

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELGAUM – 590 014



A PROJECT REPORT ON

**"SELF HEALING BIO – CONCRETE
AND ELECTRIC CURING"**

(Sponsored By KSCST)

**Submitted to Visvesvaraya Technological University in partial fulfillment of the
requirement for the award of the degree of Bachelor of Engineering**

In

CIVIL ENGINEERING

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SYNOPSIS

Concrete structures without cracks are unavoidable due to several reasons. One of the reasons that cracks are due to the presence of non hydrated excess cement particles in material mixture, which further undergoes secondary hydration reaction with ingress of water. In this study, it is intended to develop a self healing concrete in which bacteria mediate the production of minerals which seals the freshly formed cracks, which decreases the permeability of concrete thus protects steel reinforcement from corrosion and other related ill effects. It is felt that this specific organic mineral precursor compounds and spore forming alkaliphilic bacteria acts as self healing agents which may produce upto 100- μ m sized calcite particles which can potentially seal micro to even larger sized cracks.

It is proposed to culture required spore forming alkaliphilic bacteria of *bacillus* group with a specific nutrient medium and then added to the concrete. The spores developed are sealed by calcite which is secreted by the bacteria. Both bacteria and organic bio mineral precursor compounds need to be incorporated in the mineral matrix to obtain an autogenous self healing concrete. Basic tests on materials as per BIS specifications with and without bacteria are conducted. The compressive and split tensile strength of cement paste samples is determined with and without addition of bacteria. Set of replicate test specimen with specific dimensions is tested for compressive strength after 3, 7 and 28 days curing. Splitting tensile strength test is also performed. The results are encouraging. The addition of bacteria results in increase of compressive strength of concrete. It was observed that there was 31.74% increase in compressive strength of bio-concrete.

Also an attempt is made with electric curing of cement mortar. It is applicable mostly to very cold climate regions. Concrete can be cured electrically by passing an alternating current itself between two electrodes either buried in or applied to the surface of the concrete. Care must be taken to prevent the moisture from going out leaving the concrete completely dry.