

**B. Tech. Sem - III (Chemical Engg.) 2014 COURSE) (CBCS) :
SUMMER - 2019**

SUBJECT:MECHANICAL OPERATION

Day : Wednesday
Date : 15/05/2019

S-2019-2549

Time : 02.30 PM TO 05.30 PM
Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to right indicate **FULL** marks.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.
- 4) Assume suitable data, if necessary.

- Q.1** a) Describe different power laws for size reduction. (06)
b) Give classification of size reduction equipments. (04)

OR

- Q.1** a) Calculate the operating speed of a ball mill from following data (06)
i) Diameter of ball mill = 800 mm
ii) Diameter of ball = 60 mm
iii) Operating speed of ball mill is 55% less than critical speed.
b) Calculate power requirement in hp to crush 300 tons of feed if 75% of feed passes through 0.3 inches and 75 % of product passes through 0.12 inches. $K_b = 0.784$. (04)

- Q.2** Describe in detail principle, working, construction, advantages of **Screw** with neat labeled diagram. (10)

OR

- Q.2** Describe in detail principle, working, construction, advantages of **Chain** with neat labeled diagram. (10)

- Q.3** a) Discuss different types impellers in detail with neat diagram. (07)
b) Describe flow patterns in mixing. (03)

OR

- Q.3** Explain the following terms (10)
i) Power consumption in Mixing ii) Rate of mixing iii) Mixing index

- Q.4** Calculate the settling velocity for hindered settling of glass spheres in water at 68° F when the suspension contains 1206 gm glass spheres in 1140 cm³ of total volume. The average diameter of sphere was 0.0061 inch and the true density of the sphere is 154 lb / ft³. (10)

OR

- Q.4** a) Define criteria for settling regime. (07)
b) Differentiate Free Settling and Hindered settling (03)

- Q.5** Derive an expression for constant rate filtration and constant pressure filtration (10)

OR

- Q.5** A rotary filter operating at 0.08 Hz, filters 0.0085 m³/s. operating under the same vacuum and neglecting the resistance of the filter cloth, at what speed must the filter be operated to give filtration rate 0.018m³/s? (10)

- Q.6** Describe the following terms (10)
i) Centrifugal settling ii) Froth floatation

OR

- Q.6** Give uses of following in industry (10)
i) Cyclone separator ii) Electrostatic precipitator
ii) Hydrocyclone iv) Mineral jig

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