6. AASHTO

REPAIRS AND REHABILITATION OF STRUCTURES
(Professional Elective-2)

Course Code: 19CE2155	**L**	**P**	**C**
	3	**0**	**3**

Prerequisites: Concrete Technology,advanced concrete technology

Course Outcomes :

At the end of the course, the student will be able to:

CO1 Discuss the maintenance and repair strategies for evaluating a damaged structure.

CO2 Summarize the concepts of serviceability and durability of concrete.

CO3 Discuss the materials used for Repairs using special concretes.

CO4 Describe the application and techniques for repairs and protection methods.

CO5 Develop the concepts to overcome lesser strength, deflection, cracking and chemical disruption.

UNIT-I: (10 Lectures)

MAINTENANCE AND REPAIR STRATEGIES

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

Learning outcomes:

1.Illustrate maintenance strategies for damaged structures (L1)

2.Discuss the repair strategies for damaged structures (L2)

3.Discuss causes of deterioration(L3)

UNIT-II: ` (10 Lectures)

SERVICEABILITY AND DURABILITY OF CONCRETE

Quality assurance for concrete – Strength, Durability and Thermal properties of concrete, different types of cracks and causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness on cracking.

Learning outcomes:

1.Illustrate the concepts of serviceability (L1)

2.Summarize the concepts of durability of concrete (L2)

3.Discuss the concepts of corrosion(L3)

UNIT-III: (10 Lectures)

MATERIALS FOR REPAIR

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

Learning outcomes:

1.Illustrate the materials used for repairs using special concrete (L1)

2.Discuss about various special concretes (L2)

3.Discuss about fibre reinforced concrete(L3)

UNIT-IV: (10 Lectures)

TECHNIQUES FOR REPAIR AND PROTECTION METHODS

Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite 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

Learning outcomes:

1.Illustrate the various techniques for Repair (L1)

2.Discuss about the methods of protection (L2)

3.Discuss about the Demolition techniques(L3)

UNIT-V: (10 Lectures)

REPAIR, REHABILITATION AND RETROFITTING TECHNIQUES

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

Learning outcomes:

1.Describe the concepts to overcome lesser strength, cracking (L1)

2.Discuss about the cracking and chemical disruption (L2)

3.Discuss about wheathing corrosion(L3)

Text Books:

1.Denison Campbell, Allen and Harold Roper, *Concrete Structures, Materials, Maintenance and Repair*, Longman Scientific and Technical UK, 1991.

2.Allen R.T. & Edwards S.C, *Repair of Concrete Structures*, Blakie and Sons, UK, 1987

References:

1.Shetty M.S., *Concrete Technology - Theory and Practice*, S.Chand and Company, 2008.

2.DovKominetzky.M.S.,*Design and Construction Failures*, Galgotia Publications Pvt. Ltd., 2001

3.Ravishankar.K., Krishnamoorthy.T.S, *Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures*, Allied Publishers, 2004.

4. CPWD and Indian Buildings Congress, *Handbook on Seismic Retrofit of Buildings*, Narosa Publishers, 2008.

5. Gambhir.M.L., *Concrete Technology*, McGraw Hill, 2013