**17CE42E1 – REPAIR AND REHABILITATION OF STRUCTURES**

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| **Course Category**  | Core Elective | **Credits**  | 3 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 3 - 0 - 0 |
| **Prerequisite**  | Concrete Technology | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To understand the concept of repair and rehabilitation.
2. Gain-in knowledge of durability of concrete.
3. Gain-in knowledge of special concretes.
4. To access the deterioration of concrete structures.
5. To understand different techniques of repair and rehabilitation.
6. To understand the concept of retrofitting of structures.
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| **Course Outcomes** | CO1 | Understand the repair and rehabilitation of structures. |
| CO2 | Understand the durability aspects of concrete. |
| CO3 | Know the types of special concretes. |
| CO4 | Evaluate the causes of deterioration and assessment of distressed structures. |
| CO5 | Gain the knowledge of repairing of structures and demolition procedures. |
| CO6 | Gain knowledge of corrosion of embedded steel in concrete. |
| **Course****Content** | **UNIT I** **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.**UNIT II** **STRENGTH AND DURABILITY OF CONCRETE:** Quality assurance for concrete – Strength – Durability and thermal properties of concrete – Cracks – Different types –Causes – Effects due to climate – Temperature – Sustained elevated temperature –Corrosion – Effects of cover thickness.**UNIT III****SPECIAL CONCRETES:** Polymer concrete – Sulphur infiltrated concrete – Fibre reinforced concrete – High strength concrete – High performance concrete – Vacuum concrete – Self-compacting concrete – Geopolymer concrete – Reactive powder concrete – Concrete made with industrial wastes.**UNIT IV** **TECHNIQUES FOR REPAIR AND PROTECTION METHODS**: Non-Destructive Testing Techniques – Epoxy Injection – Shoring – Underpinning – Corrosion Protection Techniques – Corrosion Inhibitors – Corrosion Resistant Steels – Coatings to Reinforcement – Cathodic Protection.**UNIT V****REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES**: Strengthening of Structural Elements – Repair of structures distressed due to corrosion – fire – Leakage and earthquake – Demolition techniques – Engineered demolition methods – Case studies.**UNIT VI****CORROSION OF EMBEDDED STEEL IN CONCRETE:** Corrosion of embedded steel in concrete – Mechanism – Stages of corrosion damage – Repair of various corrosion damaged of structural elements (slab, beam and columns).**JACKETING:** Jacketing – Column jacketing – Beam jacketing – Beam Column joint jacketing – Reinforced concrete jackets – Steel jacketing – FRP jacketing. **STRENGTHENING**: Strengthening of beam: Shear strengthening and Flexural strengthening. |
| **Textbooks****and****References** | **TEXTBOOKS:**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.
3. Gambhir.M.L “Concrete Technology”, McGraw Hill, 2013.

**REFERENCES:**1. Dov Kominetzky.M.S., “Design and Construction Failures”, Galgotia Publications Pvt. Ltd., 2001.
2. Ravi shankar.K and Krishna moorthy.T.S, “Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures”, Allied Publishers, 2004.
3. CPWD and Indian Buildings Congress, Hand Book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.

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