

(3 Hours)

[Total Marks: 80]

- N.B: (1) Question No. 1 is compulsory  
(2) Solve any three questions from the remaining questions  
(3) Assume suitable data wherever necessary

Q1. Answer the following questions (any four): (20)

- Explain Negative pressure pneumatic conveying system
- Why and how filter aids are used?
- State and explain Laws of Crushing
- Write short note on elutriation
- Write a note on Effect of flocculation on sedimentation

Q2. a. Derive the Expression for screen effectiveness. (10)

b. Discuss in detail Constant rate and Constant pressure Filtration. (10)

Q3. a. A material is crushed in jaw crusher. Average size of particle reduced from 50 mm to 10 mm with consumption energy of 13 Kw/Kg.sec. What will be the consumption energy needed to crush the same material in average size 75 mm to average size of 25 mm?

Assuming i) Rittingers Law (10)

ii) Kicks law iii) Bonds Law. Which is more reliable?

b. Explain the working of Ball mill. Derive the expression for critical speed. (10)

Q4. a. If crushing rolls, 1 m in diameter, are set so that the crushing surfaces are 12.5 mm apart and the angle of nip is  $31^\circ$ , what is the maximum size of particle which should be fed to the rolls? If the actual capacity of the machine is 12 % of the theoretical, calculate the throughput in Kg/sec when running at 2.0 Hz if the working face of the roll is 0.4 m long and the bulk density of the feed is  $2500 \text{ kg/m}^3$ .

b. Explain with neat sketch continuous rotary drum filter. (10)

Q5. a. Derive the expression to calculate the area of thickener by any one method (10)

b. Derive the expression to estimate the size of smallest particle that can be separated from cyclone separator (10)

Q 6 Answer the following questions. (Any Four) (20)

- Explain Muller mixer
- Pressures in bins and silos
- Explain a type of packing's used in packed bed
- Explain free settling and hindered settling .
- Explain Screw conveyer