MAJOR (November-2004)

CH 133 NL- POWDER PROCESSING AND TECHNOLOGY

(Answer all questions) **time: 2 hr.**

[List any assumptions made]

1. The feed size distribution and product size distributions obtained from a Ball Mill is given in Table-1. The feed rate of material was 2 ton/hr with power consumption of 120KW. Estimate the energy constant with grinding equations (Bonds, Rittinger and Kicks Law).

Table-1.1 Cumulative size distribution of feed material

Cumulative undersize (wt%)	8	6	4	2	1	0.5
Size (microns)	100	96	76	41	11	3

Table-1.2 Size distribution of Mill Outlet

Cumulative undersize (Wt.%)	6	4	2	1	0.5	0.25	0.1	0.106	0.075
Size (microns)	100	87	60	45	42	39	37	29	25

(10)

2. Write in few lines the industry and material for the use of the cyclone for the following:
   i) Dust collector, ii)Gas solid heat exchanger, iii)Gas solid reactor
   iv) Incinerator, v) Classifier (10)

3. Derive an expression to estimate the cut particle size for the cyclone separator. Design a cyclone for air flow rate 250000 cu.m/.hr.(hint: Vi =14m/s; b/D=0.25; and a= 3b).Estimate the cut particle size of the designed cyclone. (10)

4. Explain mass flow and funnel flow properties of silo (5)

5. Explain difference between uni-flwo and reverse flow cyclone (5)

6. Describe Hydro cyclone as classifier, thickener and froth floatation unit (10)

7. 100000 m3/hr. of air flows at 400 ^{O}C in to the cyclone. The pressure drop in cyclone is 110 mm WG. Estimate the following:
   a)What is the power consumed in K.W.hr / day
   b) What is the power saving in KW.hr/day if the system is at 400 ^{O}C and pressure drop is reduced to 90 mm WG.
   c) What is the power saving in KWhr/day if the system is at 110mm WG and air temperature is reduced to 290 ^{O}C.
   d) What is the amount of water required in K. Lit/day to cool the air from 400 ^{O}C to 290^{O}C by direct spraying of water.

(density of air $\rho = \frac{359.49}{T^{1.00275}}$ where T is in ^{O}K) (20)