

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-5 SEMESTER – OLD PAPER – S22 TO S23 – QUESTION BANK

Subject Name & Code:

Particle and Fluid Particle Processing- 3150505

Chapter 1: Introduction

Repeated Questions:

- **Q. Define/Classify Solid-Fluid Operations.** (Appeared in: Summer 2022 - 4 marks, Winter 2023 - 3 marks)
- **Q. State the purposes of agitation of liquids in chemical industries.** (Appeared in: Winter 2022 - 3 marks, Summer 2023 - 3 marks)
- **Q. Write names of different solid-fluid reactors.** (Appeared in: Summer 2022 - 3 marks)

Other Important Questions:

- (Summer 2022 - 3 marks) What are kneaders?
- (Winter 2023 - 4 marks) Explain various solid-fluid operations with suitable examples in brief.
- (Winter 2023 - 3 marks) Explain the terms mixing and agitation with examples.

Chapter 2: Mixing and Agitation

Repeated Questions:

- **Q. Give classification of various types of impellers used for mixing and agitation of liquid.** (Appeared in: Winter 2022 - 3 marks, Summer 2023 - 3 marks)
- **Q. Explain the scale up of the agitated vessel.** (Appeared in: Winter 2022 - 7 marks, Summer 2022 - 7 marks, Summer 2023 - 7 marks) -> **Very Important**
- **Q. What are the purposes of draft tube in an agitated vessel?** (Appeared in: Winter 2022 - 4 marks, Summer 2023 - 4 marks)
- **Q. Write a short note on intensive mixers.** (Appeared in: Summer 2022 - 4 marks)
- **Q. Explain in brief: Heating and cooling mixers.** (Appeared in: Winter 2023 - 4 marks)
- **Q. Explain in brief: Static Mixers.** (Appeared in: Winter 2023 - 3 marks)
- **Q. Discuss construction and working of helical element static mixture.** (Appeared in: Winter 2022 - 7 marks, Summer 2023 - 7 marks)

Other Important Questions:

- (Summer 2022 - 4 marks) What are the various types of mechanical impellers? Write two applications of each.
- (Winter 2023 - 4 marks) Explain in brief: Calculation of power required for agitation.
- **(Numerical - Winter 2023 - 7 marks)** A disc turbine... What power will be required to operate the mixer? ... *(This is a direct application of Power Number, Reynolds Number for agitation)*

Chapter 3: Fluidization and Transportation

Repeated Questions:

- **Q. Describe types of fluidization in detail.** (Appeared in: Winter 2022 - 7 marks, Summer 2022 - 7 marks, Summer 2023 - 7 marks) -> **Very Important**
- **Q. Explain the condition of fluidization with a neat sketch.** (Appeared in: Winter 2022 - 4 marks, Summer 2023 - 4 marks)
- **Q. List out different applications of fluidization.** (Appeared in: Summer 2023 - 3 marks, Winter 2023 - 4 marks)
- **Q. Define Minimum fluidization velocity.** (Appeared in: Winter 2023 - 4 marks)
- **Q. Describe construction and working of belt conveying system.** (Appeared in: Winter 2022 - 7 marks, Summer 2023 - 7 marks)
- **Q. Explain slurry and pneumatic transport systems in detail.** (Appeared in: Winter 2023 - 7 marks)

Other Important Questions:

- (Winter 2022 - 3 marks) Differentiate between: Particulate fluidization and Bubbling fluidization.
- (Winter 2023 - 3 marks) Differentiate between: Homogeneous nucleation and heterogeneous nucleation. (*Note: This is more relevant to Crystallization, but asked under a fluidization header*).
- (Winter 2023 - 7 marks) Explain the fluid flow in porous solid beds and derive the Kozeny-Carman equation.
- (Summer 2022 - 4 marks) Write a short note on hydraulic transport.
- (Summer 2022 - 7 marks) Explain in detail about slurry transportation.
- (Winter 2023 - 3 marks) Explain the screw conveyor in brief.

Chapter 4: Filtration and Sedimentation

Repeated Questions:

- **Q. Explain Sink and Float method.** (Appeared in: Winter 2022 - 4 marks, Summer 2023 - 4 marks, Winter 2023 - 7 marks) -> **Important**
- **Q. Differentiate between filter aids and filter medium.** (Appeared in: Winter 2022 - 3 marks)
- **Q. What is the function of filter aids? State examples.** (Appeared in: Summer 2022 - 4 marks, Summer 2023 - 4 marks)
- **Q. Write a brief note on batch sedimentation.** (Appeared in: Summer 2023 - 3 marks)
- **Q. Discuss Kynch theory for design of continuous thickener.** (Appeared in: Winter 2022 - 7 marks, Summer 2023 - 7 marks)
- **Q. Describe construction and working of hydro cyclones.** (Appeared in: Winter 2022 - 7 marks)

Other Important Questions:

- (Winter 2022 - 3 marks) Give two purposes of screen analysis.
- (Winter 2023 - 4 marks) Explain the terms: (i) screen capacity (ii) screen effectiveness.
- (Winter 2023 - 3 marks) Explain in brief: Vibrating screen.
- (Summer 2023 - 4 marks) Differentiate between compressible cake and incompressible cake.
- (Summer 2022 - 7 marks) With neat diagram explain batch sedimentation test in detail.
- **(Numerical - Summer 2022 - 7 marks)** A plate and frame filter press... Estimate the washing time...
- **(Numerical - Winter 2023 - 7 marks)** A sludge filtered in a washing plate and frame press...
(i) What is the washing time? (ii) If the filtering surface... is doubled... how long does it take...? -> **Very Important Numerical Topic.**

Chapter 5: Solid-Fluid Mass Transfer

Repeated Questions:

- **Q. Explain construction and working of Swenson-Walker crystallizer.** (Appeared in: Summer 2022 - 4 marks, Summer 2023 - 7 marks)
- **Q. Explain construction and working of the Bollman extractor for leaching.** (Appeared in: Summer 2022 - 7 marks, Winter 2023 - 7 marks)
- **Q. Explain working of tray dryer for solids with a neat sketch.** (Appeared in: Winter 2022 - 7 marks, Summer 2023 - 7 marks)
- **Q. Write a brief note on homogeneous nucleation.** (Appeared in: Winter 2022 - 3 marks, Summer 2023 - 3 marks)
- **Q. Explain in brief about growth of crystals.** (Appeared in: Summer 2022 - 3 marks, Winter 2023 - 3 marks)
- **Q. Explain construction and working of fluidized bed reactor.** (Appeared in: Summer 2023 - 7 marks)

Other Important Questions:

- (Winter 2022 - 3 marks) Define: (i) Magma (ii) Invariant crystal.
- (Summer 2022 - 3 marks) List six applications of crystallization operation.
- (Summer 2022 - 7 marks) With neat diagram explain mechanism of crystal growth in detail.
- (Summer 2022 - 7 marks) With neat diagram explain drying rate curve in detail.
- (Winter 2022 - 7 marks) Write short note on Freeze drying.
- (Summer 2023 - 3 marks) Define: (i) critical moisture content.
- (Winter 2023 - 7 marks) Explain the Slurry bed reactor in detail.
- **(Numerical - Summer 2022 - 7 marks)** A 100 Kg batch of granular solids... Calculate total drying time. -> **Important Numerical Topic.**
