



COURSE DELIVERY PLAN - THEORY

<b>Department of Civil Engineering</b>		LP: VD18412
B.E/B.Tech/M.E/M.Tech : B.E Civil Engineering	Regulation: 2018	Rev. No: 00
PG Specialisation : -		Date: 28-02-2022
Sub. Code / Sub. Name : VD18412 Corrosion of Steel in Concrete and Preventive Measures		

**Syllabus:**

Introduction - Corrosion of steel in concrete - Causes and mechanisms of corrosion and corrosion damage in concrete - Carbonation - Chloride attack - Corrosion damage - Vertical cracks and horizontal cracks -Condition evaluation - Preliminary survey - Detailed survey. - Visual inspection - Delamination - Cover - Half cell potential measurements - Carbonated depth measurement - Chloride determination - Resistivity measurement - Corrosion rate measurement. - Physical and chemical repair and rehabilitation techniques - Concrete removal and surface preparation - Patches. Coating, sealers, membranes and barriers. Encasement and overlays -Sprayed concrete - Corrosion inhibitors - Electrochemical repair techniques: Basic principles of electrochemical techniques - Cathodic protection - design. Control criteria -System installation - Cathodic protection of prestressed concrete - Cathodic protection of epoxy coated reinforcing steel.

**Objective:**

To introduce the principles of corrosion and corrosion control techniques

Session No *	Topics to be covered	Ref	Teaching Aids
1	Overview of concrete and reinforcement	4	PPT
2	Durability of concrete	4-Ch.9 pp. 349-419	PPT
3	Basics of corrosion in general	4-Ch.9 pp. 349-419	PPT
4	Corrosion of steel in concrete	3-Ch.1 pp.7-9	PPT
5	Mechanism of corrosion	3-Ch.1 pp.3-6	PPT
6	Causes of corrosion in reinforcement	3-Ch.2 pp.19-28	PPT
7	Damages in concrete due to corrosion	3-Ch.7 pp.131-143	PPT
8	Carbonation	1-Ch.3 pp.19-24	PPT
9	Chloride attack	1-Ch.3 pp.19-24	PPT
10	Stages in corrosion in reinforcement, vertical and horizontal cracks	2-Ch.4 pp.71-74	PPT
11	Condition evaluation - preliminary and detailed survey	1-Ch.4 pp.31-97	PPT
12	Visual inspection, delamination, cover	1-Ch.4 pp.31-97	PPT



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13	Half cell potential measurements, Carbonated depth measurement	3-Ch.9 pp.169-186	PPT
14	Chloride determination , Resistivity measurement, Corrosion rate measurement	3-Ch.9 pp.169-186	PPT
15	Physical and chemical repair and rehabilitation techniques	1-Ch.6 pp.112-136	PPT
Test - I			
16	Concrete removal and surface preparation	2-Ch.14 pp.2133-243	PPT
17	Patches. Coating, sealers, membranes and barriers.	2-Ch.14 pp.2133-243	PPT
18	Encasement and overlays, Sprayed concrete	2-Ch.14 pp.2133-243	PPT
19	Corrosion inhibitors	2-Ch.13 pp.217-228	PPT
20	Corrosion inhibitors – eco friendly techniques	Journals	PPT
21	Electrochemical repair techniques: Basic principles of electrochemical techniques	1-Ch.7 pp.140-203	PPT
22	Corrosion monitoring	1-Ch.5 pp.103-111	PPT
23	Cathodic protection - design	3-Ch.12 pp.241-245	PPT
24	Control criteria -System installation	3-Ch.12 pp.241-245	PPT
25	Cathodic protection of prestressed concrete	3-Ch.3 pp.37-53	PPT
26	Cathodic protection of epoxy coated reinforcing steel.	3-Ch.12 pp.241-245	Hands on
27	Experiment on corrosion	Online video	PPT
28	Concrete technology and corrosion protection	2-Ch.12 pp.193-200	PPT
29	Repair techniques	2-Ch.18 pp.319-326	PPT
30	Repair techniques	2-Ch.18 pp.319-326	PPT
Test - II			
<b>Content beyond syllabus covered (if any):</b> Corrosion inhibitors – eco friendly techniques Experiment on corrosion			

\* Session duration: 50 minutes

Sub Code / Sub Name: VDI8416 Architectural Acoustics





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## REFERENCES:

1. Broomfield John P , Corrosion of Steel in Concrete , Taylor & Francis, 2003.
2. Luca Bertolini PhD, Dr. sc. tech. Bernhard Elsener PhD, Pietro Pedersen PhD, Rob B. Polder PhD, Wiley 2003.
3. Amir Poursaeed, Corrosion of Steel in Concrete Structures, Woodhead Publishing
4. M.S.Shetty, Concrete Technology theory and practice, S.Chand & Company Ltd.

	Prepared by	Approved by
Signature		
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Date	28-02-2022	28-02-2022
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