

M. SC. (HONOURS)

(BIOCHEMISTRY)

(MSCBCH)

Term-End Examination

June, 2026

MBC-003 : BIOANALYTICAL TECHNIQUES

Time : 3 Hours

Maximum Marks : 100

Note : Answer any *five* questions. All questions carry equal marks.

1. (a) Define the following terms : 2×5=10
- (i) Transmittance
 - (ii) Stokes shift
 - (iii) Half life of a radioactive element
 - (iv) Partition coefficient
 - (v) pH scale

- (b) What is normality ? How would you prepare 500 ml solution of 0.1 N HCl ? (HCl M.W. = 36.5, specific gravity = 1.18, % purity = 36.0). 2+3
- (c) Enlist the safety measures and maintenance of centrifuge. 5
2. (a) Discuss briefly the following : 5+5
- (i) Homogenization
- (ii) Ultrasonication
- (b) Describe the principle, instrumentation and application of UV-vis spectrophotometry. 10
3. (a) What is sub-cellular fractionation ? Explain the steps involved in isolating different cellular organelles with suitable diagram. 2+8
- (b) Elaborate the principle, instrumentation and applications of X-ray crystallography. 10

4. (a) Describe the working principle and uses of the following biochemical techniques :

5+5

- (i) Isoelectric focusing
- (ii) Column chromatography

- (b) Explain the steps of sample preparation in electron microscopy. How do these steps ensure high-resolution imaging of biological samples for ultrastructural analysis ?

10

5. (a) Differentiate between any *two* of the following :

5+5

- (i) Gas chromatography and high performance liquid chromatography
- (ii) Southern blotting and Western blotting
- (iii) Rate zonal centrifugation and Isopycnic centrifugation
- (iv) Phase contrast microscopy and DIC microscopy

- (b) With the help of a labelled diagram, discuss the methodology and applications of high performance thin layer chromatography. 10
6. (a) List the various advantages and disadvantages of biological radioisotopes. 10
- (b) Write the working principle, procedure and applications of thin-layer chromatography. 10
7. (a) Give a detailed account of FRET and STED. 15
- (b) Differentiate between SEM and TEM. 5
8. Write short notes on the following : $4 \times 5 = 20$
- (a) Laboratory safety rules
- (b) Scanning probe microscopes
- (c) Principle of light microscopy
- (d) Fluorescence in situ hybridization (FISH)

x x x x x