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ECH-302

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 151305

Roll No. | | | | | | | | | | |

B. Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

MECHANICAL OPERATIONS

Time : **2** Hours] [Total Marks : **50**

Note : (1) Attempt all questions.

(2) Assume missing data if any.

1. Answer any FOUR parts: **3.5x4=14**

(a) What is a criterion of separation in Mechanical Operations? Give some examples.

(b) How the concept of unit operation useful in the study of chemical industries?

(c) Calculate the sphericity of a cylinder of diameter 1 cm and height 3 cm.

(d) What are the golden rules of Sampling?

(e) Critically analyze the differential and cumulative methods of analysis to determine the average particle size

(f) Describe various statistical mean diameters.

2. Answer any TWO parts: **6x2=12**

(a) Describe the operation of the hammer mill, the fluid energy mill and the ball mill. In each case identify the dominant stressing mechanism responsible for particle breakage.

(b) Describe the various inter particle forces important to granulation (size enlargement) and their relative importance as a function of particle size?

(c) What are the various types of crushers? Explain any one of them with neat diagram.

3. Answer any TWO parts: **6x2=12**

(a) Write short notes on : Silos and hopper

(b) Describe how weighing is done in chemical industry?

(c) Why conveying of solid is done in chemical industry? State the different conveyers used in the industry.

4. Answer any TWO parts: **6x2=12**

(a) What forces act on a particle inside a cyclone separator? What is meant by the x_{50} cut size? Under what conditions might we choose to operate cyclone separators in parallel?

(b) Describe the working of thickener and classifiers.

(c) A filtration is carried out for 10 min at a constant rate in a leaf filter and thereafter it is continued at constant pressure. This pressure is that attained at the end of the constant rate period. If one quarter of the total volume of the filtrate is collected during the constant rate period, what is the total filtration time? Assume that the cake is incompressible and the filter medium resistance is negligible.