VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – I
Programme Name & Branch: B.Tech - Chemical Engineering
Fall Semester (2019-20)

Course Name and Code: Mechanical Operations & CHE1022
Class Number: VL2019201001170 **Slot:** C1+TC1
Faculty Name: Dr.A.Babu Ponnusami **Exam Duration:** 90 Minutes. **Maximum Marks:** 50

General instruction(s): Ordinary graph sheet to be provided.

Answer all the questions

Part - A (4 x 5 = 20 Marks)

1. Calculate the sphericity of a hollow cylinder of height 3 cm, having inner and outer diameters 1 & 2 cm respectively.
2. Name the methods used for charging of particles in ESP. State difference between bin and silo. Write the name of two common flow problems in flow out of bin.
3. Write short note on Magnetic drum separator with neat diagram.
4. Define work index. Explain principle difference among crushers, grinders and cutters with examples.

Part - B (2 x 15 = 30 Marks)

5. One tonne per hour of dolomite is produced by a ball mill operating in closed circuit with a 100 mesh screen. The screen analysis (Weight %) is given below.

Data: Specific Gravity of Dolomite : 2.8 Sphericity : 0.7 and Shape factor: 2

Mesh No.	Screen opening, µm	Feed	Oversize	Undersize
28	589	-	-	-
35	417	7.07	13.67	0
48	295	16.60	32.09	0
65	208	14.02	27.12	0
100	147	11.82	20.70	2.32
150	104	9.07	4.35	14,32
200	74	7.62	2.07	13.34
Pan	-	33.80	0	70.02

Calculate (a) Surface mean diameter; (b) Mass mean diameter; (c) Volume mean diameter; (d) Specific surface area of feed and (e) Effectiveness of screen .

6. a) Explain the construction and working principle of Blake Jaw crusher with schematic diagram. (5 Marks)

b) A material is crushed in a Blake jaw crusher and the average size of particles reduced from 5 cm to 1.3 cm, with the consumption of energy at the rate of 37 W hr/metric ton. What will be the consumption of energy necessary to crush the same material of average size 8 cm to an average size of 3 cm? Take work index of the material 12.74. Use Rittinger's Law, Kick's law and Bonds Law. The mechanical efficiency remains unchanged. (10 Marks)