

4. (a) Describe the two types of electron microscopes with the help of labeled diagrams. (10)
- (b) Explain how confocal microscopy is superior to fluorescence microscopy. Support your answer with a ray diagram. (5)
5. (a) Explain the principle, instrumentation, and types of high-performance liquid chromatography (HPLC). (8)
- (b) Discuss its role in separation, purification, and identification of biomolecules. (7)
6. (a) Describe the principle and applications of SDS-PAGE and agarose gel electrophoresis. (9)
- (b) What is role of native and 2D gel electrophoresis in proteomics? (6)
7. Write short notes on any **three** of the following : (5×3=15)
- (a) IR spectroscopy
- (b) Gas chromatography
- (c) RT-PCR
- (d) Circular dichroism

(1200)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 10395

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Unique Paper Code : 2233010018

Name of the Paper : DSE 18: Advanced
Biotechniques and
Bioinstrumentation

Name of the Course : B.Sc. (Hons.) Zoology

Semester : VII (NEP-UGCF-2022)

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all.
3. Question No. 1 is compulsory.

1. (a) Define the following terms : (5×1=5)

(i) Limit of resolution

(ii) Retention time

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(iii) Biosensor

(iv) Cycle threshold

(v) Magnification

(b) Write the full forms of the following abbreviations:

(5×1=5)

(i) NMR

(ii) OD

(iii) IEF

(iv) qPCR

(v) AAS

(c) Differentiate between the followings : (3×5=15)

(i) Ocular lens and objective lens

(ii) Stacking gel and resolving gel

(iii) Bright-field and dark field microscope

(iv) PCR and DNA sequencing

(v) UV Spectroscopy and AAS

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(d) Match the following :

(1×5=5)

A	B
(i) NMR	a. DNA Amplification
(ii) PAGE	b. Protein Folding
(iii) PCR	c. Metabolomics
(iv) CD Spectroscopy	d. Protein Separation
(v) Mass Spectrometry	e. Magnetic Field

2. (a) Outline the steps involved in digital-PCR. How does it differ from conventional PCR in terms of application? (6)
- (b) Discuss the role of PCR in detecting genetic mutations and infectious diseases. (5)
- (c) What are biosensors? Describe their components and applications in diagnostics. (4)
3. (a) Explain the principle, procedure, and significance of Sanger sequencing in determining nucleotide sequences. (8)
- (b) Describe the workflow and advantages of Next-Generation Sequencing (NGS) over conventional sequencing methods. Discuss its applications in genomics and personalized medicine. (7)

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