

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023

Subject Code: 3150502

Date: 11-12-2023

Subject Name: Mechanical Operations

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define volume surface mean diameter, volume mean diameter, mass mean diameter and arithmetic mean diameter.	03
	(b) Define sphericity. Find the sphericity cylinder having $D=H$.	04
	(c) Develop the equation for the calculation of effectiveness of the screen.	07
Q.2	(a) Differentiate the Crusher and grinder	03
	(b) A set of crushing rolls of 1000 mm diameter by 375 mm width of face. Minimum spacing between two rolls is 12 mm and the angle of nip is 30°. What is the maximum permissible size of feed?	04
	(c) Classify comminuting equipment and give suitable industrial application of it.	07
	OR	
	(c) A Black jaw crusher is used for crushing limestone such that the average size of the particles is reduced from 50mm to 10 mm with energy consumption of 50 W*hr/metric ton. Calculate the energy consumption for crushing the same material from average size of 75mm to 20mm. (a) Using Rittinger's law; (b) using Kick's law (c) Bond's law. Work index=12.74.	07
Q.3	(a) Discuss various mechanism of filtration in brief.	03
	(b) Classify the Filtration equipments with examples in each category.	04
	(c) Explain construction and working of continuous plate and frame filter press.	07
	OR	
Q.3	(a) Differentiate clarifier and classifier.	03
	(b) Explain construction and working of the cyclones separator.	04
	(c) Explain in detail the working of batch sedimentation with application.	07
Q.4	(a) Write down purpose of agitation	03
	(b) Write short note on tumbler mixer.	04
	(c) Describe the different mixing equipments used for solid mixing in brief.	07
	OR	
Q.4	(a) What is power number and give its significance.	03

	(b)	Write short note on equipment used for non-cohesive solid mixing	04
	(c)	Explain different types of impellers for agitation of liquids along with application.	07
Q.5	(a)	Enlist the industrial application fluidization.	03
	(b)	Discuss minimum fluidization velocity and pressure drop in fluidized bed with neat sketch.	04
	(c)	With neat sketch, explain pneumatic conveying system with advantages and disadvantages.	07
OR			
Q.5	(a)	List different types of industrial conveyers.	03
	(b)	Discuss the different criteria's for selection of conveyors.	04
	(c)	Explain in detail: Types of fluidization.	07
