



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

SCHOOL OF CHEMICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST -I
FALL SEMESTER 2025-2026

REG.NO:

SLOT: B2 + TB2

Programme Name & Branch : B.Tech, BCM
Course Code : BCHE301L
Course Name : Mechanical Operations
Faculty Name(s) : Dr. Mohammed Rehaan Chandan
Class Number(s) : VL2025260103879
Date of Examination : 18/08/2025
Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Assume any missing data with proper justification.

Q. No	Question	Marks	CO	BL
1.	a) Calculate the sphericity of a disk having its diameter three times its thickness. (5 marks) b) Estimate the diameter and height of a silo to store grains with storage capacity of 500 m ³ . Assume the inclination of hopper bottom with horizontal as 30°. (Assume K ₁ = 4) (5 marks)	10	CO1	L3
2.	a) What is the significance of angle of repose in the storage of bulk solids? Explain in brief the methods to determine angle of repose. (5 marks) b) Explain the working principle of an air slide conveyor using various types of mechanism with a neat diagram. (5 marks)	10	CO1	L2
3.	A material is crushed in a Blake Jaw crusher and the average size of particles is reduced from 5 cm to 1.3 cm, with consumption of energy at the rate of 37 kW/(kg.s). 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? The mechanical efficiency remains unchanged. (i) Using Rittinger's law (ii) Using Kick's law.	10	CO2	L3
4.	A certain set of crushing rolls has rolls of 150 cm in diameter by 50 cm width of face. They are set so that the crushing surfaces are 1.25 cm apart at the narrowest point. The manufacturer recommends 100 rpm, as the roll speed. They are to crush a rock having a specific gravity of 2.35 and the angle of nip is 30°. (a) What are the maximum permissible size of feed and the maximum actual capacity in metric tons per hour if the actual capacity is 12% of theoretical? (b) After long use, the tires on the rolls of the mill have become roughened so that the angle of nip is 33.5°. What will now be the maximum permissible size of feed and the capacity of the rolls?	10	CO2	L3
5.	a) Using force balance on a ball in a ball mill, derive critical speed of a ball mill. (5 marks) b) Explain the mechanism of the size reduction in a fluid energy mill using a neat diagram. (5 marks)	10	CO2*	L3
