Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2024

Subject Code:3150502 Date:02-12-2024

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 (i) Volume surface mean diameter (ii) Mesh Number (iii) Screening	**03**
	(b)	Discuss various factors affecting on screening operation.	**04**
	(c)	Describe various laws for size reduction and write principle of comminution.	**07**
Q.2	**(a)**	Define (i) Agitation (ii) mixing (iii) power index	**03**
	(b)	Discuss types of impellers in details.	**04**
	(c)	Define Sphericity. Calculate the sphericity of cube.	**07**
		OR	
	(c)	Develop the equation for the calculation of effectiveness of the screen.	**07**
Q.3	**(a)**	Differentiate between ideal screen and actual screen.	**03**
	(b)	Explain: “For efficient grinding, ball mills must be operated at a speed less than the critical speed.”	**04**
	(c)	Discuss minimum fluidization velocity and pressure drop in fluidized bed with neat sketch.	**07**
		OR	
Q.3	**(a)**	Discuss various mechanism of filtration in brief.	**03**
	(b)	Calculate the operating speed of the ball mill from the following data: (i) Diameter of ball mill = 500 mm (ii) Diameter of ball = 40 mm (iii) Operating speed is 50% of the critical speed of the mill.	**04**
	(c)	List different types of industrial conveyers and explain any one in detail.	**07**
Q.4	**(a)**	Enlist different types of flow pattern induced in an Agitated vessel contains liquid.	**03**
	(b)	Derive the mathematical expression for constant rate filtration.	**04**
	(c)	Explain the construction and working of trommels with the help of a neat sketch.	**07**
		OR	
Q.4	**(a)**	Write short note on types of fluidization.	**03**
	(b)	Differentiate between clarifier and classifier.	**04**
	(c)	Explain double arm kneading mixture in detail with neat sketch.	**07**
Q.5	**(a)**	Discuss Sink and float method.	**03**
	(b)	Explain in details about slurry transport.	**04**
	(c)	Explain construction and working of the Hydrocyclones separator.	**07**

OR

Q.5	**(a)**	Define mixing index and its significance.	**03**
	(b)	Discuss Industrial applications of fluidization.	**04**
	(c)	With neat diagram explain construction and working of continuous rotary vacuum filter.	**07**

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