

Surface Engineering

Credits: 4

Unit-I: Introduction: Fundamentals of surface engineering, Importance of Surface engineering, Evolution and Significance of Surface engineering, Classification of Surface engineering process, Surface Energy, The significance of surface, treatment of metals, Surface preparation techniques.

Unit-II: Conventional surface engineering 1: Surface, Surface engineering metal removal techniques, Surface engineering by Metal addition, Electro deposition/Plating, Surface modification of Ferrous and Non-ferrous alloys, Carburizing, Nitriding, Cyaniding etc.,

Unit-III: Conventional surface engineering 2: High temperature corrosion followed by protective coating, passivity, Pilling-Bedworth ratio, Oxidation rates, Conversion coating, Phosphating, Chromating, Hydrogen Attack, Anodizing,

Unit-IV: Advanced Surface engineering practices 1: Surface treatment Methods, Flame hardening, Induction hardening, Laser beam Hardening, Plasma spraying, Sputter deposition, Physical vapor deposition (PVD), Chemical vapor deposition (CVD), Ion-implantation.

Unit-V: Advance Surface engineering practices 2: Thermal spraying, Classification of Thermal spraying, Flame spraying techniques, Electric Arc spraying, Cold spraying.

Unit-VI: Characterization of Coatings: Measurements of Coating thickness, Evolution of Mechanical properties, Evolution of coating Adhesion, Hardness Test, Evolution of Crystallographic structure of Surface by X-RD, Evolution of Surface morphology & Microstructural properties by (SEM&TEM).

References

- 1) K.G. Budinski, Surface Engineering for Wear Resistance, Prentice Hall, Englewood Cliffs, 1988.
- 2) M. Ohring, The Materials Science of Thin Films, Academic Press Inc, 2005.
- 3) Surface engineering of Metals principles, Equipments, Technologies by T.Burakowski, T. Wierzchon(Poland),Washington CRC press 2009.
- 4) Surface treatment of metals for Adhesive bonding second edition by Sina Ebnesajjad, USA, 2006&2014.
- 5) Advance thermally Assisted Surface Engineering Processes by Ramnarayan Chattopadhyay India.,Kluwer Academic Publishers.,2004.