

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE – SEMESTER V • EXAMINATION – WINTER - 2012****Subject code: 150502****Date: 12-01-2013****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** (a) Define: i) minimum fluidization velocity, ii) mesh, iii) screen effectiveness, iv) crushing efficiency, v) filter aids, vi) Power number. **06**
- (b) Calculate the sphericity of a cylinder of 1cm diameter and 1cm height. **04**
- (c) Differentiate between ideal screen and actual screen. **04**
- Q.2** (a) Explain the construction and working of a jaw crusher with a neat sketch. **04**
- (b) Discuss different types of conveyers and their application. **OR** **07**
- (b) A roller crusher has rolls of 150 cm in diameter and 50 cm face width. The crushing roll surfaces are 1.25 cm apart at the narrowest point. The angle of nip 30°. The roll crusher operates at 100 rpm. They are used to crush a rock of specific gravity of 2.35. Calculate: **07**
- i) the maximum permissible size of feed.
- ii) the actual capacity, if the actual capacity is 15% of the theoretical
- Q.3** (a) Derive the expression for screen effectiveness by doing material balance over a screen. **07**
- (b) A ball mill of diameter 2000 mm uses steel balls of 100 mm diameter for grinding rock. The ball mill operates at 15 rpm. At what speed will the mill have to be run if the 100 mm balls are replaced by 50 mm balls, all the other conditions remaining the same? **07**
- OR**
- Q.3** (a) Describe different types of solid mixers in brief and their applications. **07**
- (b) Explain the working of a closed circuit grinding system with a neat sketch. **07**
- Show the difference between open circuit and closed circuit grinding.
- Q.4** (a) List the various types of filtration techniques used. Briefly explain each technique and list the major equipment in each category. **07**
- (b) Explain the fluidization regimes with neat sketch. **07**
- OR**
- Q.4** (a) Discuss the different criteria's for selection of conveyers. **06**
- (b) Describe Geldarts classification of powders for fluidization. **04**
- (c) List various application of fluidization in chemical industry. **04**
- Q.5** (a) Draw neat sketch of an agitated vessel and label the important parts. **04**
- (b) Write a short note on rotary filters. **04**
- (c) Describe a continuous gravity thickener. **06**
- OR**
- Q.5** (a) Describe batch sedimentation process with a graph. **04**
- (b) What are the various methods for prevention of swirling in an agitated vessel? **04**
- (c) Write a short note on cyclones and their applications. **06**

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