3 Hours **Marks: 80**

Question No. 1 is compulsory.
Attempt any three questions from the remaining.
Assume suitable data if required and clearly mention it.
Figures to the right indicates full marks.

1. Write short notes on the following: **[20]**
   a) Particle size measurement techniques
   b) Ball mill
   c) Belt conveyor
   d) Fludization

2. a) Describe laws of crushing. **[10]**
   b) Define screen effectiveness and derive the formula for the calculation of effectiveness of screen. **[10]**

3. a) Derive an expression to estimate the size of smallest particle that can be separated in Cyclone Seperator **[10]**
   b) Explain constant rate filtration and constant pressure filtration **[10]**

4. a) Explain the degree of mixing and rate of mixing of Dry solids **[10]**

   b) A slurry containing 5 kg of water/kg of solid is to be thickened to a sludge **[10]** containing 1.5 kg of water/kg of solids in a continuous operation. A laboratory test of six different concentrations of slurry yielded following results:

Concentration (Kg water/ kg of solid)	5.0	4.2	3.7	3.1	2.5	2
Rate of Sedimentation	0.2	0.12	.094	0.07	0.052	0.03

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

5. a) Discuss various conditions of fluidization **[10]**

b) A crushing roll 1 m in diameter are set so that crushing surface area **[10]**
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 is 12 % of the theoretical, calculate the throughput in kg/s when running at 2.0 Hz if the working face of the rolls is 0.4m long and feed weighs 2500kg/m^3.

6. Write brief notes on: **[20]**

a) Hammer Mill
b) Ribbion blender
c) Pneumatic conveying system
d) Plate and Frame filter press

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