

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2150502****Date: 20/06/2019****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 (1) Mesh number (2) Angle of nip (3) Work index **03**
(b) Define sphericity. Find the sphericity of ideal cylinder. **04**
(c) Write principle of comminution. Explain various laws of size reduction in detail. **07**

- Q.2** (a) What rotational speed in RPM would you recommend for a ball mill of 1200 mm in diameter charged with 75mm balls? **03**
(b) Derive the equation for screen effectiveness. **04**
(c) Explain and differentiate open and closed circuit operation for size reduction of solid with neat schematic diagram. **07**

OR

- (c) Give classification of size reduction equipments. **07**

- Q.3** (a) List various application of fluidization in chemical industry. **03**
(b) A certain set of crushing rolls of 1000 mm diameter by 375 mm width of face. They are set so that the crushing surfaces are 12 mm apart at the narrowest point. The angle of nip is 30° . What is the maximum permissible size of feed? **04**
(c) Define critical speed of the ball mill. Explain in detail the construction and working of the Ball mill with neat figure and the industrial application. **07**

OR

- Q.3** (a) Discuss the different criteria's for selection of conveyers. **03**
(b) What will be the power required to crush 150 tones per hour of limestone if 80% of the feed passes 2 inch screen and 80% of the product passes a 1/8 inch screen? Work index of limestone = 12.74. **04**
(c) What is fluidization? Discuss the conditions for fluidization. **07**

- Q.4** (a) What are filter aids and filter media? **03**
(b) With neat diagram explain about grizzlies. **04**
(c) Explain in detail plate and frame filter press with its neat diagram and advantages. **07**

OR

- Q.4** (a) Explain construction and working of the cyclone separator. **03**
(b) Explain sink and float method. **04**
(c) What is the differential settling method? Explain in detail the working of batch sedimentation with application. **07**

- Q.5** (a) Explain screw conveyer in brief with its industrial applications. **03**
(b) Differentiate between clarifier and classifier along with their working principle. **04**
(c) Describe the different mixing equipments used for solid mixing in brief. **07**

OR

- Q.5** (a) What are the preventive measures for reducing swirling in agitated tanks? **03**
(b) Explain method for calculation of power consumption for agitator. **04**
(c) A silty soil containing 14% moisture was mixed in a large Muller mixer with 10.0 weight percent of a tracer consisting of dextrose and picric acid. After 3 minutes of mixing, 12 random samples were taken from the mix and analyzed calorimetrically for tracer materials. The measured concentrations in the samples were, in weight percent tracer, 10.24, 9.30, 7.94, 10.24, 11.08, 10.03, 11.91, 9.72, 9.20, 10.76, 10.97 and 10.55. Calculate the mixing index **07**

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