

COURSE CODE	CORROSION AND SURFACE ENGINEERING	L	T	P	C
1153ME103		3	0	0	3

1. Preamble

This course provides general issues relating to Corrosion and Prevention of corrosion.

2. Pre-Requisites

Engineering Materials and Metallurgy

3. Links to Other Courses

Engineering Materials and Metallurgy

4. Course Educational Objectives

Students undergoing this course will be able to understand

- Different types of corrosion on engineering structures and their impacts.
- Correlate materials theory with practical applications.
- About design and selection of materials to prevent different types of corrosion.
- Behavior of materials
- Surface coating process

5. Course Outcomes

Upon the successful completion of the course, students will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Explaining various mechanisms and corrosion types	K2
CO2	Explain the various testing and corrosion prevention.	K2
CO3	Describe about plastics	K2
CO4	Explain about the characteristics of super alloys.	K2
CO5	Describe the concept about ceramics.	K2

(K2 – Understand)

6. Correlation Of COs With Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H						L					L	M	
CO2	H						L					L	M	
CO3	H						L					L	M	
CO4	H				L		L					L	M	
CO5	H				L		L					L	M	

H- High; M-Medium; L-Low

7. Course Content

UNIT 1 MECHANISMS AND TYPES OF CORROSION L - 9

Principles of direct and Electro chemical corrosion, Hydrogen evolution and oxygen absorption mechanisms - Galvanic corrosion, Galvanic series -Specific types of corrosion such as, Uniform, pitting, Intergranular, Cavitations, Crevice, Fretting, Erosion and Stress corrosion - Factors influencing corrosion.

UNIT 2 TESTING AND PREVENTION OF CORROSION L - 9

Corrosion testing techniques and procedures - Prevention of corrosion -Design against corrosion – Modification of corrosive environment - Inhibitors - Cathodic protection - Protective surface coatings.

UNIT 3 CORROSION BEHAVIOUR OF MATERIALS L - 9

Corrosion of Steels, Stainless steels, Aluminum alloys, Copper alloys, Nickel and Titanium alloys - Corrosion of polymers, Ceramics and composite materials

UNIT 4 SURFACE ENGINEERING FOR WEAR AND CORROSION RESISTANCE L - 9

Diffusion coatings - Electro and Electro less plating - Hot dip coating - Hard facing - Metal spraying, Flame and Arc processes - Conversion coatings -Selection of coating for wear and corrosion resistance.

UNIT 5 THIN LAYER ENGINEERING PROCESSES L - 9

Laser and Electron Beam hardening - Effect of process variables such as power and scan speed – Physical vapour deposition, Thermal evaporation, Arc vaporisation, Sputtering, Ion plating - Chemical vapour deposition -Coating of tools, TiC, TiN, Al₂O₃ and Diamond coating properties and applications of thin coatings.

TOTAL: 45 PERIODS

8. Text Books

1. Fontana, G., " Corrosion Engineering ", McGraw-Hill, 1985.
2. Schweitzer P.A., " Corrosion Engineering Hand Book ", 3rd Edition, Marcel Decker, 1996.

9. References

1. Winston Revie, R,Uhlig's " corrosion, Hand Book ", 2nd Edition, JohnWiley, 2000.
2. Kammeth G. Budinski, " Surface Engineering for Wear resistance ", Prentice Hall, 1988.
3. Metals Handbook, Vol.5, " Surface Engineering ", ASM International, 1996.