



Department of Marine Engineering		LP: MR16009
B.E/B.Tech/M.E/M.Tech : MARINE Regulation: 2016		Rev. No: 01
PG Specialisation : N/A		Date: 14.12.19
Sub. Code / Sub. Name : <b>MR16009 MARINE CORROSION AND PREVENTION</b>		
Unit: I INTRODUCTION TO CORROSION		

**Unit Syllabus:** Atoms & Ions, PH value, Electrochemical corrosion, Mechanism of corrosion- Factors influencing corrosion-Electrochemical series, Galvanic series-Galvanic cell- chemical corrosion – Electrochemical corrosion–Direct chemical attack– Electro-Chemical attack – reason – Remedial measures. Various types of corrosion.

**Objective:** The students are able to understand the mechanism and different types of Corrosion.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Atoms & Ions, PH value	T1 Pg93-94	PPT / BB
2.	Electrochemical corrosion	T1 Pg14	PPT / BB
3.	Mechanism of corrosion	TI Pg53,124	PPT / BB
4.	Factors influencing Corrosion	T1 Pg45	PPT / BB
5.	Galvanic cell- chemical corrosion	T1 Pg174	PPT / BB
6.	Chemical corrosion	T1 Pg 307	PPT / BB
7.	Electrochemical corrosion	T1 Pg 14 -21	PPT / BB
8.	Reasons for Direct chemical attack	T1 Pg282	PPT / BB
9.	Reasons for Electro-Chemical attack	TI Pg19	PPT / BB
10.	Remedial measures for Corrosion attack	T1 PG278	PPT / BB
11.	Various types of corrosion	T1 Pg38	PPT / BB
Content beyond syllabus covered (if any):			

\* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16009 MARINE CORROSION AND PREVENTION**  
Unit: II **HULL PLATE PREPARATION**

**Unit Syllabus:** Plate preparation during building and repair periods -Atmospheric corrosion Mill scale – flame cleaning – Acid Pickling – Blast cleaning – causes of paint failure – shipboard preparations for painting – power wire brushing – power discing – air hammer – high pressure water blasting – sand blasting shot blasting.

**Objective:** The students should be able to understand different methods adopted for Hull plate preparation.

Session No *	Topics to be covered	Ref	Teaching Aids
12	Plate preparation during building and repair periods	R4 Pg111	PPT / BB
13	Atmospheric corrosion Mill scale	R4 Pg111	PPT / BB
14	Flame Cleaning	R4 Pg111	PPT / BB
15	Acid Pickling	R4 Pg 112	PPT / BB
16	Blast cleaning	R4 Pg 112	PPT / BB
17	Causes of paint failure	R4 Pg 113	PPT / BB
18	Shipboard preparations for painting.	R4 Pg 114	PPT / BB
19	Power wire brushing – power disking – air hammer	R4 Pg 114	PPT / BB
20	High pressure water blasting,sand blasting,shot blasting.	R4 Pg 115	PPT / BB

Content beyond syllabus covered (if any):

\* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16009 MARINE CORROSION AND PREVENTION**  
Unit: III **MODERN PAINT TYPES**

**Unit Syllabus:** Basic composition of paint Alkyd – bitumen or pitch – chlorinated rubber – coal tar epoxy – Epoxy – oleoresinous – phenolic – polyurethane – primers – vinyl – self polishing copolymers – shipboard paint systems – underwater AF paints – boot top anti-corrosive paints – super structure paints

- **Objective:** The students will be able to understand different types of paints applied to protect Marine vessels and Marine structures from Corrosion.

Session No *	Topics to be covered	Ref	Teaching Aids
21	Basic composition of paint	R4 Pg 115	PPT / BB
22	Alkyd – bitumen or pitch – chlorinated rubber	R4 Pg 115	PPT / BB
23	Coal tar epoxy Epoxy – oleoresinous	R4 Pg 116	PPT / BB
24	Phenolic – polyurethane – primers	R4 Pg 117	PPT / BB
25	Vinyl – self polishing copolymers	R4 Pg 117	PPT / BB
26	Shipboard paint systems	R4 Pg 121	PPT / BB
27	Underwater AF paints	R4 Pg 122	PPT / BB
28	Boot top anti-corrosive paints	R4 Pg 123	PPT / BB
29	Super structure paints	R4 Pg 123	PPT / BB
Content beyond syllabus covered (if any):			

\* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16009 MARINE CORROSION AND PREVENTION**  
Unit: IV **CORROSION IN BOILER**

**Unit Syllabus:** Effect of salts & Grease in feed water. Effect of corrosion while boiler is not in service – preservation to avoid corrosion. CORROSION IN MARINE DIESEL ENGINES: Corrosive wear of cylinder liners – Reasons and remedies – corrosion of Main Engine Jacket cooling spaces – Reasons and remedies – Corrosion in bearings.

- **Objective:** The students will be able to understand the corrosion that could occur in Boiler and how to Prevent the corrosion inside the boiler drum.

Session No *	Topics to be covered	Ref	Teaching Aids
30	Effect of salts & Grease in feed water	R3 Pg59	PPT / BB
31	Effect of corrosion while boiler is not in service	R3 Pg60	PPT / BB
32	Preservation to avoid corrosion	R3 Pg 60	PPT / BB
33	Corrosive wear of cylinder liners	R3 Pg 61	PPT / BB
34	Reasons and remedies – corrosion of Main Engine Jacket cooling spaces.	R3 Pg 63	PPT / BB
35	Corrosion in bearings	T1 Pg243	PPT / BB
36	Reasons and remedies	T1Pg244	PPT / BB
Content beyond syllabus covered (if any):			

\* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16009 MARINE CORROSION AND PREVENTION**

Unit: V **CORROSION AND ITS PREVENTION**

**Unit Syllabus:** Anodic & cathodic protection. Anodic control protection- Forms of metallic coatings – anodizing – phosphating. Cathodic protection- sacrificial anodes, Impressed Current Cathodic protection.

Design faults causing corrosion.

**Objective:** The students will be able to understand Corrosion and its Prevention methods.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Anodic protection	T1 Pg294	PPT / BB
38	cathodic protection	T1 Pg300	PPT / BB
39	Anodic control protection	T1 Pg 15-19	PPT / BB
40	Forms of metallic coatings	T1 Pg304	PPT / BB
41	Anodizing	T1 Pg236	PPT / BB
42	Phosphating	T1 Pg357	PPT / BB
43	Cathodic protection- sacrificial anodes	R4 Pg106	PPT / BB
44	Impressed Current Cathodic protection	R4 Pg107	PPT / BB
45	Design faults causing corrosion	R4Pg110	PPT / BB

Content beyond syllabus covered (if any):

\* Session duration: 50 minutes



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**TEXT BOOKS:**

1. Corrosion engineering 3rd edition Mars G by McGraw Hill 2010.
2. Corrosion, prevention and control Raj Baldev, Mudali, Kamatchi Narose publishing house 2009.

**REFERENCES:**

1. Corrosion science and technology Mechanism , migration and monitoring by Mudali, Kamachi Narosa publishing house 2008
2. Introduction to metallic corrosion and its prevention Raj Narayan Oxford & IBM publishing
3. Marine engineering practice vol 2 Part II Corrosion for marine & offshore engineers 1st edition Rowlands
4. 'Shipboard Operations" by HI Lavery Butterworth –Heinemann Reprinted 2007

	Prepared by	Approved by
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Designation		HOD
Date	14-DEC-2019	
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