

SURFACE TREATMENT PROCESSES-EL 2
Semester III (Production Engineering) SUB CODE: MEPR303-C
Teaching Scheme (Credits and Hours)

Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	0	0	3	3	3	70	30	20	0	120

LEARNING OBJECTIVES:

The objective of this course is

- To learn various concepts related to application of various surface treatment processes for protection against corrosion, wear

LESSON PLANNING

SR.NO	CHAPTER NO	DATE/WEEK	%WEIGTAGE
1	1,2	1 st 2 nd 3 rd	20
2	3,4	4 th 5 th 6 th	20
3	5	7 th 8 th 9 th	20
4	6,7	10 th 11 th 12 th	20
5	8	13 th 14 th 15 th	20

Total hours (Theory): 45, Total hours (Practical):00, Total hours: 45

DETAILED SYLLABUS

Chap. No.	Topic
1	Introduction of Surface dependent properties: Classification and scope of surface engineering in metals, ceramics, polymers and composites, tailoring of surfaces of advanced materials. Surface protection (Physical)
2	Surface dependent engineering properties, viz., wear, friction, corrosion, fatigue, reflectivity, emissivity, etc.; common surface initiated engineering failures; mechanism of surface degradation; importance and necessity of surface engineering
3	Various Surface Cleaning Processes: Classification and Selection of Cleaning processes. Acid and Alkaline, Salt bath, Ultrasonic, Mechanical cleaning, Pickling and descaling, etc. Process details of each, applications of each, Environmental concern of each
4	Surface modification techniques: classification, principles, methods, and technology used, conventional surface engineering methods: Diffusion coatings like carburizing, nitriding, cyaniding, hot dipping, galvanizing, anodizing, Aluminizing, Phosphetising etc.
5	Diamond and Diamond like Carbon thin films and coatings for engineering surfaces .Electrochemistry and electro-deposition; electro less deposition Scope and application of conventionally deposited materials; advantages and limitations of above mentioned processes.
6	Other Surface engineering processes: Influence of manufacturing processes on various surface properties of an engineering component; scope of surface engineering in augmentation of surface properties. Other processes used in surface engineering – Thermal spray coatings, Physical vapor deposition, Chemical vapour deposition

7	Process, applications. Mass production; surface engineering problems related to substrate characteristics. Plasma enhanced Surface engineering, Ion Implantation.
8	<p>Evaluation of engineered properties: control properties, response properties; surface geometry – characterization techniques (conventional and recent trends); coating thickness measurements – laboratory techniques and special techniques for accurate routine thickness measurements; adhesion measurement – conventional methods and recent developments;</p> <p>Recent trends in surface engineering: Measurement of mechanical properties of engineered surface in nano scale; Evaluation of tribological characteristics of engineered surface in macro, micro and nano scale, simulation of actual application environment in tribometer. Use of Laser in Surface Engineering</p>

INSTRUCTIONAL METHOD AND PEDAGOGY [Continuous Internal Assessment (CIA) Scheme]

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all units while conducting teaching & examination.
- Attendance is compulsory in lectures and tutorial.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.

STUDENTS LEARNING OUTCOMES:

At the end of the course

The students will gain an experience in surface treatment processes.

References:

1. ASM Hand Book, Vol. 5, “Surface Engineering”.
2. Tool & Manufacturing Engineers Hand book, Vol.3, ‘ Materials Finishing and Coating’