Module 3: Size Characterization

1. Given the following particle size distribution (PSD) measured by a 0.6 μm-wavelength laser particle counter in a manufacturing facility:

Size Range (nm)	**Count**
10 – 20	1000
20 – 30	500
30 – 40	200
40 – 50	100
50 – 100	10

- Identify the light-scattering regime (assuming isolated spherical particles).
- State how scattering intensity would change from size channel to channel.
- What is the nature of the particle size distribution curve? Is it consistent with typical clean room air contamination?
- What would be the preferred technique to quantify particle sizes in this size range?

- Name five required characteristics of a laser particle counter, and describe how these are ensured in practice.
- Sketch the tri-modal nature of atmospheric particle size distribution. What formation mechanisms are predominant in each size range?
- Sketch the nature of indoor particle size distribution. What formation mechanisms are predominant in each size range?
- Given a particle size distribution, how would you calculate a:
    - Linear mean diameter
    - Surface mean diameter
    - Volume mean diameter
    - Sauter mean diameter?
    - What is the relevance of the Sauter mean diameter?
- Describe the static and dynamic methods of particle size measurement. Give two examples of each technique.
- Describe how you would perform size characterization for the following cases, and outline the principles involved: (10 Marks)
    - 1 – 10 nm sized particles suspended in air
    - Sub-μm to μm-sized particulate media used in a high-concentration polishing slurry
- What are the three common size-distributions found in practice? Sketch their characteristic size-distribution curves.