4. Attempt any <u>two</u> parts of the following: 6×2=12

(a) What are the different kinds of conveyors used in chemical industries? Discuss the working of belt conveyor in detail.

(b) What is the fluidization? Describe the minimum fluidization velocity and applications in industry.

(c) Derive the Corman Kozeny equation for flow through packed beds.

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NCH302

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 151315

Roll No.

B.Tech. (Semester-V)

SPL. THEORY EXAMINATION, 2014-15

MECHANICAL OPERATIONS

Time : 2 Hours] *[Total Marks : 50*

Note: Attempt <u>all</u> questions.

1. Attempt any <u>four</u> parts of the following: 3×4=12

(a) A pair of rolls is to take a feed equivalent to sphere of 3 cm in diameter and crush them to sphere having 1 cm diameter. If the coefficient of friction is 0.29, what would be the diameter of the rolls?

(b) Explain the utility of a classifier in a process. Discuss the Rank classifier in detail.

(c) Discuss the principle characteristics of mass flow and funnel flow bins in detail.

(d) Write short notes on different weighing equipments used.

(e) Define Rittinger's, Kicks and Bonds Law of Crushing with the limitation of each.

(f) What do you understand by screening? Mention any one screening equipment briefly.

2. Attempt any <u>two</u> parts of the following: 6×2=12

(a) What are the factors to be considered while selecting a size reduction equipment? With the help of neat sketch explain the construction and working of Blake jaw crusher.

(b) Define the critical speed and derive the formula for calculating the critical speed of the Ball Mill.

(c) A leaf filter filtering slurry gave a total of 8 m^3 filtrate in 30 minutes. Filtration was continued till 11.3 m^3 of filtrate was collected. Estimate the washing time minutes, if 11.3 m^3 of wash water are used. The resistance of cloth can be neglected and a constant pressure is used thought.

3. Attempt any <u>two</u> parts of the following: 7×2=14

(a) Derive the equation and draw the plot t/V versus V in constant pressure filtration and explain the following terms used in filtration: Specific cake resistance, Filter medium resistance.

(b) Write a neat sketch, explain the principle and operation of a centrifugal separation equipment.

(c) The screen analysis shown in the table applies to a sample of crushed quartz. The density of the particle is 2.650 kg/m^3, and the shape factors are a = 2 and Qs = 0.571. For the material balance between 4-mesh and 200 mesh in particle size, calculate:

(i) Aw, specific surface in square millimeter per gram

(ii) Nw, number of particles in the particles per gram

(iii) Dv, volume mean diameter

(iv) Ds, volume surface-mean diameter

(v) Dw, mass mean diameter

Mesh	Screen opening Dpi, mm	Mass fraction retained Xi	Average particle diameter in increment, Dpi, mm
4	4.699	0.0000	–
6	3.327	0.0251	4.013
8	2.362	0.1250	2.845
10	1.651	0.3207	2.007
14	1.168	0.2570	1.409
20	0.833	0.1590	1.001
28	0.589	0.0538	0.711
35	0.417	0.0210	0.503
48	0.295	0.0102	0.356
65	0.208	0.0077	0.252
100	0.147	0.0058	0.178
150	0.104	0.0041	0.126
200	0.074	0.0031	0.089
Pan	–	0.0075	0.037