Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2150502 **Date: 27/04/2017**

Subject Name: Mechanical Operation

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.**

Q.1		**Short Questions**	**14**
	1	Define: Sphericity	
	2	State: Bond`s crushing law	
	3	Define: Fluidization	
	4	What is the use of filter aid?	
	5	Define: Work index	
	6	What is Agitation?	
	7	Define: screen effectiveness	
	8	What is the use of filter media?	
	9	Define: Minimum fluidization velocity	
	10	Enlist Various types of filter	
	11	Define: Mesh number	
	12	Enlist different types of conveyers	
	13	Define: Filtration	
	14	What is Mixing?	
Q.2	**(a)**	Differentiate between ideal screen and actual screen.	**03**
	(b)	Describe batch sedimentation process with a neat sketch in details.	**04**
	(c)	Explain in detail: Conditions for fluidization	**07**
		OR	
	(c)	Explain in detail: Types of fluidization	**07**
Q.3	**(a)**	Differentiate clarifier and classifier.	**03**
	(b)	What are the various methods for prevention of swirling in an agitated vessel?	**04**
	(c)	In a filter press, at a constant pressure difference of 3.0 kg/cm^2, a 12cm cake is formed in one hour with a filtrate volume of 5400 liters. Washing proceeds exactly as filtration using 900 liters. All other operation takes 11 minutes time. Assume the filtrate has same properties of wash water. The rate of washing is 0.20 times the final filtration rate. Calculate the volume of filtrate produced in one day of operation.	**07**
		OR	
Q.3	**(a)**	What is power number and its significance?	**03**
	(b)	A silty soil containing 14% moisture was mixed in a large Muller mixer with 10.0 weight percent of a tracer consisting of dextrose and picric acid. After 3 minutes of mixing, 12 random samples were taken from the mix and analyzed calorimetrically for tracer materials. The measured concentrations in the samples were, in weight percent tracer, 10.24, 9.30, 7.94, 10.24, 11.08, 10.03, 11.91, 9.72, 9.20, 10.76, 10.97 and 10.55. Calculate the mixing index.	**04**
	(c)	Draw a neat diagram and explain construction, working, advantages, limitations and applications of rotary drum filter.	**07**
Q.4	**(a)**	Write a short note on Pneumatic conveying system.	**03**
	(b)	Write purposes of agitation.	**04**
	(c)	A roller crusher has rolls of 180 cm in diameter and 60 cm face width. The	**07**

crushing roll surfaces are 1.20 cm apart at the narrowest point. The angle of nip 30°. The roll crusher operates at a speed of 120 rpm. They are used to crush a rock of specific gravity of 2.30. Calculate the maximum permissible size of feed and the maximum actual capacity in metric tons per hour, if the actual capacity is 20% of the theoretical.

OR

Q.4	**(a)**	Explain in brief: Ribbon Blender	**03**
	(b)	List various applications of fluidization in chemical industry	**04**
	(c)	Describe the working of a ball mill and derive the expression for critical speed of a ball mill.	**07**
Q.5	**(a)**	Explain in brief: Muller mixer	**03**
	(b)	Write a short note on Screen analysis.	**04**
	(c)	Explain different types of flow pattern induced in an Agitated vessel (liquid).	**07**

OR

Q.5	**(a)**	Explain in brief: Sink and float method of sorting classifiers	**03**
	(b)	Calculate the power required to crush 120 tones/hr of limestone if 80 % of the feed passes through a screen 3.74 cm aperture and 80 % of the product passes through a screen with 0.04 cm aperture. The work index for lime stone is 12.75, when the capacity is expressed in tones/min, power required in HP and size of feed and product in feet.	**04**
	(c)	With the help of neat sketch explain different types of impellers for agitation of liquids along with application.	**07**

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