



PAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

**FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES**  
**SCHOOL OF HEALTH SCIENCES**  
**DEPARTMENT OF CLINICAL HEALTH SCIENCES**

<b>QUALIFICATION :</b> BACHELOR OF MEDICAL LABORATORY SCIENCES	
<b>QUALIFICATION CODE:</b> 08BMLS	<b>LEVEL:</b> 5
<b>COURSE CODE:</b> IML511S	<b>COURSE NAME:</b> INTRODUCTION TO MEDICAL LABORATORY SCIENCE
<b>SESSION:</b> JUNE 2023	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
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<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Scientific calculator

**THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)**

**SECTION A (40 MARKS)****QUESTION 1****[10]**

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Write the appropriate letter next to the number of the statement/phrase on your answer sheet.

- 1.1 A Pathologist holds the following qualification: (1)
- (A) PhD in science
  - (B) Bachelor of Biomedical Science
  - (C) Medical degree (MBChB) plus four years of specialization
  - (D) Bachelor of Medical Laboratory Science plus specialization
- 1.2 If a Medical Laboratory Scientist (MLS) works in a small district lab, his/her work will include: (1)
- (A) Medical microbiology
  - (B) Immuno-chemistry
  - (C) Histology and cytology
  - (D) Molecular diagnostics
- 1.3 A transfusion reaction in blood transfusion can cause the death of the recipient, and happens when: (1)
- (A) A recipient receives HIV positive blood
  - (B) A recipient receives blood which has clotted
  - (C) The blood groups of the donor and the recipient are incompatible
  - (D) The donor and the recipient do not have the same blood groups in universal donors
- 1.4 When the coagulation (clotting) of fresh whole blood is prevented through the use of an anticoagulant the straw-coloured fluid that can be separated from the formed elements (cells), is the following: (1)
- (A) Serum
  - (B) Plasma
  - (C) Whole blood
  - (D) Platelets
- 1.5 If you cannot get the object in focus on oil when using the microscope, the following should be done: (1)
- (A) Make sure the slide is not upside down
  - (B) Make sure the fine adjustment knob is not turned all the way in one direction
  - (C) Make sure there is enough oil
  - (D) All of the above

- 1.6 The quality of reagent type water may be tested by the following methods, EXCEPT: (1)
- (A) Tested for resistance – poor conduction of electricity
  - (B) pH tested – should be pH = 7
  - (C) Colony counts – culture on selective and non-selective media
  - (D) Observed with the eye for impurities
- 1.7 Tasks related to the analysis of specimens by a MLS include the following, except: (1)
- (A) Carry out maintenance on instruments / trouble shooting
  - (B) Calibrate laboratory equipment prior to testing
  - (C) Prepare reagents which might be needed to perform the test
  - (D) Dispose of hazardous material in the most convenient way
  - (E) Perform analytical procedures according to standard operating procedures
- 1.8 Our values as Medical Laboratory Scientists develop from the following except: (1)
- (A) Association with other people
  - (B) Life experiences
  - (C) The environment
  - (D) Rules and regulations imposed by others
  - (E) Within the self
- 1.9 A medical laboratory scientist finds a WBC count of 6000 cells per ul in a patient's blood. Converted to the SI unit, the WBC count is the following: (1)
- (A)  $6 \times 10^6/L$
  - (B)  $6 \times 10^3/L$
  - (C)  $6 \times 10^9/L$
  - (D)  $6 \times 10^{-9}/L$
- 1.10 Most of the errors in the lab occur in the following area of operation: (1)
- (A) Pre-analytical
  - (B) Analytical
  - (C) Post-analytical
  - (D) (a) and (c)

**QUESTION 2****[10]**

Assess the following statements and decide whether they are true or false. Write only the number of the question and TRUE or FALSE on your answer sheet.

- 2.1 In molecular diagnostics DNA or RNA can be extracted from a patient sample like plasma or urine. (1)
- 2.2 The Allied Health Professions Council is concerned with the service benefits and salaries of practising medical technologists. (1)
- 2.3 Blood donors are recruited e.g. in schools and in newspaper advertisements, and get paid for their blood. (1)

- 2.4 Records created by the MLS in a laboratory belong to the patient since he/she paid for the test. (1)
- 2.5 Mouth pipetting may be performed when using a graduated glass pipette to measure out serum. (1)
- 2.6 Cerebrospinal fluid (CSF) needs to be tested STAT (urgently) because the elements disintegrate easily and the conditions for which they are drawn, tend to be life threatening. (1)
- 2.7 In spectrophotometry, absorbance of light is directly proportional to the concentration of the substance. (1)
- 2.8 The reference range for a specific analyte, eg cholesterol, is the range of concentrations found in a healthy person. (1)
- 2.9 If you have a total quality management system in place, there should not be a concern for continuous improvement. (1)
- 2.10 The quality control samples are treated differently from patient samples, and special care should be taken when running quality control samples. (1)

**QUESTION 3**

**[20]**

Define / briefly describe the following terms

- 3.1 Congenital infections (2)
- 3.2 Rhesus blood group system (2)
- 3.3 Bio-hazard (2)
- 3.4 On board time of reagents (2)
- 3.5 Package inserts of reagents (2)
- 3.6 The chemical reaction of anticoagulants in Vacutainers (2)
- 3.7 The principle on which a thermometer functions (2)
- 3.8 Centrifugation (2)
- 3.9 Distillation (2)
- 3.10 Random errors (2)

**SECTION B (60 MARKS)**

**QUESTION 4**

**[6]**

Define "haematology" and explain briefly what your work will entail if you work as a medical laboratory scientist (MLS) in a haematology lab. Name the four tests which are most commonly done here. (6)

**QUESTION 5** **[6]**

5.1 Name any one of the rights of a MLS who is working in a clinical laboratory. (1)

5.2 List two factors which influence us when we develop values. (2)

5.3 Complete the following quotation from American Society for Clinical Pathology:

“I am aware that since the ...(a)..... relies on my work in the diagnosis and treatment of .....(b)..... even a trivial error may affect seriously the ...(c)..... or even the life of a patient. Every procedure, therefore, must be carried out with thoughtfulness and accuracy.” (3)

**QUESTION 6** **[13]**

6.1 Explain rules regarding food and drink in the lab. (3)

6.2 Give two (2) examples of hazardous waste. (2)

6.3 Describe two (2) modes of transmission of blood-borne infections in the lab. (4)

6.4 List what you should NOT do in case of a burn wound. (3)

6.5 What should staff in peripheral (far from head office) labs do if they have to dispose of chemicals which have expired? (1)

**QUESTION 7** **[8]**

7.1 Link each number in column A with the appropriate answer in column B. (5)

VACUTAINER STOPPER COLOUR (COLUMN A)	TESTS PERFORMED (COLUMN B)
1. Yellow	A. Serology, blood transfusion
2. Red	B. Glucose
3. Light blue	C. Most clinical chemistry and immunochemistry tests where serum is required
4. Grey	D. Coagulation
5. Purple	E. Haematology, flow cytometry

7.2 List three precautions that need to be taken when a urine sample is collected for testing. (3)

**QUESTION 8**

**[9]**

8.1 You have bought four glucose standards with given concentrations. You ran the glucose test on each standard and recorded the absorbance of each standard read on a spectrophotometer. You plotted a standard curve of concentration and absorbance. State three rules which apply to the graph which is drawn. (3)

8.2 Copy the following table in your answer sheet and complete it. (6)

	Origin	Concentration of analyte known / unknown	Use in the clinical laboratory
Standard			
Control			

**QUESTION 9**

**[6]**

9.1 A test on a patient serum ran outside the linear range of an instrument. The serum was diluted 1 to 4 and re-run. The reanalyzed result is 40 mmol/L. What is the final patient result that must be reported to the doctor? (2)

9.2 A ten-fold serial dilution is performed with a final dilution of 1/1000. The beginning dilution in tube 1 is 1/10.  
 What is the dilution in each tube?  
 If the original concentration had been 75,000 umol/L, what would the concentration be in tube 3? (4)

**QUESTION 10**

**[12]**

10.1 Evaluate the importance of internal quality control in the clinical laboratory. List four reasons why we do IQC on a daily basis. (4)

10.2 Differentiate between accuracy and precision of a testing method. (4)

10.3 Give alternate terms for "reference range". Explain how reference ranges are used in the clinical laboratory. Describe how a reference range is obtained. (4)

**END OF QUESTION PAPER. GOOD LUCK!**