

The West Bengal University of Health Sciences
B.Sc. in Medical Laboratory Technology 3rd Year August-September, 2026 Examination
Subject: Clinical Biochemistry

Time: 3 hrs.

Attempt all questions

Full Marks: 100

20 x 1

1. Select the most appropriate option :

- a) What is the primary purpose of the blocking step in ELISA?
 i) To bind to the primary antibody ii) To remove unbound antigen
 iii) To prevent non-specific binding iv) To initiate the color reaction
- b) In thin layer chromatography (TLC), what is commonly used as the stationary phase?
 i) Filter paper ii) Silica gel or alumina iii) Cellulose iv) Activated charcoal
- c) Which of the following is the correct order of steps in a Western blot?
 i) Transfer → Electrophoresis → Blocking → Detection
 ii) Blocking → Electrophoresis → Detection → Transfer
 iii) Electrophoresis → Transfer → Blocking → Detection
 iv) Electrophoresis → Blocking → Transfer → Detection
- d) In an indirect ELISA, which of the following is enzyme-linked?
 i) Antigen ii) Primary antibody iii) Secondary antibody iv) Blocking agent
- e) What is the purpose of the blocking step in Western blotting?
 i) To denature proteins ii) To enhance probe binding
 iii) To prevent non-specific binding of antibodies iv) To separate proteins by size
- f) What is the role of luminol in chemiluminescence detection?
 i) It binds to the protein ii) It emits light when oxidized
 iii) It serves as a blocking agent iv) It breaks down antibodies
- g) Monoclonal antibodies are useful because:
 i) Work quickly ii) Obtained from single animal iii) Long lasting iv) Pure preparation
- h) In ELISA, the antigen-antibody reaction is detected by using
 i) Fluorescent dye ii) Radioactive material iii) An enzyme-substrate reaction iv) Magnetic resonance
- i) Which component in electrophoresis helps in maintaining pH and conductivity?
 i) Buffer solution ii) Distilled water iii) Agarose iv) Ethidium bromide
- j) What is the primary goal of Quality Assurance (QA) in a laboratory?
 i) To ensure low-cost testing. ii) To prevent errors and improve test reliability.
 iii) To increase the number of tests conducted. iv) To eliminate the need for quality control.
- k) What is the role of SDS in SDS-PAGE?
 i) To provide a positive charge to proteins ii) To denature proteins and provide a uniform negative charge
 iii) To enhance protein fluorescence iv) To stain proteins
- l) The buffer used in agarose gel electrophoresis (like TAE or TBE) is important because it:
 i) Stains DNA ii) Provides an acidic environment
 iii) Conducts electric current and maintains pH iv) Melts the agarose
- m) What is the common step in both DNA and RNA isolation?
 i) Electrophoresis ii) Precipitation with alcohol iii) Cell lysis iv) RNase treatment
- n) What is the main goal of quality assurance in a clinical laboratory?
 i) To reduce electricity consumption ii) To increase test prices
 iii) To ensure accuracy, reliability, and timeliness of test results iv) To speed up equipment installation

P.T.O.

- o) Which of the following is NOT a part of pre-analytical quality assurance?
 i) Patient identification ii) Sample labeling iii) Reagent storage iv) Report interpretation

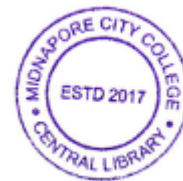
- p) What is the main purpose of using control samples in laboratory testing?
 i) To increase testing time ii) To consume excess reagents
 iii) To monitor test performance and accuracy iv) To identify patient history

- q) A test repeated multiple times gives very similar results, but they are all far from the true value. This reflects:
 i) High accuracy, low precision ii) High precision, low accuracy
 iii) High specificity iv) High sensitivity

- r) Which of the following documents is central to a laboratory's quality assurance program?
 i) Job appointment letter ii) Test pricing sheet
 iii) Standard Operating Procedures (SOPs) iv) Maintenance log

- s) LDH (Lactate Dehydrogenase) levels are elevated in:
 i) Liver cirrhosis only ii) Many tissue injuries including heart, liver, and muscle damage
 iii) Only bone disease iv) Lung-specific disorders

- t) Carbonic anhydrase is most abundant in which of the following organs?
 i) Brain ii) Pancreas iii) Kidneys and red blood cells iv) Bones



2. Answer the following :

5 x 2

- Mention the clinical application of blotting techniques.
- What is the role of the primer in PCR reaction?
- Mention the clinical significance of cardiac marker?
- What do you mean by IMAC?
- What are the difference between normal phase and reverse phase chromatography?

3. Answer **any six** of the following :

6 x 5

- Explain the principle and clinical applications of ion selective electrodes.
- Write a short note: on chemiluminescence and its types.
- Explain the southern blotting technique with its clinical explanation.
- Write short notes on: ion exchange chromatography.
- What is turnaround time (TAT)? How it is monitored?
- Describe the 5 Qs of Quality managements?
- Non- selective electrodes.

4. Answer **any one** of the following :

1 x 10

- Explain the concepts of accuracy, precision, and reliability in quality control with examples. Explain how Westgard rules influence directly in quality control to maintain laboratory test results.
- Define ELISA. Explain its principle of types of ELISA with their clinical applications.

5. Answer **any two** of the following :

2 x 15

a)

Person	A	B	C	D	E
Height	160	165	170	175	180
Weight	55	58	62	65	70

Calculate the standard deviation of height and weight. Calculate the Pearson correlation coefficient between height and weight. Interpret the result in terms of the relationship between height and weight. Explain why CV is more preferable than SD?

b) Explain the principle procedure and clinical importance of DNA and RNA isolation.

- a) Define biomarkers. Describe the clinical significance and diagnostic use of the following biomarkers: Prostate Specific Antigen (PSA), Cardiac Troponins and Creatine Kinase (CK-MB).