

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**

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- 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 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]
- 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  $998 \text{ kg/m}^3$ . 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]

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

[8+4+4]

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SET-2

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**MECHANICAL UNIT OPERATIONS**  
**(CHEMICAL ENGINEERING)**

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

**Answer any FIVE questions**  
**All questions carry equal marks**

- - -

- 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  $998 \text{ kg/m}^3$ . 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 MSMR Crystallizer with a neat sketch.
- b) Explain ‘ $\Delta L$ ’ 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

**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) 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/m<sup>3</sup>. 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 MSMR 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  
 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]

- 8.a) Define power laws? Write range of application of Rittinger's 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]

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SET-4

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

**Answer any FIVE questions**  
**All questions carry equal marks**

- - -

- 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  $998 \text{ kg/m}^3$ . 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.
- b) Write properties of particulate masses in detail. [8+8]
- 4.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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- 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]
- 6.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]
- 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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