Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) EXAMINATION – SUMMER 2016

Subject Code:2143506 **Date:01/06/2016**

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 specific surface area of a particle with expression.

2 Define sphericity with expression.

3 Define particle size and average particle size.

4 Write basic mechanism of filtration.

5 Write the feed and product size for a roll crusher.

6 What is the role of filter aid in filtration?

7 Write any two characteristics of filter media.

8 What is cube factor?

9 Classify different screening equipments.

10 What is the advantage of screen slope?

11 What is angle of nip?

12 Classify different size reduction equipments.

13 Write the formula of 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 open circuit and closed circuit grinding with the help of neat diagram. **04**

	(b)	Explain the power requirement for a crushing mill by Bond's power laws with expressions.	**03**
	(c)	What will be the power required to crush 250 tons per hour of limestone if 80% of the feed passes 150 mm screen and 80% of the product a 3.125 mm screen? Work index of limestone is 12.74.	**07**
		OR	
	(c)	Classify different crushing equipments and explain any one with construction, working, and diagram.	**07**
Q.3	**(a)**	What is ideal screen and actual screen? Explain it with diagram.	**04**
	(b)	What is filtration? What factors needs to be considered for selecting a filtering equipment.	**03**
	(c)	What is screen analysis? 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)	Explain working and construction of plate and frame filter press with a neat diagram.	**07**
Q.4	**(a)**	Explain in detail the working and construction of a cyclone separator 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)	Explain the working and construction of top driven centrifuge with a neat sketch.	**07**
		OR	
Q.5	**(a)**	Explain the working and construction of a ball mill with a neat sketch.	**04**

	(b)	Explain the working and construction of a fluid energy mill with a neat sketch.	**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 jaw crusher with a neat sketch.	**03**
	(c)	What is the basic principle of magnetic separation? Explain the working and construction of a magnetic separator with diagram.	**07**

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