

**M.Sc. LABORATORY TECHNOLOGY (MSc LT)
SEMESTER -II EXAMINATION, AUGUST-2026**

MSc LT-201- DIAGNOSTIC BIOCHEMISTRY & INSTRUMENTATION

[Time allotted: Three Hours]

[Max Marks: 100]

Note: Read all the instructions carefully

Answer all questions in serial order, Draw suitable diagrams wherever necessary

Q. 1. Objective type questions: (Attempt All)**(10 x 02 = 20)**

(Very short/ Short answer/ MCQ/ One liners/ Fill in the blanks/ True/False)

- a. Which piece of laboratory glassware is specifically designed to measure and deliver exact volumes of liquids, especially during titrations? CO4, PO4
 - i. Beaker
 - ii. Burette
 - iii. Erlenmeyer flask
 - iv. Graduated cylinder
- b. What is the primary function of a hot air oven in a laboratory setting? CO4, PO4
 - i. Rapid cooling of samples
 - ii. Mixing chemical solutions
 - iii. Sterilization of glassware and instruments
 - iv. Evaporating solvents quickly
- c. Which instrument is used to separate substances of different densities by spinning them at high speeds? CO4, PO4
 - i. Water bath
 - ii. Centrifuge
 - iii. Hot plate
 - iv. Incubator
- d. Which of the following vitamins is also known as Retinol? CO8, PO5
 - i. Vitamin B1
 - ii. Vitamin C
 - iii. Vitamin A
 - iv. Vitamin D
- e. Which vitamin acts as a hormone precursor and promotes calcium absorption? CO8, PO4
 - i. Vitamin A
 - ii. Vitamin D
 - iii. Vitamin K
 - iv. Vitamin E
- f. Scurvy is caused by the deficiency of which vitamin? CO8, PO1
 - i. Vitamin B3
 - ii. Vitamin C
 - iii. Vitamin K
 - iv. Vitamin A
- g. Which of the following is a water-soluble vitamin? CO8, PO1
 - i. Vitamin A
 - ii. Vitamin D
 - iii. Vitamin C
 - iv. Vitamin K
- h. What is the primary function of an enzyme in a biochemical reaction? CO5, PO4
 - i. To increase the energy of activation
 - ii. To decrease the energy of activation
 - iii. To alter the pH of the cell
 - iv. To act as a structural component of the cell membrane
- i. Chemically, almost all enzymes are made up of? CO5, PO4
 - i. Lipids
 - ii. Carbohydrates
 - iii. Nucleic acids
 - iv. Proteins (specifically folded into tertiary or quaternary structures)
- j. The specific region of an enzyme molecule where the substrate binds is known as the? CO5, PO4
 - i. Allosteric site
 - ii. Catalytic site
 - iii. Active site
 - iv. Binding pocket

Q. 2. Short notes/ Short answer type questions (Attempt any Five)**(05 x 04 = 20)**

- a. Clinical centrifuge. CO4, PO1
- b. Semi-automated biochemistry analyzer. CO4, PO1
- c. Purine salvage pathway and its significance CO1, PO1
- d. Differentiate between serum and plasma samples based on collection and composition. CO2, PO1
- e. Explain the color-coding system used in segregation for biomedical waste management. CO2, PO1
- f. State the Henderson-Hasselbalch equation and explain its clinical utility in acid-base balance. CO3, PO1
- g. Define surface tension and viscosity. Explain their importance regarding biological fluids. CO3, PO1

Q. 3. Structured questions (Attempt any Three)**(03 x 10 = 30)**

- a. Classify biological waste generated in a laboratory. Detail the treatment and disposal protocols for each category. CO2, PO1
- b. Describe the operating mechanism, optical components, and clinical applications of a UV-Visible Spectrophotometer. CO4, PO1
- c. Elaborate on the biological functions, dietary requirements, deficiency manifestations, and toxicity of Iron. CO6, PO1
- d. Describe the steps of the Urea cycle. Discuss the consequences and names of disorders linked to its enzyme deficiencies. CO7, PO1

Q. 4. Long Answer/ Essay type questions (Attempt any Two)**(02 x 15 = 30)**

- a. Discuss the principles, types (differential, density gradient), and clinical laboratory applications of centrifugation. Include standard operating safety measures. CO2, CO4, PO1
- b. Define acid-base imbalances. Discuss the etiology, metabolic compensation mechanisms, and lab findings for Metabolic Acidosis and Respiratory Alkalosis. CO3, PO1
- c. Provide a detailed account of fat-soluble vitamins. Discuss their absorption mechanisms, physiological functions, and associated clinical deficiency syndromes. CO6, CO8, PO1