

## POWDER METALLURGY

### Module I (12 Hours)

Production of powders: Mechanical, Chemical, Electrolytic and atomization Methods. Commercial production of metallic powders. Characterization of metal powders: Chemical composition and structure: Particle size and their shape, apparent and tap density, pressing properties and their determination: Powder flow, compressibility and porosity measurements:

### Module II (12 Hours)

Treatment of metal powders: Behaviour of powder during compaction. Die compaction: Types of presses: Tooling and design: Modern methods of powder consolidation, Isotactic pressing: Roll compaction, Powder extrusion and forging, Slip casting, evaluation of sintered products.

### Module III (12 Hours)

Sintering furnaces and atmosphere: Stages of sintering, driving forces for sintering, mechanism of sintering, liquid phase sintering, hot processing: Iron, copper and aluminium base P/M alloys: Porous materials: Friction and Antifriction materials: Brushes, Heavy alloys, Cemented carbides: Cermets, Electrical contact materials.

### Books for reference:

1. German R.M., Powder Metallurgy Science
2. Lenel F.V., Powder Metallurgy
3. Hirschhorn J.S., Powder Metallurgy.
4. Goetzel C., Treatise on Powder Metallurgy – vol. 1&2.
5. Sands R.L. & Shakespeare C.R., Powder Metallurgy Practice and Applications.
6. Hausner H. H. & Mal M., Handbook of Powder Metallurgy — 2nd Ed.