Q.P. Code : 3642

(3 Hours) | Total Marks : 80

N.B. : (1) Question no.1 is compulsory
  (2) Attempt any three from remaining five questions.
  (3) Assume suitable data if required.
  (4) Figure to the right indicates full marks.

1. (a) Explain in brief different particle size measurement techniques. 4
   (b) Write applications of fluidization. 4
   (c) Write short note on Ribben Blender. 4
   (d) Write short note on Elutriation. 4
   (e) What is minimum fluidization velocity. 4

2. (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°, 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 kg/m³. 10

   (b) Discuss conditions for Fluidization in details. 10

3. (a) A slurry containing 5 kg of water/ kg of solid is to be thickened to a sludge containing 1.5 kg of water/ kg of solids in a continuous operation. A laboratory test using five different concentrations of slurry yielded the following results: 10

Conc. (Kg water/ kg of solid)	5.0	4.2	3.7	3.1	2.5
Rate of Sedimentation, (mm/sec)	0.20	0.12	0.094	0.070	0.052

   Calculate the minimum area of the thickener to effect the separation of 1.33 kg/s of solids.

   (b) Discuss constant pressure filtration and constant rate filtration. 10

4. (a) Derive the expression to estimate the size of smallest particle that can be separated in Cyclone separator. 10

   (b) Write construction, operation of continuous vacuum filtration unit and Derive the mathematical expression. 10

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5. (a) Discuss Blake Jaw Crusher in detail. **10**

(b) A sample of pyrite was screened. The screen analysis is given below. **10**

Mesh	8/10	10/14	14/20	20/28	28/35	38/48	48/65
Mass fraction retained	0	21.2	19.6	17.4	14	15.8	12
Aperture, mm	1.651	1.168	0.833	0.589	0.417	0.295	0.208

(i) Calculate the mean surface diameter. Specific Gravity of pyrite is 5.0

(ii) Find specific surface.

6. (a) Write short note on: **10**

      (i) Bag Filter   (ii) Belt conveyor

(b) A bed of ion-exchange beads 2.4 m deep is to be backwashed with water to remove **10**
dirt.

The particles have a density of 1.24 g/cm³ and an average size of 1.1 mm. What is
the minimum fluidization velocity using water at 20°C, and what velocity is
required to expand the bed by 25percent? The beads are assumed to be spherical
($\Phi s = 1$).

Given: $\in_M = 0.40$; m = 3.9

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