

Sr. No.	't' sec	'V' m ³
7	58.8	3.406×10^{-3}
8	73.6	4.00×10^{-3}
9	89.5	4.6×10^{-3}
10	107.3	5.009×10^{-3}

Viscosity of water = 8.937×10^{-4} N-s/m²

Density of water = 1000 kg/m³. 12

- (b) Explain Kynch theory of sedimentation. 8
6. (a) Discuss different types of impellers used in agitation and mixing. 8
- (b) What is mixing index and degree of mixing ? 4
- (c) Draw neat sketches of flow patterns of propeller (any *four*). 8

NTK/KW/15/7902

Faculty of Engineering & Technology
B.Tech. Fifth Semester (Chemical Tech.) Examination
SOLID FLUID OPERATIONS
Paper—II

Time : Three Hours] [Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
- (2) Answer any **FOUR** questions.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data wherever necessary.
- (5) Diagrams and Chemical equations should be given wherever necessary.
- (6) Retain the construction lines.
- (7) Illustrate your answers wherever necessary with the help of neat sketches.
- (8) Use of Slide rule, Logarithmic tables, Steam tables, Mollier's charts, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. (a) Derive expression of power for crushing and grinding using :
 - (i) Rittinger's law
 - (ii) Kick's law
 - (iii) Bond's law. 13

- (b) Derive the following equation for roll crusher.

$$\cos \alpha = \frac{(r + d)}{(r + R)}.$$

All the terms have their usual meanings. 7

2. (a) Describe the construction and working of belt conveyor with the help of following points :
 - (i) Belt idlers
 - (ii) Belt drive arrangement
 - (iii) Belt tension devices. 10
- (b) Explain dilute phase pneumatic conveyors. 8
- (c) Define :
 - (i) Terminal velocity
 - (ii) Hindered settling velocity. 2

3. (a) Discuss different types of non mechanical classifiers for size separations with neat sketches. 12

- (b) What are three main categories of classifiers ?
Explain working of drag classifiers. 8

4. (a) Derive an expression for filtration at constant rate and at constant pressure. 10

- (b) Explain in detail :

- (i) Sand filters
- (ii) Plate and frame filter press. 10

5. (a) Data for laboratory filtration of CaCO_3 slurry in water at 25°C are reported as follows at a constant pressure of 350 kN/m^2 . The filter area of plate and frame press was 0.05 m^2 and slurry conc. was 23.47 kg/m^3 . Calculate the constants and R_m from the experimental data given where 't' is time in seconds and 'v' is filtrate volume collected in m^3 :

Sr. No.	't' sec	'V' m^3
1	4.1	0.448×10^{-3}
2	9.6	1.1×10^{-3}
3	15.3	1.45×10^{-3}
4	25.5	1.95×10^{-3}
5	33.8	2.388×10^{-3}
6	45.1	2.9×10^{-3}