patient preparation for FOBT. (20 Marks)
 - 1.2.2 Briefly explain the principle of FOBT. (15 Marks)
 - 1.2.3 Mention two clinical conditions that would give positive results for FOBT. (10 Marks)

2. 2.1 A 20-year-old woman complains of mild fever along with urgency and dysuria for 2 days. On physical examination, a mild tenderness to deep palpation in the supra pubic area was noted. Urine Full Report was requested and the findings are as follows:

Colour	: Yellow	Pus cells	:Moderately field full/ hpf
Clarity	: Slightly turbid	RBC	:10 – 15/ hpf
Specific gravity	: 1.025	Epithelial cells	:Few
pH	: 6.0	Casts	:Granular cast: +
Albumin	: +	Organisms	: +
Glucose	: Negative		
Bilirubin	: Negative		
Ketone bodies	: Negative		
Urobilinogen	: Normal		

- 2.1.1 Identify the abnormal findings on the above report. **(15 Marks)**
- 2.1.2 Mention the probable diagnosis. **(05 Marks)**
- 2.2 2.2.1 Briefly explain the factors with their relevant standards that should be standardized in microscopic examination of urine. **(35 Marks)**
- 2.2.2 Mention the importance of standardization of microscopic examination of urine. **(10 Marks)**
- 2.3 A 34-year-old male and his 32-year-old wife were evaluated after 5 years of primary infertility. Seminal Fluid Analysis was requested by the Consultant Gynaecologist.
- 2.3.1 Briefly explain the advice to be given to the patient, to prepare him for the collection of seminal fluid. **(20 Marks)**
- 2.3.2 “Only Complete Collection of Seminal Fluid is Accepted”. Comment. **(15 Marks)**

3. 3.1 Serum Calcium, Potassium, Sodium and Random Blood Sugar tests were requested for a 25 year old boy. The phlebotomist followed the sequential order mentioned below to collect blood:

1. Random Plasma Glucose
2. Serum Calcium, Sodium, Potassium

The laboratory results were as follows:

	Report	Reference Range
Random Blood Sugar (mg/dL)	99	< 200
Serum Ca ²⁺ (mg/dL)	9.6	9.0 - 10.5
Serum Na ⁺ (mmol/L)	165	135 - 147
Serum K ⁺ (mmol/L)	9.9	3.5 - 5.0

- 3.1.1 Comment on the above laboratory results. (10 Marks)
 - 3.1.2 Briefly explain the possible cause for the above results. (20 Marks)
 - 3.1.3 Give the possible remedial measures to be taken to rectify the fault of the above results? (10 Marks)
 - 3.1.4 Briefly discuss the advice that has to be given to the phlebotomist on collecting the blood sample and blood collection tubes for total calcium measurement. (20 Marks)
 - 3.1.5 List two analytical methods that can be used to measure total calcium (10 Marks)
- 3.2 Diagrammatically explain the electrophoretic patterns of plasma proteins observed in the following disease conditions.
- 3.2.1 Nephrotic syndrome (10 Marks)
 - 3.2.2 Multiple myeloma (10 Marks)
 - 3.2.3 Hepatic Cirrhosis (10 Marks)

4. Male patient aged 60 years with the history of smoking for 20 years presented with difficulty in breathing. Upon further evaluations, he was diagnosed with Emphysema. His laboratory findings are given below:

Parameter	Normal	Range
Na ⁺ (mEq/L)	141	135-145
Cl ⁻ (mEq/L)	100	95-105
HCO ₃ ⁻ (mEq/L)	29	22-26
Glucose (mg/dl)	100	60-100
pH	7.30	7.35-7.45
Paco ₂ (mmHg)	50	40

Answer the following questions based on the above laboratory findings.

- 4.1 What is the primary acid-base derangement in this patient? (10 Marks)
- 4.2 For the primary acid-base derangement you mentioned in question 4.1, calculate the compensatory change in the bicarbonate level and comment. (30 Marks)
- 4.3 Briefly explain how the primary acid-base derangement developed in this patient with Emphysema. (30 Marks)
- 4.4 Briefly explain how kidney involves in the compensatory mechanism? (30 Marks)

5. A 45 year old female patient presented with yellowish discoloration of the skin and conjunctiva with generalized itching and weight loss. Upon further investigations, she is found to have a rare malignant tumour in the biliary tract. Her total and direct bilirubin levels were 3mg/dl (Normal: 0.1-1mg/dl) and 1mg/dl (0.0-0.3 mg/dl) respectively.

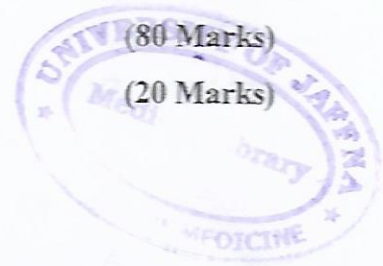
- 5.1 Based on the findings derive the condition. (10 Marks)
- 5.2 Explain the rationale behind the generalized itching and the laboratory abnormalities observed in this patient. (40 Marks)
- 5.3 What difference will be observed in the serum levels of liver enzymes and urine bilirubin metabolites? (20 Marks)
- 5.4 Briefly explain the principle and steps involved in the quantitative estimation of serum conjugated bilirubin and total bilirubin levels. (30 Marks)

6. 6.1 Explain how Agarose Gel Electrophoresis is performed to separate DNA fragments.

(80 Marks)

6.2 Explain the use of stains in gel electrophoresis.

(20 Marks)



7. Write short notes on

7.1 High Performance Liquid Chromatography (HPLC).

(50 Marks)

7.2 Thin Layer chromatography.

(50 Marks)

8. 8.1 A crude protein sample contains "Proteins A, B and C". The isoelectric pH values of the "Proteins A, B and C" are 6.0, 8.0 and 9.0 respectively and their molecular weights are 69, 200 and 30 Daltons.

8.1.1 Which chromatographic technique/s would be most appropriate to separate the above three proteins. Give reasons.

(25 Marks)

8.1.2 Give the probable steps to separate the three proteins mentioned in Question 8.1.1 from the crude protein sample by the appropriate chromatographic technique/s?

(75 Marks)