MAJAOR ( MAY- 2007)

*CH L 133 - POWDER PROCESSING AND TECHNOLOGY*

**(Answer all questions)**                                    **time: 2 hr.**
**[List any assumptions made]**

1. In a formulation section of Pharma industry uniform mixture of sizes are stored in a hopper. It was observed there is fluctuation in the size distribution of material coming out of hopper at various time                                    (10)

    i)    Why there is segregation inside the hopper
    ii)   Describe radial and axial size distribution during unloading of powder from hopper
    iii)   Explain sizes that will vary from the sample collected at different times
(Explain size distribution with reference to fines and coarse)

2. Explain the importance of porosity of packed powder with reference to a) spherical particles b) flaky particles c) Needle shaped particles                                    (10)

3. Give generalized Communition equation and simplify it to derive Rittinger, Kick's and Bond's equation. Give limitations of these equations                                    (10)

4. In Tile manufacturing unit Ball mill of Dia=. 2.2  (mm) and length =2.4 (mm) is filled with ceramic balls of 50 mm of density 2500Kg/cu.m with ball loading of 0.45. The slurry with particles of density 2400Kg/cu.m was filled in slurry for conc.65 (wt.% ). The energy consumed was observed to be 120KW/ton. The slurry was filled to 80% of volume of mill. Estimate the following. The feed size was 25 mm and product size was 80 microns.                                    (20)
    a)  Amount of balls added in Tons
    b)  Amount of solid added in Tons
    c)  Amount of water added
    d)  Amount slurry added in to the mill
    e)  Work index of Bond's equation

5. Define permeability of filter cloth. Explain the method to select the filter cloth. What are main factors depends on the filtration operation? Explain the importance of filtration in pharmaceutical industry.                                    (10)

6. Write short notes on the following　　　　　　　　　　　　　　　　　(20)

    i)　　Nano particle application in Pharma industry
    ii)　　Why ball mill is selected in Paint industry
    iii)　　Chemical engineering in semiconductor industry
    iv)　　Particle characterization in Fuel cell making

**Problems for Groups:**　　　　　　　　　　　　　　　　　　　　　　　(20)

**Group - 1**

Write with example the importance of shape measurement in pharmaceutical

industry? How do you quantify that shape of particle from Blaine's Permeameter and

angle of repose? Write if there is any relation between angle of repose and particle

size and shape.

**Group - 2**

    a) Explain effect of pH in wet grinding?　B) Express relationship between

    Feret diameter and sieve diameter c) what is the effect of loading on

    collection efficiency in uniflow cyclone

**Group - 3**

What are three operations involved in powder coating?　Write techniques of powder

coating? What are advantage and disadvantage in powder coating?

**Group - 4**

Explain the importance of filler in paper industry? Name three fillers. What properties

of paper are improved with addition of filler material?