

(3 Hours)

[Total Marks: 80]

Note: Q.1 is compulsory.**Attempt any 3 out of remaining 5 questions.**

- Q.1 a) Write a note on coagulation & flocculation. 5
 b) Explain the batch test for sedimentation. 5
 c) List the steps involved in downstream operation of an intracellular enzyme production process. 5
 d) Outline the stages involved in a typical downstream operation. 5
- Q.2 a) Discuss physical methods of cell disruption. 10
 b) A lab scale filtration experiment was carried out with a slurry having solids content of 24.6g/l on filter of area 5cm.sq. at a pressure drop of 500 mm of Hg. The resistance of filter medium was negligible & viscosity of filtrate was 1 cP. The plot of t/V vs. V was plotted and K was determined to be 0.014 s/cm^6 .
 i) Calculate the time required for filtration of 2 m^3 of same slurry on a plate & frame filter press, consisting of 15 frames of area $900 \text{ cm}^2/\text{frame}$.
 ii) Calculate the total filtration cycle time if the cake was washed with 0.25 m^3 of water and cleaning the press at the end of the filtration cycle requires 20 minutes. 10
- Q.3 a) Explain the various types of equilibrium diagrams obtained in leaching. 10
 b) What is Binodal Solubility Curve? Explain the effect of temperature & pressure on it. 10
- Q.4 a) Write a note on continuous filtration. 10
 b) Write a note on supercritical fluid extraction. 10
- Q.5 a) Explain the process of isoelectric precipitation & its significance. 10
 b) A suspension of spherical particles of 0.1 mm diameter was allowed to settle in a column of 50 cm length. The density difference between the solid particles and liquid was 0.05 g/cm^3 and viscosity of the liquid was 1.1 cP.
 i) Calculate the settling time of the particles assuming that the particles reach their terminal velocity almost instantaneously.
 ii) Calculate the settling time in a centrifuge rotating at 400 rpm if the distance between the axis of rotation and bottom of centrifuge was 12 cm and the distance between the axis and liquid surface was 3 cm. 10
- Q.6 a) Explain the significance of minimum liquid-gas ratio for absorbers. 5
 b) What are the factors affecting reversed micellar extraction process? 5
 c) Explain construction of Disc Bowl Centrifuge. 5
 d) Write a note on multistage counter-current extraction with reflux. 5