4SE47: REPAIR AND REHABILITATION OF STRUCTURES
CREDITS - 3 (LTP: 3,0,0)

Course Objectives:

1. To impart knowledge of causes of distress and its assessment.
2. To enhance the knowledge of different repair materials and techniques.
3. To explain the different demolition, rehabilitation techniques, maintenance and protection of structures.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	60	40	0	0	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction:** Deterioration of structures with aging, Need for rehabilitation.	6
2	**Deterioration of concrete structures: Causes of distress** Causes of distress in concrete structures, construction and design failures, Distress in concrete due to physical and chemical deterioration Deterioration due to water leakage, fire – detection & mitigation of the same. **Visual deterioration of structures-** Types of cracks, causes & characteristics of cracking in various structural components. Measurement of cracks as per IS456 Annexure F interpretation of the cause of particular type of crack.	10
3	**Conditional/damage assessment & Evaluation of structures:** Condition assessment and distress-diagnostic techniques, Field & laboratory testing procedures for evaluating the structure for strength, corrosion activity, performance & integrity, durability by use of NDT equipments	10
4	**Materials and Techniques for Repair** **Repair materials** - Criteria for durable concrete repair, Methodology, selection of repair materials, Preparatory stage of repairs, Different types of repair materials & their application, types of repair techniques . Corrosion damage of reinforced concrete - repair and prevention measures - Surface deterioration, Efflorescence, causes, prevention and protection Surface coatings and painting - Water proofing	4
5	**Rehabilitation methods** Retrofitting, RCC Jacketing, Fibre wrapping, Building and restoration of earthquake damaged masonry structure, Method for foundation rehabilitation; Case studies	5
6	**Demolition techniques** : Engineered demolition techniques for Dilapidated structures – case studies.	4

Unit No.	Topics	Teaching Hours
7	**Allied topics:** **Protection & maintenance of structures -** Deterioration due to ageing, inadequate maintenance Facets of Maintenance, importance of Maintenance various aspects of Inspection. Corrosion mitigation techniques to protect the structure from corrosion. **Long term health monitoring / Structural health monitoring (SHM)–** Definition maintenance of structures and motivation for SHM, Basic components of SHM and its working mechanism.	6
	Total	45

List of References:

1. Concrete Microstructure, Properties and Materials P.Kumar Mehta / Paulo J.M.Monteiro,
2. Handbook on Repairs and Rehabilitation of RCC buildings; CPWD, Government of India.
3. Concrete technology, A.R.Shanthakumar; Oxford University Press, India
4. Concrete Technology, M.L.Gambhir; Tata McGraw-Hill Education
5. Appraisal and Repair of Reinforced concrete R.Holland; Thomas Telford Ltd
6. Testing of Concrete in Structures, J.H.Bungey, S.G.Millard&M.G.Grantham; Taylor & Francis, London & New York
7. Handbook on Nondestructive Testing of Concrete, V. M. Malhotra, Nicholas J. Carino
8. Repair and Strengthening of Concrete structures FIP guide; Thomas Telford, London

Course Outcomes (COs):

At the end of this course students will be able to …

1. Achieve the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures by different NDT methods.
2. Understanding different repairing materials and its techniques.
3. Apply the different techniques of demolition, rehabilitation, protection and maintenance of structures.