# Gautam Buddha University, Greater Noida

## School of Engineering (Mechanical Engineering)

| Degree | Course Name | Course Code | Marks:100 |
|---|---|---|---|
| M. Tech. | Surface Engineering | MEM 517 | SM+MT+ET 25+25+50 |
| **Semester** | **Credits** | **L-T-P** | **Exam.** |
| I | 3 | 3-0-0 | 3 Hours |

### Unit - I

**Metal Cleaning And Preview on Surface Engineering:** Need and relevance of surface engineering; Pre-treatment of coating; General cleaning process for ferrous and non ferrous metals and alloys; Selection processes – alkaline cleaning – emulsion cleaning – ultrasonic cleaning – acid and pickling salt bath descaling – abrasive bath cleaning – polishing and bulling shot peening; Classification of surface engineering processes. **(06 Hours)**

### Unit – II

**Thermal Spraying Processes And Electrodeposited Coatings:** Thermal spraying – Flame, arc, plasma and HVOF processes – PLV process; Design for thermally sprayed coatings – coating production; Spray consumables – principles of electroplating; Technology and control – electroplating systems – properties and Faraday's Law – factors affecting throwing power; Applications of electrodeposits; Non aqueous and electroless deposition. **(08 Hours)**

### Unit - III

**Hot Dip Coating and Diffusion Coatings:** Principles – surface preparation – batch coating and continuous coating process; Coating properties and applications; Principles of cementation – cladding – Diffusion coating of C, N, Al, Si, Cr and B; Structure; Properties and application of diffusion coatings; Chemical vapour deposition; Physical vapor deposition. **(08 Hours)**

## Unit - IV

**Non-Metallic Coating Oxide and Conversion Coatings:** Plating coating – Lacquers – rubbers and elastomers – vitreous enamels – anodizing phosphating and chromating; Application to aluminium, magnesium, tin, inc, cadmium copper and silver; Phosphating primers. **(08 Hours)**

## Unit - V

**Selection and Tribological Characterization of Coatings:** Selection of coatings – industrial applications of engineering coatings.; Basic mechanisms of wear – abrasive, adhesive wear, contact fatigue – Fretting corrosion – Corrosion, Testing wear resistance; Practical diagnosis of wear. **(08 Hours)**

## Unit - VI

**Quality Assurance and Testing of Coatings:** The quality plan – design – testing and inspection of thickness; Adhesion strength; Porosity measurement; hardness measurement; Elasticity and toughness measurement. **(07 Hours)**

## Recommended Books:


1. Engineering Coatings – Design and Application; Stan Grainger; Jaico Publishing House; 1994.
2. Electroplating Handbooks; N.V. Parthasarathy; Prentice Hall; 1992.
3. Metals Hand Book vol.2; 8th Edition, American society of Metals; 1994
4. Principles of Metal Surface Treatment and Protection; D. R. Gabe; Pergamon; 1990
5. Advances in Surface Treatments; Niku-Lavi; Pergamon; 1990