Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- V EXAMINATION-SUMMER 2023

Subject Code: 3150502 Date: 27/06/2023

Subject Name: Mechanical Operations

Time: 02:30 PM TO 05:00 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 (1) Mesh number (2) Angle of nip (3) Work index	**03**
	(b)	What the use is of filter aid and filter media?	**04**
	(c)	Explain the construction and working of trommels with the help of a neat sketch and enlist various trommels arrangement.	**07**
Q.2	**(a)**	Calculate the power required to crush 150 tonnes per hour of limestone if 80% of the feed passes 50mm screen and 80% of the product passes a 3.125mm screen? Work index of limestone = 12.74.	**03**
	(b)	Differentiate between open circuit and closed circuit operations.	**04**
	(c)	Write principle of comminution. Explain various laws of size reduction in detail.	**07**
		OR	
	(c)	Give classification of various size reduction equipments.	**07**
Q.3	**(a)**	Give significance of Power no, Reynolds no and Froude no for mixing of liquids.	**03**
	(b)	Explain: "For efficient grinding, ball mills must be operated at a speed lessthan the critical speed."	**04**
	(c)	List different types of industrial conveyers and explain any one in detail.	**07**
		OR	
Q.3	**(a)**	What are the various equipments used for storage of solids? Discuss any one.	**03**
	(b)	What rotational speed in RPM would you recommend for a ball mill 1100mm in diameter charged with 70 mm balls?	**04**
	(c)	Explain in detail: Types of fluidization.	**07**
Q.4	**(a)**	Define sphericity. Prove that sphericity of sphere is unity.	**03**
	(b)	Differentiate differential and cumulative analysis.	**04**
	(c)	A roller crusher has rolls of 200 cm in diameter and 75 cm face width. The crushing roll surfaces are 1.25 cm apart at the narrowest point. The angle of nip 30°. The roll crusher operates at a speed of 150 rpm. They are used to crush a rock of specific gravity of 2.35. Calculate the maximum permissible size of feed and the maximum actual capacity in metric tons per hour, if the actual capacity is 15 % of the theoretical.	**07**
		OR	
Q.4	**(a)**	Give the difference between ideal screen and actual screen.	**03**
	(b)	Explain construction and working of the Dorr thickener	**04**
	(c)	What is the differential settling method? Explain in detail the working of batch sedimentation with application.	**07**
Q.5	**(a)**	Define: electrostatic separation.	**03**
	(b)	Discuss Sink and float method	**04**
	(c)	Discuss selection criteria of agitator.	**07**
		OR	
Q.5	**(a)**	Differentiate between clarifier and classifiers	**03**
	(b)	Discuss different method for prevention of swirling and vortex formation in agitated tank.	**04**
	(c)	Explain construction and working of continuous rotary vacuum filter.	**07**