Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: Bio separation and Biochemical Analysis **Semester: 6**

Program: BT-Biotechnology **Duration: 3 Hours**

Course Code: HSBT3009 **Max. Marks: 100**

Instructions: Attempt all the questions

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q 1	Define Scale-up and Scale-down.	**1.5**	**CO1**
Q 2	What is Mass Spectrometry?	**1.5**	**CO2**
Q 3	Define TLC (Thin-Layer Chromatography)	**1.5**	**CO1**
Q 4	Define microfiltration and provide an example of its application in bioprocessing.	**1.5**	**CO3**
Q 5	What is concentration polarization in membrane-based separation processes?	**1.5**	**CO3**
Q 6	Define agarose gel electrophoresis.	**1.5**	**CO5**
Q 7	What are the key differences between filtration processes conducted at constant pressure and constant rate?	**1.5**	**CO5**
Q 8	What are the advantages of ultracentrifuges compared to conventional centrifugation techniques	**1.5**	**CO2**
Q 9	what factors influence flocculation?	**1.5**	**CO2**
Q 10	Define flux expression in membrane filtration.	**1.5**	**CO1**
Q 11	What is salt precipitation?	**1.5**	**CO1**
Q 12	What is the principle behind solvent extraction in separation processes?	**1.5**	**CO5**
Q 13	What is the purpose of dialysis in separation processes?	**1.5**	**CO4**
Q 14	What is the main purpose of gel filtration chromatography?	**1.5**	**CO5**
Q 15	Define HPLC (High-Performance Liquid Chromatography).	**1.5**	**CO2**
Q 16	Define Batch Filtration.	**1.5**	**CO2**
Q 17	What is Darcy's Law?	**1.5**	**CO3**
Q 18	Define Constant Pressure Filtration.	**1.5**	**CO3**
Q 19	Name methods of cell disintegration.	**1.5**	**CO5**

Q 20	What is the principles governing flux expression and rejection rates in membrane filtration?	**1.5**	**CO1**
Section B (4Qx5M=20 Marks)			
Q 1	What are the common methods for the quantitation of proteins, DNA, and RNA?	**5**	**CO3**
Q 2	Outline the mathematical equations governing batch and continuous filtration processes.	**5**	**CO4**
Q 3	What are the key principles underlying gel filtration chromatography, and how does it exploit differences in molecular size to separate biomolecules in a mixture?	**5**	**CO5**
Q 4	What are the distinguishing features of ultrafiltration and affinity ultrafiltration techniques?	**5**	**CO2**
Section C (2Qx15M=30 Marks)			
Q 1	What are the primary biomolecules found in living organisms, and how do their structures and functions contribute to biological processes?	**15**	**CO2**
Q 2	What are the advantages and limitations of dead-end and cross-flow modes in membrane filtration, and how do these operational modes impact the performance and longevity of membrane systems in large-scale biomanufacturing processes?	**15**	**CO4**
Section D (2Qx10M=20 Marks)			
Q 1	How do membrane-based separation processes such as microfiltration, dialysis, and reverse osmosis exploit molecular size, charge, and concentration gradients to achieve selective permeation, and what are the challenges associated with minimizing concentration polarization and maximizing flux rates?	**10**	**CO5**
Q 2	What are the key factors influencing the resolution and reproducibility of electrophoretic separations, and how can these parameters be optimized for reliable and accurate results in biochemical research and diagnostics?	**10**	**CO2**