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**A PROJECT REPORT ON**

**“EVALUATION OF PROPERTIES OF BITUMINOUS  
CONCRETE ON ADDITION OF DIFFERENT FIBRES FOR  
DIFFERENT GRADE OF BITUMEN”**

**Submitted in partial fulfillment of the requirements for the award of degree  
Of BACHELOR OF ENGINEERING in CIVIL ENGINEERING.**

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## SYNOPSIS

Bitumen is available on a variety of types and grades. To judge the suitability of these grades various tests are specified by the different agencies like ASTM, ISI etc. for classifying bitumen and studying the performance of bituminous pavement, penetration and ductility tests are essential. The other tests like softening point, flash and fire point tests are more important to guide the paving technologists during field operations. In recent years it has been recognized that the above tests are not sufficient to define the temperature susceptibility of the bituminous materials. The bitumen from the different sources possessing the same penetration value at a specified temperature may exhibit entirely different viscous characteristics at the application temperatures. These tests therefore may need intensive correlation with fundamental property like viscosity.

Viscosity is the resistance offered by liquids for its motion and it is the general term for consistency. The degree of fluidity of the binder at the application temperature greatly influences the strength characteristics of the paving mixes. High or low viscosity during mixing or compaction will result in lower stability values. At low viscosity bituminous binder simply lubricates the aggregates instead of coating a thin film over. At high viscosity resists the compaction effort and mix results in heterogeneous character exhibiting low stability values. And as thus viscosity gains an important role in the mix design. Thus measurement of viscosity at the application temperature is very much essential.

The conventional type of measurement of viscosity involves the determination of 'transpiration time' to flow certain quantity of fluid under standard test condition. These methods give viscosity in seconds, specifying the apparatus with which it is measured. Brookfield viscometer is one which measures the viscosity directly in the fundamental units i.e. mass, length and seconds. Test procedure is very simple to conduct. With the thermosel accessories viscosity can be determined to any desired temperature. Present studies made use of this one.

Various type of cracks, like fatigue cracking, low temperature cracking, reflection cracking etc., were found to develop on bituminous pavements. In recent years to prevent these cracking in bituminous pavements geosynthetics in the form of fibers, fabrics and grids are being extensively used.

The present investigation envisages laboratory study of different grades of bitumen with and without fibers with respect to change in viscosity measured with Brookfield viscometer. And also investigations were carried on bituminous mixes incorporated with different types of fibers at different percentages with respect to change in Marshall Stability and flow values.

The conclusions drawn bond on the laboratory investigations are:

1. Viscosity of different grade bitumen will increases with the inclusion of fibers.
2. Out of glass fiber, steel wool and polypropylene fibers, steel wool gives good results with respect to increase in viscosity.
3. Fibrous bitumen concrete shows an increase in Marshall Stability and flow values over non-fibrous bitumen concrete. However, increase in Marshall Stability value is not much significant.
4. Steel wool gives good results with respect to increase in Marshall Stability and flow values.
5. Temperature susceptibility of lower grade bitumen will be higher.