



MAINTENANCE AND REPAIR OF CONCRETE STRUCTURES

PROF. RADHAKRISHNA G. PILLAI

Department of Civil Engineering
IIT Madras

TYPE OF COURSE : Rerun | Elective | UG/PG

COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)

EXAM DATE : 23 Apr 2022

PRE-REQUISITES : Completed 3rd year of a Bachelor program in civil engineering

INTENDED AUDIENCE : Undergraduate Students, Graduate students, research scholars, practicing engineers, repair experts, and scientists, working in the areas of concrete science and technology

INDUSTRIES APPLICABLE TO : Govt. agencies and public/private companies involved in the design, construction, and maintenance of concrete structures: • Govt agencies: National Highway Authority (NHAI), Central Public Works Department (CPWD) and PWD/Housing departments of various states • Chemical manufacturers: BASF, SIKA corporation, Euclid chemicals, and other chemical admixture companies • Cement companies: ACC Ltd., Ambuja cement, JSW cement Ltd, JK Cement Ltd, Penna Cement Industries Ltd, Ultratech cement Ltd.

COURSE OUTLINE :

This course will help students learn how to identify various deterioration mechanisms or damage mechanisms in concrete structures (say, deterioration of metallic reinforcement and cementitious materials). The course will discuss the scientific aspects and its use while practicing repair works at site. Use of various non-destructive, partially-destructive tools to assess the condition of the structure will be discussed. Also, tips on selecting measurable parameters that are useful in deciding the further repair and maintenance practices will be provided.

ABOUT INSTRUCTOR :

Prof. Radhakrishna G. Pillai is an Associate professor at the Department of Civil Engineering at the Indian Institute of Technology Madras, Chennai, India, where he is working since 2010. He earned his M.S. and Ph.D. in Civil Engineering from Texas A and M University (TAMU), College Station, Texas, USA. He has co-authored more than 70 publications in the areas of structural and materials performance, concrete technology, and corrosion mechanisms and service life estimation in concrete structures. In addition, he is a lead investigator for various research projects funded by public and private agencies involving corrosion, condition assessment and restoration of concrete structures.

COURSE PLAN :

Week 1: Introduction, significance of corrosion, and corrosion mechanisms

Week 2: Embedded metal corrosion

Week 3: Deterioration of cementitious systems – Sulphate and Acid attack

Week 4: Deterioration of cementitious systems – Alkali Silica Reaction (ASR), Shrinkage, and others

Week 5: Concrete assessment using non-destructive tests (NDT)

Week 6: Concrete assessment and load effects

Week 7: Surface repair – Condition assessment

Week 8: Surface repair – Analysis, strategy, and design

Week 9: Surface repair – Material requirement, surface preparation, placement of repair material

Week 10: Strengthening and stabilization – Introduction and beam shear capacity strengthening

Week 11: Strengthening and stabilization – Column strengthening

Week 12: Strengthening and stabilization – Flexural strengthening