



Department of Chemical Engineering	LP: CL22014
B.E/B.Tech/M.E/M.Tech : Chemical Engineering	Rev. No: 00
PG Specialisation : NA	Date: 08.07.24
Sub. Code / Sub. Name : CL22014 / Surface Engineering	
Unit : I	

UNIT I INTRODUCTION**9**

Importance of surfaces and wear surface properties in engineering applications, Current status of surface engineering, Categories of wear, Low-stress abrasion, High-stress abrasion, Gouging abrasion, Cavitation, Slurry and impingement erosion, Fretting wear, Adhesive wear, Seizure, Galling, Oxidative wear, Pitting wear, Spalling, Impact wear and Brinelling.

Objective: • Identify the wear phenomena and mechanism occurring on the surfaces of various substances.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Importance of surfaces and wear surface properties in engineering applications	T1:2-10	PPT
2	Current status of surface engineering	T1:10-14	PPT
3	Categories of wear	T1:16-17	PPT
4	Low-stress abrasion, High-stress abrasion, Gouging abrasion	T1:17-21	PPT
5	Slurry and impingement erosion,	T1:20-28	PPT
6	Fretting wear, Adhesive wear, Seizure	T1:28-34	PPT
7	Galling, Oxidative wear, Pitting wear	T1:34-38	PPT
8	Spalling	T1:38-39	PPT
9	Impact wear and Brinelling.	T1:39-42	PPT

Content beyond syllabus covered (if any):

Case studies wherever applicable

**UNIT II ELECTROPLATING & SURFACE HARDENING****9**

Electroplating fundamentals, Electrodeposition from plating baths, Electroless plating, Metallizing, Selective plating, Hard anodizing, Other plating processes, Applicability of plating for wear resistance, Surface hardening – Carburizing, Nitriding, Cyaniding, Carbonitriding, Induction Hardening.

Objective: Select the suitable plating or hardening technique with respect to the application.

Session No	Topics to be covered	Ref	Teaching Aids
10	Electroplating fundamentals	T1:44-46	PPT
11	Electrodeposition from plating baths	T1:49-52	PPT
12	Electroless plating	T1: 52-53	PPT
13	Mettallizing, Selective plating, Hard anodizing	T1:54-70	PPT
14	Other plating processes, Applicability of plating for wear resistance	T1:47-50	PPT
15	Applicability of plating for wear resistance	T1:70-77	PPT
16	Surface hardening – Carburizing	T1:349-350 T1:80-87 :	PPT
17	Nitriding, Cyaniding	T1:98-106	PPT
18	Carbonitriding, Induction Hardening	T1:105-106 T1:128-129	PPT

Content beyond syllabus covered (if any):-

**UNIT III THIN FILM COATING****9**

Thermal evaporation, Physical Vapour Deposition (PVD) and Chemical Vapour Deposition (PVD), Metal organic CVD, Plasma assisted CVD, Sputter coating, Ion plating, Thin film for wear application, Coating specifications.

Objective: Apply the appropriate thin film coating technology for a specific application.

Session No *	Topics to be covered	Ref	Teaching Aids
19	Thermal Evaporation	T1:140-147	PPT
20	Physical vapour deposition	T1:139-140	PPT
21	Chemical Vapour deposition	T1:139-140	PPT
22	Metal organic CVD	T1:140-142	PPT
23	Plasma assisted CVD	T1:140-147	PPT
24	Sputter coating	T1-148-153	PPT & BB
25	Ion plating	T1:153-155	PPT
26	Thin film for wear application	T1:155-161	PPT
27	Coating Specification	T1:161-162	PPT
Content beyond syllabus covered (if any): -			

**UNIT IV HIGH ENERGY AND SPECIAL SURFACE MODIFICATIONS****9**

Rebuilding and surface cements, Wear tiles, Electrospark deposition coatings, Fused carbide cloth, Ceramic coatings, Centrifuge-Cast wear coatings, Wear sleeves, Wear plates

Objective: Investigate the application of high energy and other special technology in surface modifications..

Session No *	Topics to be covered	Ref	Teaching Aids
28	Rebuilding and surface cements	T1:191-194	PPT
29	Wear tiles	T1:195-198	PPT
30	Electrospark deposition coatings	T1:198-200	PPT
31	Fused carbide cloth	T1:201-202	PPT
32	Ceramic coatings	T1:201-202	PPT
33	Centrifuge wear coatings	T1:201-202	PPT
34	Cast wear coatings	T1:203-204	PPT
35	Wear sleeves	T1:204-206	PPT
36	Wear plates	T1:206-208	PPT
Content beyond syllabus covered (if any): -			

**UNIT V HARDFACING APPLICATIONS****9**

Arc welding and its types, Oxyacetylene welding, Furnace fusing, Thermal spray processes and their applications, Hard facing transformation, Fusion alloys, Non fusion materials. Hardfacing in new designs, Hardfacing for repairs, Hard facing with fusion processes, Nonfusion deposits, Weldability considerations, Finishing considerations.

Objective: Apply suitable technique and consumables for hardfacing applications

Session No *	Topics to be covered	Ref	Teaching Aids
37	Arc welding and its types	T1:209-210	PPT
38	Oxyacetylene welding	T1:218	PPT
39	Furnace fusing, Thermal spray processes and their applications	T1:218-234	PPT
40	Hard facing transformation, Fusion alloys	T1:242-264	PPT
41	Non fusion materials. Hardfacing in new designs	T1:242-279	PPT
42	Hardfacing for repairs	T1:288-289	PPT
43	Hard facing with fusion processes, Nonfusion deposits	T1:290-292	PPT
44	Weldability considerations	T1:297	PPT
45	Finishing considerations	T1:299	PPT
Content beyond syllabus covered (if any): -			

TEXT BOOKS:

1. Budinski, K.G., —Surface Engineering for Wear Resistance", Prentice Hall, New Jersey, 1988.
2. Hocking M.G., Vasantasree V. and Sidky P.S., —Metallic and Ceramic Coatings: Production, High Temperature properties and Applications. | John Wiley & Sons, 1989.

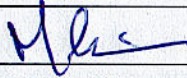

REFERENCES:

1. Strafford, K.N., Datta, P.K., and Gray, J.S., —Surface Engineering Practice ,Processes, Fundamentals and Applications in Corrosion and Wear|, Ellis Harwood, 1990.
2. Mathews, A., —Advanced Surface Coatings: A Hand book of Surface Engineering|, Spinger, 1991.
3. Varghese C.D, —Electroplating and Other Surface Treatments - A Practical Guidel, TMH, 1993



SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

	Prepared by	Approved by
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Designation	Assistant Professor	Professor & Head
Date	8/7/24	8/7/24
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD