



RN-6727

**B. E. III (Sem. V) (Chemical) Examination**  
**May / June – 2010**  
**Mechanical Operation**

Time : Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दशावलि निशानीवाणी विगतो उत्तरवडी पर अवश्य लभवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. 3 (Sem. 5) (Chemical)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Mechanical Operation"/>	<input type="text"/>
Subject Code No. : <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="2"/> <input type="text" value="7"/>	Section No. (1, 2,.....) : <input type="text" value="1&amp;2"/>
Student's Signature	

- (2) Answer the following **two** sections are to be written in **separate** answer books.
- (3) Figures to be **right** indicate full marks.
- (4) Assume suitable data whenever **necessary**.
- (5) Draw neat labelled diagrams.

**SECTION - I**

- 1 (a) Attempt the following : 10
- (i) Define : Rittinger's law.
- (ii) Maximum size reduction in ball mill is done by \_\_\_\_\_.
- (iii) The openings of standard screen are \_\_\_\_\_ mesh.
- (iv) Define : Jigging.
- (v) Separation of particles of various sizes, shapes and densities by allowing them to settle in fluid is called \_\_\_\_\_.
- (vi) Define : Fluidization.
- (vii) The no. of openings per linear inch is called \_\_\_\_\_.
- (viii) Define : Size reduction.
- (ix) The angle between the two jaws in black jaw crusher is \_\_\_\_\_.
- (x) Define : Sphericity
- (b) Discuss principle, construction and working of ball mill with neat sketch. 8

- 2** Attempt any **two** of the following : **8×2=16**
- (i) Crushign laws and work index
  - (ii) Calculate the operation speed of the ball mill from the following data:
    - (a) Diameter of ball mill = 500 mm
    - (b) Diameter of ball = 40 mm
    - (c) Operating speed is 50% of the critical speed of the mill.
  - (iii) What will be the power required to crush 150 tonnes per hour of limestone if 80% of the feed passes 50 mm screen and 80% of the product a 3.125 mm screen? Work index of lime stone = 12.74.
- 3** Attempt any **four** of the following : **4×4=16**
- (i) Vibrating system
  - (ii) Bubbling Fluidization
  - (iii) Types of size reduction equipments
  - (iv) Trommels
  - (v) Hydrocyclones

## SECTION - II

- 4** (a) Attempt the following : **10**
- (i) Justify the tank bottom of the agitated process vessel is made rounded rather than flat. **1**
  - (ii) What are the main types of impeller? **1**
  - (iii) Give significance of froude number. **1**
  - (iv) Give an expression for specific cake resistance. **1**
  - (v) The slurry no. 1 composed of solid A and liquid B. The slurry no. 2 composed of solid A and liquid C. The viscosity of B is greater than that of C. All other conditions being same in both cases. State in which case, time of filtration will be more. **1**
  - (vi) Enlist the settling zones in continuous thickener. **2**
  - (vii) Enlist filter mediums that have strong chemical resistance. **2**
  - (viii) Angle of repose for bituminous coal is \_\_\_\_\_ and whereas for anthracite coal it is \_\_\_\_\_. **1**
- (b) Give classification of filters and explain the main factors to be considered while selecting the filtration equipment. **8**

- 5** Attempt the following (any **two**) **7×2=14**
- (i) Explain with a neat sketch motionless mixer.
  - (ii) Explain in detail with assumptions made for Kynch theory of sedimentation.
  - (iii) A plate and frame press filtering a slurry, gave a total of  $25 \text{ m}^3$  of filtrate in 30 minutes and  $35 \text{ m}^3$  in 60 minutes and  $35 \text{ m}^3$  in 60 minutes when filtration was stopped. Estimate the washing time in minutes if  $10 \text{ m}^3$  of wash water is used. the resistance of the cloth can be neglected and a constant pressure is used throughout.
- 6** Attempt the following : (any **three**) **6×3=18**
- (i) With a neat sketch explain leaf filter.
  - (ii) Write a short note on mixing index.
  - (iii) Enlist the purpose of agitation. Explain in detail effect of system geometry on power consumption of agitator.
  - (iv) Write a short note on tumbling mixer.
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