4/4 B.Tech EIGTH SEMESTER

CE8T4D REPAIR AND REHABILITATION OF STRUCTURES Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Design and drawing of concrete structures, concrete technology

Learning objectives:

This subject imparts a broad knowledge in the area of repair and rehabilitation of Structures.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the properties of fresh and hardened concrete.
2. Know the strategies of maintenance and repair.
3. Get an idea of repair techniques.
4. Understand the properties of repair materials
5. Understand the retrofitting strategies and techniques

UNIT-I

SERVICEABILITY AND DURABILITY OF STRUCTURES

Serviceability and Durability of Structures - Quality Assurance for concrete construction - Fresh concrete properties – Strength – Permeability - Cracking - Effects due to climate – Temperature – chemicals - Wear and erosion - Design and construction errors - Corrosion mechanism - Effects of cover thickness and cracking - Methods of corrosion Protection – Inhibitors - Resistant steels – Coatings - Cathodic protection

UNIT-II

DIAGNOSIS AND ASSESSMENT OF DISTRESS

Diagnosis and Assessment of Distress - Visual inspection – Non destructive tests – Ultrasonic pulse velocity method – Rebound hammer technique – ASTM classifications – Pullout tests – Core test

UNIT-III

MATERIALS FOR REPAIR

Materials for Repair - Special concretes and mortar - Concrete chemicals – Special elements for accelerated strength gain - Expansive cement - Polymer concrete – Ferro cement, Fibre reinforced concrete - Fibre reinforced plastics.

UNIT-IV

TECHNIQUES FOR REPAIR

Techniques for Repair - Rust eliminators and polymers coatings for rebars during repair - Foamed concrete - Mortar and dry pack - Vacuum concrete - Gunite and shotcrete - Epoxy injection - Mortar repair for cracks - Shoring and underpinning

UNIT V

RETROFITTING OF R.C BUILDINGS

Introduction; Considerations in retrofitting of structures; Source of weakness in RC frame Building, Classification of retrofitting techniques; retrofitting strategies for RC buildings.

Example of Repairs to Structures - Repairs to overcome low member strength – Deflection – Cracking - Chemical disruption - Weathering wear - Fire leakage – Marine Exposure.

Learning resources:

Text books:

1. Santha Kumar, A.R., (2007), Concrete Technology, Oxford University Press.

Reference books:

1 Shetty, M.S. (2005), Concrete Technology Theory and Practice, S.Chand and company, New Delhi.
2. Santha Kumar, A.R., (1996), Concrete Chemical Theory and Applications, Indian Society for Construction Engineering and Technology, Madras.
3. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structwel Designers & Consultants Pvt.Ltd., Mumbai, 1994.
4. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002
5. Garas, F.K,.Clarke, J.L, Armer, GST (1997), Structural assessment, Butterworths, UK.
6. R.T. Allen and S.C.Edwards, (1998), Repair of Concrete Structures, Blakie and Sons, UK.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/