

# **SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**MICRO LESSON PLAN**



**SUBJECT : REPAIR AND REHABILITATION OF STRUCTURES**

**CODE : CE 811**

**CLASS : IV Year / VIII SEM**

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**A.P, DEPT. OF CIVIL ENGG.**

## **CE 811 REPAIR AND REHABILITATION OF STRUCTURES**

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### **OBJECTIVE**

To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

### **UNIT I MAINTENANCE AND REPAIR STRATEGIES 9**

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

### **UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE 11**

Quality assurance for concrete construction concrete properties- strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking.

### **UNIT III MATERIALS FOR REPAIR 9**

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

### **UNIT IV TECHNIQUES FOR REPAIR AND DEMOLITION 8**

Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidated structures - case studies.

### **UNIT V REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES 8**

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

**TOTAL: 45 PERIODS**

### **TEXT BOOKS**

1. Denison Campbell, Allen and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, Repair of Concrete Structures, Blakie and Sons, UK, 1987

### **REFERENCES**

1. M.S.Shetty, Concrete Technology - Theory and Practice, S.Chand and Company, New Delhi, 1992.

2. Santhakumar, A.R., Training Course notes on Damage Assessment and repair in Low Cost Housing , "RHDC-NBO" Anna University, July 1992.
3. Raikar, R.N., Learning from failures - Deficiencies in Design, Construction and Service - R&D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
4. N.Palaniappan, Estate Management, Anna Institute of Management, Chennai, 1992.
5. Lakshmipathy, M. etal. Lecture notes of Workshop on "Repairs and Rehabilitation.
6. Handouts of Repair and Rehabilitation of structures.

## **SUBJECT DESCRIPTION AND OBJECTIVE**

### **SUBJECT DESCRIPTION**

This subject provides understanding of the following: damages and causes for damages in reinforced concrete structures; methods for condition monitoring testing and interpretation; repair material selection and repair techniques; methods of production and maintenance; specification for durable concrete structures; traditional and modern processes for strengthening of damaged and undamaged structures; and life cycle prediction. An individual project forms the essential component of this subject.

### **OBJECTIVES**

To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

To provide the knowledge required for developing and implementing suitable repair and rehabilitation programs for existing marine structures.

The objectives of this course are for the students to become able:

- To recognize the mechanisms of degradation of concrete structures and to design durable concrete structures.
- To learn how to conduct field monitoring and non-destructive evaluation of concrete structures.
- To design repair strategies for deteriorated concrete structures including repairing with composites.
- To understand the methods of strengthening methods for concrete structures
- To carry out the research on topics.

## MICRO LESSON PLAN

<b>HOURS</b>	<b>LECTURER TOPICS</b>	<b>READINGS</b>
<b>UNIT I MAINTENANCE AND REPAIR STRATEGIES</b>		
1	Introduction	
2	Maintenance	R6
3	Repair and Rehabilitation	R6
4	Facets of maintenance	R6
5	Importance of Maintenance	R6
6	various aspects of Inspection	R6
7,8	Assessment procedure for evaluating a damaged structure	R6
9	causes of deterioration	R6
<b>UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE</b>		
10	Introduction	R6
11	Quality assurance for concrete construction concrete properties	R6
12,13	Strength, Permeability	R6
14	thermal properties and Cracking	R6
15,16	Effects due to climate, Temperature	R6
17	Effects due to chemicals	R6
18	Effects due to corrosion	R6
19	Design and construction errors	R6
20	Effects of cover thickness and cracking.	R6
<b>UNIT III MATERIALS FOR REPAIR</b>		
21	Introduction	R6
22	Special concretes mortar	R6
23	concrete chemicals	R6
24	special elements for accelerated strength gain	R6
25	Expansive cement	R6
26	polymer concrete	R6
27	sulphur infiltrated concrete	R6
28	ferro cement	R6
29	Fibre reinforced concrete	R6
<b>UNIT IV TECHNIQUES FOR REPAIR AND DEMOLITION</b>		
30	Rust eliminators and polymers	R6

	coating for rebars during repair foamed concrete, mortar and dry pack	
31	vacuum concrete, Guniting and Shotcrete	R6
32	Epoxy injection, Mortar repair for cracks, shoring and underpinning	R6
33	Methods of corrosion protection,	R6
34	corrosion inhibitors	R6
35	corrosion resistant steels, coatings and cathodic protection	R6
36	Engineered demolition techniques for dilapidated structures	R6
37	case studies	R6
<b>UNIT V REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES</b>		
38	Introduction	R6
39,40	Repairs to overcome low member strength	R6
41,42	Deflection, Cracking, Chemical disruption	R6
43,44	weathering corrosion, wear	R6
45	Fire, leakage and marine exposure	R6