GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER- V • EXAMINATION - WINTER 2016

Subject Code:150502 Subject Name: Mechanical Operation Time: 10:30AM – 01:00PM Instructions:

Total Marks: 70

Date: 24/11/2016

Instructions: 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. **(a)** Define sphericity. Prove that sphericity of sphere is 1. Write short note on one of 0.1 07 the mixer for cohesive solids with sketch. Describe open and closed circuit operation for size reduction with neat sketch. **(b)** 07 **O.2** Describe various laws for size reduction and write principle of comminution. 07 **(a)** Give classification of various size reduction equipments. **(b)** 07 OR A silty soil containing 14 % moisture was mixed in a large Muller mixer with **(b)** 07 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 and standard deviations. 0.3 Describe the working of a ball mill and derive the expression for critical speed of 07 (a) a ball mill. **(b)** Explain the construction and working of a roller crusher with the help of a neat 07 sketch and write the important equations for roll crusher. OR Describe different types of conveyers in brief used for solid transport. 0.3 07 (a) What is fluidization? Discuss the conditions for fluidization. **(b)** 07 Explain in detail about filter media and filter aid. 0.4 07 (a) Explain principles of cake filtration and pressure drop through filter cake. 07 **(b)** OR **Q.4 (a)** What will be the power required to crush 150 tonnes per hour of limestone if 07 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. What is swirling and what is its effect on liquid mixing. What are the various 07 **(b)** ways of prevention of swirling? A bed of ion-exchange beads 8 ft deep is to be backwashed with water to remove 07 **Q.5 (a)** dirt. The particles have a density 1.24 g/cm³ and an average size of 1.1 mm. What is the minimum fluidization velocity using water at 20 °C, and what velocity is

(b) What is flow number? Derive the mathematical form of N_Q with all its 07 consideration.

required to expand the bed by 25 percent? The beads are assumed to be spherical (Φ s=1), ϵ_{M} is taken as 0.40 and μ =0.01 P and ρ =1 g/cm³. Take exponent m = 3.9.

OR

- Q.5 (a) Explain the working of cyclone separator with neat sketch. 07
 - (b) Explain sink and float method and also differential settling method. 07