Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 150502 **Date: 02/06/2012**

Subject Name: Mechanical Operation

Time: 02:30 pm – 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	**(a)**	Classify the size reduction equipments according to their usage and give examples in each category.	**07**
	(b)	What will be 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.	**05**
	(c)	Define (i) Spherecity and (ii) Crushing efficiency.	**02**
Q.2	**(a)**	With a flowsheet explain the working of a closed circuit grinding system.	**07**
	(b)	Explain screen analysis in detail with reference to Tyler standard screen series.	**07**
		OR	
	(b)	(i) Define screen capacity and screen effectiveness.	**02**
		(ii) A screen with an aperture of 6 mesh BSS is treating a feed with 66% of +6 mesh and producing an oversize fraction containing 89% of +6 mesh particles. If the undersize fraction contains 2% of +6 mesh particles, calculate the effectiveness of the screen.	**05**
Q.3	**(a)**	Explain the fluidization process and its applications in chemical industry.	**07**
	(b)	What rotational speed in RPM would you recommend for a ball mill 1200mm in diameter charged with 75mm balls?	**05**
	(c)	Define: (i) angle of nip and (ii) mixing index.	**02**
		OR	
Q.3	**(a)**	Explain the construction and working principle of belt conveyer and bucket elevator with a sketch.	**07**
	(b)	Catalyst pellets 5mm diameter are to be fluidized with 45000 kg/hr of air at 1 atm. and 80^0C in a vertical cylindrical vessel. The density of the catalyst particle is 960 kg/m^3 and their spherecity is 0.86. If the given quantity of air is just sufficient to fluidize the solids, what is the vessel diameter? Assume ε_M = 0.45. Take air properties: density = 1kg/m^3, viscosity = 0.02cP.	**07**
Q.4	**(a)**	Explain the construction and working of a plate and frame filter press.	**07**
	(b)	What is the use of filter aid and filter media?	**04**
	(c)	Write a short note on batch centrifuge.	**03**
		OR	
Q.4	**(a)**	Differentiate between clarifier and classifier along with their working principle.	**07**
	(b)	Describe the different mixing equipments used for solid mixing in brief.	**07**

Q.5	**(a)**	With the help of neat sketch explain different types of impellers for agitation of liquids along with application.	**07**
	(b)	What is swirling and what is its effect on liquid mixing. What are the various ways of prevention of swirling?	**04**
	(c)	What is power number and its significance?	**03**

OR

Q.5	**(a)**	With the help of a neat sketch explain the construction and working of a cyclone separator.	**07**
	(b)	Write short note on (i) motionless mixer and (ii) ribbon blender.	**07**

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