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**Part C**

01. A hydro-cyclone is a device to classify, separate or sort particles in a liquid suspension based on the ratio of their centripetal force to fluid resistance. This ratio is high for dense and coarse particles, and low for light and fine particles. Hydro-cyclone also finds application in the separation of liquids of different densities.

- a. Explain "Use of hydro-cyclone in ceramic industry" using flow sheet diagram/s. [40 marks]
- b. What is cut point? [30 marks]
- c. Briefly explain how to determine the cut point [30 marks]

02. a. State the Stokes's and Newton laws and identify their limitations. [20 marks]
- b. Derive an equation for the terminal velocity of a spherical particle of diameter  $d$  and density  $D_s$  falling under gravity in a viscous fluid (the fluid viscosity =  $\eta$ ) of density  $D_f$  under free-settling conditions using Stokes's law [40 marks]
- c. Calculate settling time of each given diameter size ( $d$ ) mineral particles in slurry. [40 marks]

- Particle diameter: 40, 60, 600, 1000 microns
- Viscosity of slurry =  $1.015 \times 10^{-3}$  Pa.s
- Specific gravity of mineral = 2.65
- Slurry height from bottom to top level of slurry = 80 mm
- Acceleration of gravity =  $9.8 \text{ m/s}^2$

03. Briefly explain **any four** of the following. Use diagrams if necessary. [25 marks each]
- a. Meteorological balance in mineral processing industry.
  - b. Hydro cyclone and its zones.
  - c. Types of feeders use in the mineral processing plant
  - d. Deference between High-tension separator and Gravity separation methods.
  - e. De-watering methods in mineral processing industry.

