

MECHANICAL OPERATION

Time: Three hours

Full Marks: 100

PART-I (Marks-60)

(Answer Any Five Questions. All questions carry equal marks.)

1. a.) What is the definition of equivalent diameter of a particle ?
b.) What do you mean by shape factor of a particle?
c.) Calculate the shape factor of a solid cylindrical particles having its height is equal to its diameter. (4+4+4)
2. Discuss the analytical methods for determining the particle diameters of a particular fraction of a mixture of solid particles by screen analysis. (12)
3. a.) Discuss the basic principle of Bond's law and Rittinger's law for determining the energy required for a machine being employed in crushing or grinding operations.
b.) The energy required per unit mass to grind limestone particles of very large size to 200 μm is 18.7 kWh/ton. Calculate (using Bond's law) the energy to grind the particles from a very large size to 40 μm size of product. (6+6)
4. Discuss the design principle and operating methods of
 - a.) Roll crusher, and
 - b.) Ball mill
5. a.) Deduce the equation for determining the terminal velocity of a particle undergoing free settling in a stagnant liquid at Stoke's region.
b.) Compare this equation with that of Hindered settling. (8+4)
6. Starting from the concept of pressure drop in a packed bed, determine the equation of total pressure drop along the filter cloth and cake deposited during filtration of a slurry containing solid particles in water. (12)
7. Write short notes on : (Any Two) (6+6)
 - a.) Differential settling process.
 - b.) Cyclone separator
 - c.) Mixing index
 - d.) Agitation

Ref. No. EX/FTBE/T/315/2017(S)

BACHELOR OF ENGINEERING IN FOOD TECHNOLOGY & BIOCHEMICAL
ENGINEERING SUPPLEMENTARY EXAMINATION, 2017

(3rd Year 1st Semester)

MECHANICAL OPERATIONS

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Full Marks: 100

Part-II

Answer any two questions

20×2 = 40

1. What is the goal of material handling? What are the different types of equipments used in solid material handling? Mention different types of conveyers used in solid material handling. 5+5+10 = 20
2. What are the different equipment selection criteria? Briefly describe about different storage equipments for solid material handling. Write a short note on a equipment which can separate fine powder from the air mixture. 10+5+5 = 20
3. What is the basic nature of pump for transportation of slurry material and what is the difference with liquid transporting pump? What are the different types of slurry pumps? Write advantages and disadvantages of any slurry pump. 5+8+7 = 20