PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter, 2019-20 Examination

Semester: 3   Date: 27/11/2019
Subject Code: 203103203   Time: 2:00pm to 4:30pm
Subject Name: Particle and Fluid Particle Processing   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions -   **(15)**

1. Martin and Fernet defined characterization of particles based on-

   a) Particle shape

   b) Particle size

   c) a and b both

   d) none

2. Size reduction techniques are used to –
   a) To increase specific surface area.
   b) For easy storage.
   c) For better handling
   d) All of the above

3. Rittinger's law is applicable for the particles having range of –
   a) Diameter of particle more than 50 mm.
   b) Diameter of particle lies between 0.05 mm and 50 mm.
   c) Diameter of particle less than 0.05 mm.
   d) None of the above.

4. Properties of particles are-
   a) Crystalline and amorphous
   b) Porous and Non porous
   c) Roughness
   d) All of the above

5. Force acting on submerged bodies are-
   a) Drag Force
   b) Lift Force
   c) Centrifugal Force
   d) Both a) and b)

6. Sphericity is independent of _____(size/shape).

7. ASTM series stands for _____ .

8. It is possible to create drag force without lift force in submerged bodies? (True/False)

9. Gradation test is also known as _____

10. Characterization of particle is based on _____and _____.   .

11. 14/20 mesh means-

12. Sphericity of spherical particle is-

13. Area of openings in any one screen in series is exactly _____ that of opening in next series.

14. Write the formula of Work Index in terms of gross energy required per tonne of feed.

15. Write the different types of fluidization.

Q.2 Answer the following questions. (Attempt any three) **(15)**
A) Explain classification of filtration.

B) Explain different regimes formed during batch sedimentation process.

C) Explain the laws of communition.

D) Explain Size reduction methods with examples.

Q.3 A) Explain Fluidization and minimum fluidization velocity. Also mention applications of fluidization. **(07)**

B) Volume of filtrate is given as 5 litres and volume of washing water is given as 1 litre. Time given for filtration is 100seconds. Calculate time requirement for washing. **(08)**
Equations given as: $\frac{\Delta P}{L} = k_1 \frac{dV}{dt}$, $L = k_2 V$

OR

B) Calculate the drag coefficient for a bacteria of size 2µm moving in water with velocity of 15mm/s.(Consider Stokes's law regime) **(08)**

Q.4 A) Derive pressure drop equations for cake filtration process and also derive final rate of filtration equation. **(07)**

OR

A) Explain Batch Sedimentation process. Derive equation for terminal settling velocity. **(07)**

B) What are nano-particles. Explain its characteristics with applications. **(08)**