PMT8J001 SURFACE ENGINEERING

Module – I (12 hours)

Importance and necessity of surface engineering; classification and scope of surface engineering in metals, ceramics, polymers and composites, Surface dependent engineering properties, - wear, friction, corrosion, fatigue, reflectivity, emissivity; common surface initiated engineering failures; mechanism of surface degradation.

Module – II (12 hours)

Conventional surface engineering methods: carburising, nitriding, cyaniding, diffusion coating, hot dipping, galvanizing. Scope and application of conventional surface engineering techniques in engineering materials; advantages and limitations of conventional processes. surface modification by directed energy beams like ion, electron and laser beams; energy transfer, beam configuration and modes, surface integration, heat and mass transfer (composition and temperature profile) during directed energy beam irradiation; novelty of composition and microstructure; post irradiation characterization (microstructural & compositional) and testing/evaluation of surface-properties; structure-property correlation.

Module –III (12 hours)

Recent trends in surface engineering: Coatings and Thin Films and their applications; Stress, defect formation and surface evolution; classification of Processing routes; Physical/chemical vapour deposition, plasma spray coating, plasma assisted ion implantation, Sol-gel processing, Langmuir-Blodgett films, Electrodeposition; Characterization; Thickness, residual stress, morphology, adhesion.

Books for Reference:

1. *Surface engineering of metals - principles, equipments, technologies, by Tadeusz Burakowski and Tadeusz Wierzchon, CRC press.*
2. *ASM Handbook on Surface Engineering.*
3. *M. Ohring, Materials Science of Thin Films, 2nd Edition, Academic Press, 2002.*
4. *L. I. Tushinsky, I. Kovensky, A. Plokhov, V. Sindeyev, P. Reshedko, Coated Metal: Structure and Properties of Metal-Coating Compositions, Springer, Germany, 2002.*