VISVESVARAYA TECHNOLOGICAL UNIVERSITY,BELGAUM

A Project report on

"FIBER REINFORCED CONCRETE" (USING NATURAL & UNCONVENTIONAL FIBERS)

A dissertation submitted to the Department of Civil Engineering of Visvesvaraya Technological University, in the partial fulfillment for the Award of Degree of Bachelor of Engineering during the academic year 2012-2013.

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ABSTRACT

Investigations to overcome the brittle response and limiting post – yield energyabsorption of concrete led to the development of fiber reinforced concrete using discretefibers within the concrete mass. A wide variety of fibers have been proposed by theresearchers such as steel, glass, polypropylene, carbon, polyester, acrylic and aramidetc., Over half of the population around the world is living in slums and villages.

Theearthquake damages in rural areas get multiplied mainly due to the widely adopted non–engineered constructions. On the other hand, in many smaller towns and villages insouthern part of India, materials such as nylon, plastic, tire, coir, sugarcane bagasse andrice husk are available as waste. So, here an attempt has been made to investigate thepossibility of reusing these locally available rural waste fibrous materials as concretecomposites.Since the materials used are locally available rural fibers, a detailedcharacterization is planned.

A concrete mix has been designed to achieve the minimumgrade of M20 as required by IS 456 – 2000. The investigation contains four phases. Inthe first phase, to identify the effects on workability and mechanical strength propertiesdue to the addition of these rural fibers, workability tests such slump, vee – bee, aircontent tests and the mechanical strength tests on standard specimens such ascompressive strength, split tensile strength, modulus of rupture, modulus of elasticityand shear strength were conducted on the different fibrous concrete specimens to obtainthe optimum volume fraction and length of fibers.Totally 174 cubes, 174 flexure specimens were cast and tested.

Based on the experimental results of workability and
mechanical strength studies, a constant length of 50 mm and two volume fractions suchas 0.5% and 1% are chosen for further studies. By analyzing the results, empiricalrelations also have been proposed for mechanical strength properties and compared withthe experimental results. From these results, it is concluded that even though addition offibers reduces the workability of fresh concrete, marginal improvements in themechanical strength properties are observed which ranges from 10% to 20%.

Finally it is concluded that fibers recovered from various waste stream aresuitable to use as secondary reinforcement in concrete. The advantage of using suchrural fibers provides generally a low cost construction than using virgin fibers and theelimination of the need for waste disposal in landfills. Utilization of these fibers inconcrete leads to an effective solid waste management technique