

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) Sphercity 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 80⁰C in a vertical cylindrical vessel. The density of the catalyst particle is 960 kg/m³ and their sphercity is 0.86. If the given quantity of air is just sufficient to fluidize the solids, what is the vessel diameter? Assume $\epsilon_M = 0.45$. Take air properties: density = 1kg/m³, 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**
