

**VIT**Vellore Institute of Technology
(Approved by the University Grants Commission, New Delhi, India, 1986)**Continuous Assessment Test -I (CAT I) Fall Semester (2023-24)**

Course Name & code : Mechanical Operations & BCHE301L
Programme Name & Branch : BCM & School of Chemical Engineering
Class Number : VL2023240101570
Slot : F1+TF1
Faculty Name : Prof. Samarshi Chakraborty (17023)
Exam Duration : 90 minutes **Maximum Marks** : 50 Marks

General instruction(s):

1. All questions are to be answered. 2. Calculator allowed

Q.No.	Question	Max Marks
1.	a) Identify the critical factors affecting the choice of conveyor system for solid transport? (7) b) Differentiate between Surface diameter, Volume diameter, and, Sauter mean diameter. (3)	10
	a) Illustrate the factors affecting the size reduction operation from material property perspective. (7) b) What are the desirable features of ideal size reduction equipment? (3)	10
3.	A certain crusher takes rock whose average particle diameter is 0.030 m and crushes it to a product whose average particle diameter is 0.015 m, at the rate of 25 tonnes/hour. At this rate, the mill takes 9 HP of power and 0.86 HP power is required to run it empty. (A) What would be the power consumption for same capacity, if the average particle diameter in the product is 0.010 m. (5) (B) How much power would be required under the same conditions by kicks law. (5)	10
4.	One ton per hour of dolomite is produced by crushing and then screening through a 28-mesh screen. Accordingly, to the screen analysis (wt%) is provided in the table below. Determine mass flow rate of feed and effectiveness of the screen.	10

Mesh	Feed%	Undersize%	Oversize circulation load%
4 cm	14.3	--	20
8 cm	20.0	--	25
14 cm	23.5	0	25
28 cm	18.5	38	18
48 cm	10.6	30	12
60 cm	8.6	20	Through 48 mesh
100 cm	3.9	10	--
100 through	0.6	2	--
	100	100	100
a) Differentiate between differential and cumulative screen analysis and also state limitations of both the analysis? (7) b) Identify the relationship between capacity and efficiency of different screening apparatus. Report it in tabular format. (3)			