CE648A: Repair and Rehabilitation of Concrete Structures **1.5-0-0-0 [5]**

Course Contents:

Deterioration in concrete structures: Causes of deterioration, construction defects (formwork-related, placement-related, consolidation-related, etc.); materials defects (improper mix design, poor materials, etc.); design defects; over-loading; foundation problems; loading-related failures; fire-damaged concrete; Types of cracks and properties, crack depth, crack width, crack diagnosis; Non-destructive testing (NDT): Load testing on structures, buildings, bridges and towers, rebound hammer, acoustic emission, ultrasonic testing principles and application, holography, advanced NDT methods, ultrasonic pulse echo, impact echo, impulse radar techniques, GECOR , ground penetrating radar (GPR); Methods for repair and rehabilitation: General principles - design for rehabilitation, relieving loads, strengthening superstructures, plating, post-stressing, jacketing, bonded overlays, reinforcement addition, strengthening sub-structures, under-pinning, increasing the load capacity of footing, seismic retrofitting, strengthening of beams, columns, slab, masonry walls, protection methods of structures, mud-jacking and grouting for foundation, micro-piling, sub-grade water proofing, soil stabilization techniques, epoxy injection, repairing of concrete floors and pavements, case studies; Deterioration in concrete structures: Causes of deterioration, construction defects (formwork-related, placement-related, consolidation-related, etc.); materials defects (improper mix design, poor materials, etc.); design defects; over-loading; foundation problems; loading-related failures; fire-damaged concrete; Types of cracks and properties, crack depth, crack width, crack diagnosis; Non-destructive testing (NDT): Load testing on structures, buildings, bridges and towers, rebound hammer, acoustic emission, ultrasonic testing principles and application, holography, advanced NDT methods, ultrasonic pulse echo, impact echo, impulse radar techniques, GECOR , ground penetrating radar (GPR); Methods for repair and rehabilitation: General principles - design for rehabilitation, relieving loads, strengthening superstructures, plating, post-stressing, jacketing, bonded overlays, reinforcement addition, strengthening sub-structures, under-pinning, increasing the load capacity of footing, seismic retrofitting, strengthening of beams, columns, slab, masonry walls, protection methods of structures, mud-jacking and grouting for foundation, micro-piling, sub-grade water proofing, soil stabilization techniques, epoxy injection, repairing of concrete floors and pavements, case studies.