

Veer Surendra Sai University of Technology
 Department of Chemical Engineering
 Mid Term Examination, March-2017
 4th Semester, B.Tech. Chemical Engineering

Sub: Process & Handling of Materials

Max. Marks: 20

Time: 2Hrs.

Note: Answer Q. No. 1 which is compulsory and any three from the rest. Make suitable assumptions, if necessary.

Q. No.		Marks
1	(a) Find the shape factor of a particle in the shape of a cuboid having L: B:H in the ratio 1:2:3. (b) Why sphere is taken as reference shape to define sphericity of a non-spherical particle? (c) Explain with examples how particle shape and size effects particle properties. (d) (i)What are the different forces employed in size reduction equipments? (ii) Why more power is required to grind finer particles than coarser particles? (e) Why average particle size concept is used to represent the size of a particle used in screening? Explain the terms oversize and undersize used in screening.	1x5
2	Explain with a neat labelled diagram the construction, working principle, advantages and dis-advantages of following industrial screening equipments:- (a) Trommels (b) Gyratory screens	2.5+2.5
3	(a) What are the factors effecting screen effectiveness? Write the 3 laws of comminution using generalised expression ? (b) Derive the expression for screen effectiveness.	2+3
4	(a) Derive the expression for specific surface of mixtures and total number of particles. (b) Size analysis of a powdered material on a weight basis is given by straight line from zero mass fraction at 2 μm to 1 mass fraction at 200 μm . Calculate the volume mean diameter. Take step increment =0.2 for mass fraction.	3+2
5	(a) Explain the three laws of comminution. (b) A crusher and grinder are connected to the same power drive. About 2500 kg/hr of limestone passes through the crusher and then through the grinder in succession. Screen analysis of feed & product obtained from crusher and product from the grinder indicated the specific surface areas as 2.9, 103, 865 m^2/kg respectively. Calculate the power required in kW by the drive to run the crusher-grinder assembly, if the η_m of crusher is 20 % and that of grinder is 25 %. Rittinger's number for limestone is 77.4 m^2/kJ .	2+3
6	Powdered coal with following screen analysis is fed to a vibrating screen screen. The particle size distribution data of feed, oversize and undersize is shown below in (a) Determine effectiveness of 48 mesh mesh screen taking undersize as product. (b) Ratio of quantity of undersize to oversize. (Table given in next page)	4+1

Mesh No	% Feed retained	% Oversize retained	% Undersize retained
-3 +4	1.07	1.8	0
-4+6	2.35	3.3	0
-6+8	6.72	8.8	0
-8+10	8.64	11.2	0
-10+14	10.87	14.2	0
-14+20	17.59	22.9	0
-20+28	13.97	18.20	0
-28+35	10.77	10.4	11.95
-35+48	10.13	6.5	21.98
-48+65	7.46	2.5	23.91
-65+100	5.01	0.2	18.77
-100+150	3.3	0	14.27
-150+200	2.12	0	9.12

