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

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2143506 **Date: 03/06/2017**

Subject Name: Unit Operations-I

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.**

Q.1		**Short Questions**	**14**
	1	Define surface area of a particle.	
	2	Define sphericity with expression.	
	3	Define particle size and average particle size.	
	4	Define sedimentation.	
	5	Define feed and product size for a roll crusher.	
	6	Define filter aid in filtration?	
	7	Write any two characteristics of filter media.	
	8	What is screening?	
	9	Classify different screening equipments.	
	10	What is screen slope?	
	11	What is angle of nip?	
	12	Classify different crushingequipments.	
	13	What is critical speed of a ball mill, how the operating speed is measured from it.	
	14	Write the basic difference between clarifier and thickener.	
Q.2	**(a)**	Explain the difference between ideal and actual screen.	**04**
	(b)	Explain the power requirement for a crushing mill by Rittinger's power law with expression.	**03**
	(c)	What will be the power required to crush 500 tons per hour of limestone if 80% of the feed passes 150 mm screen and 80% of the product a 2.125 mm screen? Work index of limestone is 12.74.	**07**
		OR	
	(c)	Classify different size reductionequipmentswith feed and product size.	**07**
Q.3	**(a)**	Draw the diagram of open circuit and closed circuit grinding highlighting the difference.	**04**
	(b)	What factors needs to be considered for selecting a filtering equipment.	**03**
	(c)	What is screen effectiveness? Derive the expression for screen effectiveness?	**07**

OR

	(a)	Derive the expression for the overall pressure drop on a filtration unit.	**04**
	(b)	Explain the gritte filters with diagram.	**03**
	(c)	Show with neat diagram the batch sedimentation of different stages and explain the differences.	**07**
Q.4	**(a)**	Explain in detail the working and construction of a fluid energy mill with diagram.	**04**
	(b)	Explain the construction and working of a disc type centrifuge.	**03**
	(c)	Discuss the operating cycle of a centrifugal separator with the curve of power requirement and time.	**07**

OR

Q.4	**(a)**	Discuss the advantage and disadvantage of bag filters.	**04**
	(b)	What is the principle of froth flotation? Explain the mechanical flotation machine with diagram.	**03**
	(c)	Derive the expression of angle of nip for a roll mill.	**07**
Q.5	**(a)**	Explain the working and construction of a ball mill with a neat sketch.	**04**
	(b)	Explain the working and construction of plate and frame filter press.	**03**
	(c)	What is the suitable size of particles for electrostatic separation? What are the advantages and disadvantages over bag filters to electrostatic separator?	**07**

OR

Q.5	**(a)**	Explain the working and construction of bag filters with a neat diagram.	**04**
	(b)	Explain the working and construction of a roll mill with a neat sketch.	**03**
	(c)	What is filtration? Explain the working and construction of a rotary drum filter with diagram.	**07**

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