(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

Q. 1 (A) What are the various ways of representing the particle size distribution? Explain. **[05]**
(B) Why and how filter aids are used? **[05]**
(C) Write a note on Application of fluidization **[05]**
(D) Explain free and hindered settling **[05]**

Q. 2 (A) Explain Blake Jaw crusher in detail. **[10]**
(B) Discuss in detail Constant rate and Constant pressure Filtration. **[10]**

Q. 3 (A) Explain mixing index in blending granular solids. **[10]**
(B) The performance of the solid mixer has been assessed by calculating the variance occurring in weight fractions of a component amongst a selection of samples withdrawn from mixture. The quality was tested at intervals of 320 sec and the results are: **[10]**

Sample variance	0.025	0.006	0.015	0.019
Mixing Time	30	60	90	150

If the component analyzed is estimated to represent 20% of the mixture by weight and each sample removed contained 100 particles. Comment on the quality of the mixture produced and present the data in graphical form showing variation and mixing index with time.
Which is more reliable result?

Q. 4 (A) A material is crushed in jaw crusher. Average size of particle reduced 50 mm to10 mm with consumption energy of 13 kW/kg/s. what will be the energy consumption needed to crush the same material of average size 75mm to average size of 25 mm. **[10]**
Assuming: 1) Rittinger's Law.
2) Kick's Law
3) Bond's Law
(B) Discuss conditions for fluidization in details. **[10]**

Q. 5 (A) 1000 ton/day of a metallurgical pulp is thickened from a feed concentration of 200 kg/m^3 to an underflow concentration of 1500 kg/m^3 by continuous sedimentation. Batch sedimentation data is given below. **[10]**

Time (hr.)	0	0.1	0.25	0.5	1.0	2.0	4.0
Pulp height(m)	0.91	0.61	0.43	0.27	0.15	0.08	0.03

Calculate the minimum required diameter of the thickener.
Solid density = $4440 kg/m^3$
(B) Derive the Expression for screen effectiveness **[10]**

Q. 6 (A) Write Short notes on **(any four)** **[20]**
a) Particulate and Bubbling Fluidization.
b) Plate and frame filter press.
c) Flotation cell
d) Ball mill
e) Muller mixer

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