



DEPARTMENT OF CHEMICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

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Test II

CH 2005 MECHANICAL OPERATIONS

Duration: 1 hour

Date :10.04.2015

Maximum Marks: [20]

Answer all the questions

(Any missing data may be suitably assumed)

1. Distinguish clarifier and classifier with examples? [2]
2. Define hindered settling [1]
3. Explain the principle and application of centrifuge? [2]
4. What are the good qualities of a filter media? [2]
5. What are filter aids? Name few commonly used filter aids [2]
6. Differentiate ideal and actual screens [2]
7. Discuss in detail the working operation of any one filtration equipment with a neat sketch. [3]
8. A viscous solution contains particles with a density ρ_p equal to 1200 kg/m^3 is to be clarified by centrifugation. The solution density (ρ) is equal to 850 kg/m^3 and its viscosity is 80 cp. The centrifuge has a bowl with $r_2 = 0.02 \text{ m}$, $r_1 = 0.01$ and height $b = 0.25 \text{ m}$. Calculate the critical particle diameter of the largest particles in the exit stream if $N = 15000 \text{ rpm}$ and flow rate $q = 0.002 \text{ m}^3/\text{hr}$? [3]
9. A quartz mixture is screened through a 10-mesh screen. The cumulative screen analysis of feed, overflow and underflow are given in the table. Calculate the mass ratios of the overflow and underflow to feed and the overall effectiveness of the screen. [3]

Mesh	D_p (mm)	Feed	Overflow	Underflow
4	4.699	0	0	0
6	3.327	0.025	0.071	0
8	2.362	0.15	0.43	0
10	1.651	0.47	0.85	0.195
14	1.168	0.73	0.97	0.58
20	0.833	0.885	0.99	0.83
28	0.589	0.94	1.0	0.91
35	0.417	0.96		0.94
65	0.208	0.98		0.975
Pan		1.0		1.0