BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.TECH   SEMESTER: III
BRANCH: CHEMICAL AND CHEMICAL (P&P)   SESSION : MO/2019

SUBJECT : CL205 MECHANICAL OPERATIONS

TIME: 2:00 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

Q1 (a) Calculate the sphericity of spherical, cubical and cylindrical particles.   [2]
     (b) Describe the mechanism of solid flow in hopper.   [3]

Q2 (a) Compare belt conveyor and screw conveyor.   [2]
     (b) Derive the expression for efficiency of a screen. Calculate the minimum and maximum possible range of efficiency.   [3]

Q3   Draw a neat sketch of jaw crusher and explain the working of it.   [5]

Q4 (a) What are the advantages of rod mill?   [2]
     (b) A material is crushed in a Blake jaw crusher such that the average size of particle is reduced from 50 mm to 10 mm, with the consumption of energy of 13.0 kW/(kg/s). What will be the consumption of energy needed to crush the same material of average size 75 mm to average size of 25 mm: [3]
           (i) Assuming Rittinger's Law applies,
           (ii) Assuming Kick's Law applies.
           Which of these results would be regarded as being more reliable and why?

Q5 (a) The terminal settling velocity of a 6 mm diameter glass sphere (density = 2500 kg/m3) in a viscous Newtonian liquid (density = 1500 kg/m3) is 100 µ m/s. The value of acceleration due to gravity is 9.81m/s2. Estimate the viscosity of the liquid (in Pa-s) by applying Stokes law.   [2]
     (b) Describe the working of gravity settling tank with sketch.   [3]