

(i) Printed Pages : 3

Roll No.

(ii) Questions : 9

Sub. Code :

0	9	7	8
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Exam. Code :

0	0	3	6
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B.Sc. (Hons.) Biotechnology 4th Semester

(2054)

BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES

Paper : BIOT-402-T

Time Allowed : Three Hours]

[Maximum Marks : 67

Note :— (1) Attempt *five* question in all.

(2) Question Number 1 is compulsory.

(3) Attempt *one* question from each Section.

1. Briefly answer the following :

- (i) Role of the monochromator in a spectrophotometer. 2
- (ii) Spin-spin coupling. 2
- (iii) Role of the condenser in a microscope. 2
- (iv) Cryo-electron microscopy and its advantage. 2
- (v) "Unit cell" in the context of crystal structure. 2
- (vi) Principle of reverse-phase HPLC. 2
- (vii) Isotopic labelling and its application. 2
- (viii) Name any one application of tandem mass spectrometry. 1

SECTION—A

2. (A) Explain the principle of UV-Visible Spectrophotometry and its application in the determination of protein concentration. 7
- (B) Compare and contrast the principles of atomic absorption spectroscopy (AAS) and atomic emission spectroscopy (AES). 6
3. (A) Explain the basic principles of Raman spectroscopy and its advantages in studying biological samples. 7
- (B) Illustrate the use of magnetic resonance imaging (MRI) in biomedical research and diagnostics. 6

SECTION—B

4. (A) Describe the principle of Phase Contrast Microscopy and its advantages over Bright Field Microscopy in live cell imaging. 7
- (B) Explain the working of Fluorescent Microscopy and its applications. 6
5. (A) Discuss the differences between Scanning and Transmission Electron Microscopy in terms of their imaging techniques and applications. 7
- (B) Explain the principle of centrifugation and describe the applications of ultracentrifugation in biomolecular separation. 6

SECTION—C

6. (A) Explain the physical basis of crystal formation and the process of mounting crystals for analysis. 7
- (B) Describe Bragg's Law and its significance in X-ray diffraction studies for determining crystal structures. 6
7. (A) Discuss High-Performance Liquid Chromatography (HPLC) and its importance in the purification of biomolecules. 7
- (B) Write the principle and instrumentation of Gas Chromatography (GC). 6

SECTION—D

8. (A) Explain the use of radiotracers in biological studies and describe the principle of scintillation counting. 7
- (B) Discuss the principle and applications of Mass Spectrometry in protein identification and characterization. 6
9. (A) Describe the principle of Gas Chromatography-Mass Spectrometry (GC-MS) and its application in Biological science. 7
- (B) Explain the role of Geiger-Müller (GM) counter in radiation detection and measurement. 6