

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

Full Marks: 100

Time: 3 hrs.

Attempt all questions



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

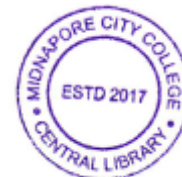
- p) What is the main purpose of using control samples in laboratory testing?
 i) To increase testing time ii) To consume excess reagents
 iii) To monitor test performance and accuracy iv) To identify patient history

- 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 :

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

3. Answer any six of the following :

6 x 5

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

4. Answer any one of the following :

1 x 10

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

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

Subject: Blood Bank and Special Hematology

Time: 3 hrs.

Full Marks: 100

Attempt all questions

20 x 1

I. Select the most appropriate option :

- a) Which one is clinically important concerning blood grouping system?
 i) MNS ii) Lutheran iii) Rhesus iv) Duffy
- b) Incomplete antibodies can cause agglutination of RBC when:
 i) Suspended in albumin ii) Suspended in saline
 iii) Treated with enzyme iv) All are incorrect
- c) Which one is not the genotype of Blood group A?
 i) AO ii) AA iii) AB iv) None of them
- d) Chemically bold group antigens are:
 i) Lipoprotein ii) Glycoprotein iii) Mucoprotein iv) Lipid
- e) Indirect Coomb's test is used to detect:
i) Antibody in serum ii) Antigen in serum iii) Antigen on cell surface iv) Antibody on cell surface
- f) Immune anti bodies are usually:
 i) IgM ii) IgG iii) IgA iv) IgE
- g) Potent Anti D (IgM) serum is showing no agglutination with RBC. Interpretation is:
 i) Rh positive ii) Rh negative iii) Coomb's test to be done iv) Test to be repeated
- h) Which is an inactive gene?
 i) O ii) H iii) h iv) B
- i) For preparation of platelet concentrate blood is stored at:
 i) 4-8°C ii) 22-24°C iii) 30-32°C iv) R.T
- j) Which is not the genotype of Rh(D) positive person?
 i) CDE/cDE ii) Cde/cdE iii) cDe/cde iv) cdE/cDE
- k) To donate blood, for men, Hb level in Gm/dl must be above:
 i) 6 ii) 8 iii) 10 iv) None is correct
- l) About donation of cord blood, which of the following statement is incorrect?
 i) It is taken from mother's side of the cord ii) It is taken from baby's side of the cord
 iii) It is not rich in stem cells iv) All statements are incorrect
- m) Rh hemolytic disease of new born usually occur from:
 i) First pregnancy ii) Second pregnancy iii) Third pregnancy iv) Fourth pregnancy
- n) Von Willebrand factor remaining in complex with:
 i) F V ii) F VII iii) F VIII iv) F X
- o) Coomb's fluid is not:
 i) Anti IgG ii) Anti IgM iii) Primary antibody iv) Secondary antibody
- p) P.T. is an indicator of defect in:
 i) Extrinsic pathway ii) Intrinsic pathway
 iii) Intrinsic and common pathways iv) Extrinsic and common pathways
- q) Number of nucleolus in lymphoblast is:
 i) 1 ii) 3 iii) 5 iv) More than 5
- r) Benzidine used in MPO stain is:
i) Di- amino ii) Di- chloro iii) Di- methyl iv) Di-methoxy
- s) Enlargement of spleen is an outstanding feature in:
 i) CLL ii) ALL iii) CML iv) AML
- t) Calculation of I.N.R. is essential for patients:
 i) Of chronic liver disease ii) Undergoing anticoagulant therapy
 iii) With history of bleeding disorder iv) All of them



2. Answer the following :

5 x 2

- a) Why blood group Antigens other than A,B and D are less important clinically?
- b) Principle of reverse (Serum) grouping.
- c) Classification of ALL
- d) Philadelphia chromosome.
- e) Interpretation of results of PT and APTT in combination.

3. Write short notes on **any six** of the following :

6 x 5

- a) Describe the uses of different blood components.
- b) ABO-HDN.
- c) Indications for whole blood transfusion.
- d) Factor VIII.
- e) Why blood components are preferred over whole blood?
- f) F.F.P.
- g) Indications for doing the tests for bleeding disorder.
- h) AML.



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

1 x 10

- a) What do you mean by cyto- chemical stain? What are the applications of these stains? Enumerate the common cytochemical stains mentioning their uses. 2+2+6
- b) Enumerate the persons who are otherwise fit, but can not donate blood. 10

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

2 x 15

- a) What is Coomb's test? What are the utilities of different types of Coomb's test? Discuss about quality control of Coomb's test. What is Coomb's fluid? 3+2+5+5
- b) Mention the tests done before component separation. What are the changes that occur in blood on storage? What are the tests done before issue of blood? 3+10+2
- c) What is meant by coagulation blood? Discuss about different pathways of coagulation along with a flow chart. How you shall prepare a set for doing bleeding time by Ivy's method? 3+10+2