

Code.No: NR/RR310801

NR/RR

SET-1

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
MECHANICAL UNIT OPERATIONS
(CHEMICAL ENGINEERING)

Time: 3hours**Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

- 1.a) Explain the objectives of size reduction in Chemical Process industries with suitable examples.
- b) Write properties of particulate masses in detail. [8+8]
- 2.a) Define Average Size of Particles? What are different ways of finding Average size of mixed particles? Explain briefly
- b) Compare and Contrast between mixing of solids and pastes [8+8]
- 3.a) Define the term “Specific Surface”? Discuss the effect of moisture content and size of feed particles on comminution briefly
- b) Define the term “Work Index”. Calculate the power required to crush 180 tones per hour of lime stone if 80% of the feed passes 50 mm screen and 80% of product passes through 3.125 mm screen? Given work Index as 12.74. [8+8]
- 4.a) Define power laws? Write range of application of Rittinger law? Calculate the power consumption of a mill for case 1 if rock feed having an average particle diameter of 0.025m is fed to it at a rate of 20 tones/hr. The average diameter of the product found to be 0.018m, for this the mill takes 6.7 KW of power and 0.34KW power when it is empty.
Case-1:
If the average particle diameter of product is 0.008m.
- b) Define the Capacity of a Crusher? Distinguish between gyratory Crusher and Jaw Crusher. [10+6]
- 5.a) What is Specific Cake resistance? Derive an expression for it during filtration.
- b) Define constant rate filtration and constant pressure filtration? Derive expression for rate of filtration for above two cases. [8+8]
6. Write short notes on:
 - a) Centrifugal classifiers
 - b) Ultra filtration. [8+8]
- 7.a) Define Agitation? Draw neat sketches of various impellers of industrial choice and explain their specific features.
- b) Differentiate Mixing and blending
- c) A flat blade turbine impeller 0.5 m diameter is used to mix a polymer having viscosity 1000 poise and density 998 kg/m³. The turbine is operated at 100 rpm. The tank is baffled with 1.35m ID. Calculate the Reynolds number of fluid inside the tank. [8+4+4]

- 8.a) Explain MSMPR Crystallizer with a neat sketch.
- b) Explain ' ΔL ' lam of Crystal growth
- c) Write short notes on imperfections.

[8+4+4]

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SET-2

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(CHEMICAL ENGINEERING)

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Answer any FIVE questions
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- 1.a) Define the term “Specific Surface”? Discuss the effect of moisture content and size of feed particles on comminution briefly
- b) Define the term “Work Index”. Calculate the power required to crush 180 tones per hour of lime stone if 80% of the feed passes 50 mm screen and 80% of product passes through 3.125 mm screen? Given work Index as 12.74. [8+8]
- 2.a) Define power laws? Write range of application of kicks law? Calculate the power consumption of a mill for case 1 if rock feed having an average particle diameter of 0.025m is fed to it at a rate of 20 tones/hr. The average diameter of the product found to be 0.018m, for this the mill takes 6.7 KW of power and 0.34KW power when it is empty.
Case-1:
If the average particle diameter of product is 0.008m.
- b) Define the Capacity of a Crusher? Distinguish between gyratory Crusher and Jam Crusher. [10+6]
- 3.a) What is Specific Cake resistance? Derive an expression for it during filtration.
- b) Define constant rate filtration and constant pressure filtration? Derive expression for rate of filtration for above two cases. [8+8]
4. Write short notes on:
 - a) Centrifugal classifiers
 - b) Ultra filtration. [8+8]
- 5.a) Define Agitation? Draw neat sketches of various impellers of industrial choice and explain their specific features.
- b) Differentiate Mixing and blending
- c) A flat blade turbine impeller 0.5 m diameter is used to mix a polymer having viscosity 1000 poise and density 998 kg/m^3 . The turbine is operated at 100 rpm. The tank is baffled with 1.35m ID. Calculate the Reynolds number of fluid inside the tank. [8+4+4]
- 6.a) Explain MSMPR Crystallizer with a neat sketch.
- b) Explain ‘ ΔL ’ lam of Crystal growth
- c) Write short notes on imperfections. [8+4+4]
- 7.a) Explain the objectives of size reduction in Chemical Process industries with suitable examples.
- b) Write properties of particulate masses in detail. [8+8]

- 8.a) Define Average Size of Particles? What are different ways of finding Average size of mixed particles? Explain briefly
- b) Compare and Contrast between mixing of solids and pastes [8+8]

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SET-3

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Answer any FIVE questions
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- - -

- 1.a) What is Specific Cake resistance? Derive an expression for it during filtration.
- b) Define constant rate filtration and constant pressure filtration? Derive expression for rate of filtration for above two cases. [8+8]

2. Write short notes on:
 - a) Centrifugal classifiers
 - b) Ultra filtration. [8+8]

- 3.a) Define Agitation? Draw neat sketches of various impellers of industrial choice and explain their specific features.
- b) Differentiate Mixing and blending
- c) A flat blade turbine impeller 0.5 m diameter is used to mix a polymer having viscosity 1000 poise and density 998 kg/m³. The turbine is operated at 100 rpm. The tank is baffled with 1.35m ID. Calculate the Reynolds number of fluid inside the tank. [8+4+4]

- 4.a) Explain MSMPR Crystallizer with a neat sketch.
- b) Explain 'ΔL' lam of Crystal growth
- c) Write short notes on imperfections. [8+4+4]

- 5.a) Explain the objectives of size reduction in Chemical Process industries with suitable examples.
- b) Write properties of particulate masses in detail. [8+8]

- 6.a) Define Average Size of Particles? What are different ways of finding Average size of mixed particles? Explain briefly
- b) Compare and Contrast between mixing of solids and pastes [8+8]

- 7.a) Define the term "Specific Surface"? Discuss the effect of moisture content and size of feed particles on comminution briefly
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If the average particle diameter of product is 0.008m.

- b) Define the Capacity of a Crusher? Distinguish between gyratory Crusher and Jaw Crusher. [10+6]

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SET-4

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Answer any FIVE questions
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- 1.a) Define Agitation? Draw neat sketches of various impellers of industrial choice and explain their specific features.
- b) Differentiate Mixing and blending
- c) A flat blade turbine impeller 0.5 m diameter is used to mix a polymer having viscosity 1000 poise and density 998 kg/m^3 . The turbine is operated at 100 rpm. The tank is baffled with 1.35m ID. Calculate the Reynolds number of fluid inside the tank. [8+4+4]
- 2.a) Explain MSMPR Crystallizer with a neat sketch.
- b) Explain 'ΔL' lam of Crystal growth
- c) Write short notes on imperfections. [8+4+4]
- 3.a) Explain the objectives of size reduction in Chemical Process industries with suitable examples.
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Case-1:
If the average particle diameter of product is 0.008m.
- b) Define the Capacity of a Crusher? Distinguish between gyratory Crusher and Jam Crusher. [10+6]
- 7.a) What is Specific Cake resistance? Derive an expression for it during filtration.
- b) Define constant rate filtration and constant pressure filtration? Derive expression for rate of filtration for above two cases. [8+8]

8. Write short notes on:
a) Centrifugal classifiers
b) Ultra filtration.

[8+8]

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