

M.Sc. BOTANY
II SEMESTER EXAMINATION MAY 2024

Paper Name: **Tools and Techniques in Biology**

Paper Code: **MBO-GE201**

Time: **2½ hours**

Maximum Marks: **60**

Note: This paper has 3 sections A, B, and C.

Section A: Answer all the questions. **Section B:** Attempt any 5 out of 6.

Section C: Attempt any 2 out of 3.

Abbreviations used:

CLO-Course Learning Outcomes

CLO 1: explain the concepts and principles of various analytical tools and techniques commonly employed in biology (understand/evaluate);

CLO 2: operate the instruments and manipulate the data obtained for their specific research purposes (apply);

CLO 3: analyze and examine the data obtained (analyze); and

CLO 4: enumerate the various application of the tools and techniques (remember).

BTL-Bloom's Taxonomy Levels

1- Remembering, 2-Understanding, 3-Applying, 4-Analyzing, 5-Evaluating, 6-Creating

SECTION A

Very Short Type Question (15 questions)

15 x 1 = 15 marks

Q.No.	Questions	Marks	CLO	BTL
1	Name the technique used for quantification of the plant hormone ethylene.	1	4	1
2	Define Relative Centrifugal Force (RCF) in centrifugation.	1	1	2
3	Write the role of immersion oil in light microscopy.	1	3	4
4	Define the term 'elution' in chromatography.	1	1	2
5	What is Abbe equation?	1	1	2
6	Name one commonly used metal for surface plasmon resonance sensor surfaces.	1	1	1
7	Write the role of mobile phase in chromatography.	1	2	4
8	What are the factors influencing the sedimentation rate of particles in centrifugation?	1	1	5
9	Define resonance angle in surface plasmon resonance.	1	1	1
10	Explain the roles of column in HPLC system.	1	1	2
11	What is the R _f value in TLC, and how is it calculated?	1	3	1
12	Name the technique used for quantification of potassium in the biological samples.	1	4	1
13	Define sedimentation coefficient.	1	1	2
14	Write the importance of sodium dodecyl sulfate (SDS) gel electrophoresis.	1	4	2
15	If an objective lens magnifies an object 40 X and eyepiece lens magnifies 10 X. Calculate the total magnification of the object being viewed under compound microscope.	1	2	6

Please turn over

SECTION B

Short Type Question. (Attempt any five out of six)

5 x 5 = 25 marks

Q.No.	Question	Marks	CLO	BTL
1	Describe in detail about the procedure of protein resolution in Iso Electric Focusing.	5	1	4
2	Write a short note on gel filtration chromatography.	5	1	1
3	Differentiate between horizontal and vertical gel Electrophoresis.	5	3	4
4	Define fixation and discuss its importance in microscopy? Name important reagents used as a fixative for plant tissues.	5	4	1
5	Describe the working principle of mass spectrometer. Briefly explain the importance of mass-to-charge ratio (m/z) in identification and characterization of molecules.	5	1	2
6	Write the principles and applications of freeze-etching and freeze-fracture in microscopy	5	1	1

SECTION C

Long type Question (Attempt any two out of three)

2 x 10 = 20 marks

Q.No.	Question	Marks	CLO	BTL
1	Differentiate between agarose gel electrophoresis and polyacrylamide gel electrophoresis in terms of their applications, resolution, and gel properties. Or Using a ray diagram, explain the working principle of scanning electron microscope. Write a brief account of applications of electron microscopy in biological sciences.	10	1	3
2	Elaborate the working principle, operational procedure, and applications of ion exchange chromatography. Or Give a detailed account of various steps used in processing the biological samples for the electron microscopy.	10	2	1
3	Define spectrophotometry. Discuss the operational procedure and applications of atomic absorption spectrophotometer. Or Discuss the working principle, instrumentation, and applications of surface plasmon resonance in biological research.	10	2	2

END OF QUESTION PAPER