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Question Paper Code: 97D02

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Seventh Semester

Biotechnology

19UBT702- DOWNSTREAM PROCESSING

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10x 2 = 20 Marks)

1. Define cavitation and state its significance CO1-U
2. List out the pre-treatment techniques required for better downstream processing CO1-U
3. What is relative centrifugal force (RCF)? Find G- factor of the centrifuge with an effective diameter of 30 cm and rotating at a speed of 50 rotation per sec. CO2-App
4. When will you prefer centrifugal filtration process CO1-U
5. What do you mean by Binodal curve? State its significance CO1-U
6. Define partition coefficient (K) in the context of liquid – liquid separation. State the importance of K value CO1-U
7. If the pI of the protein is 6.2 then what kind of ion exchange chromatography will you choose? CO2-App
8. Comment on the significance of resolution in chromatogram CO2-U
9. Define super saturation coefficient CO1-U
10. Give the expression for crystal growth CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) Explain the characteristics and features of fermentation broth in bio separation process. CO1-U (16)

Or

- (b) Describe the cell disruption for product release by chemical methods with suitable examples CO1-U (16)

12. (a) Classify different adsorption isotherms and plot necessary graph with appropriate design equations CO2-App (16)
- Or
- (b) Chlorella cells are being cultivated in an open pond. We plan to harvest this biomass by passing the dilute stream of cells through disc bowl centrifuge. The settling velocity v_g for these cells has been measured as 1.07×10^{-4} cm/sec. the centrifuge has 80 discs with an angle of 40° an outer radius of 15.7 cm and an inner radius of 6 cm. We plan to operate the centrifuge at 6000 r/ min. Estimate the volumetric capacity (Q) for this centrifuge. CO2-App (16)
13. (a) In a company, the R&D division propose aqueous two phase extraction for the separation of target bio-molecule from the given fermentation broth. Give the possible reasons in selecting the technique and also explain the basic principles in detail CO3-An (16)
- Or
- (b) If a researcher wants to precipitate the target protein from the fermentation broth, which salt can be adopted? Justify your selection of salt and explain the basic principles behind in the protein precipitation CO3-An (16)
14. (a) Explain about Pseudo affinity chromatography CO1-U (16)
- Or
- (b) Explain about the Principle and application of Gel Permeation chromatography CO1-U (16)
15. (a) Explain the drying theory which explains the rate of drying as a function of free moisture control and discuss the type of dryers used in final product purification CO1- U (16)
- Or
- (b) Describe the different equipment used for drying with neat diagram CO1-U (16)