

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI- 590 010



PROJECT REPORT

ON

“TO STUDY BEHAVIOUR OF CONCRETE T-BEAMS REINFORCED WITH FRP COMPOSITES”

Submitted in Partial fulfillment of the requirements for the award of degree

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING

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CERTIFICATE

Certified that the project work entitled "TO STUDY BEHAVIOUR OF CONCRETE T-BEAMS REINFORCED WITH FRP COMPOSITES" is a bonafide work carried out by Ms.Vidya Vijayakumar, Mr.Makbul Lalsaheb Yalagod, Mr.Pratap Rajput, Mr.Thilak Kumar K Naik, bearing USNs 4AL16CV101, 4AL17CV410, 4AL17CV416, 4AL17CV423 respectively in partial fulfillment for the award of BACHELOR OF ENGINEERING in CIVIL ENGINEERING of VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI during the year 2019-2020. It is certified that all corrections/suggestions indicated for Internal assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

In structural engineering, composite construction exists when two different materials are bound together so strongly that they act together as a single unit from a structural point of view. When this occurs, it is called composite action. The primary reason composite materials are chosen for components is because of weight saving for its relative stiffness and strength. The top of the T-shaped cross section serves as a flange or compression member in resisting compressive stresses. The web (vertical section) of the beam below the compression flange serves to resist shear stress and to provide greater separation for the coupled forces of bending. FRP composites possess some outstanding properties such as: resistance to corrosion, good fatigue and damping resistance, high strength to weight ratio and electromagnetic transparency.

A composite T-beam comprises of concrete encased with different section of steel (open and closed). In this project a three dimensional composite T-beam is modelled to study the deflection of T-Beam with respect to force applied using finite element analysis (ANSYS WORKBENCH 14.5). The support conditions of the structure are modelled as fixed beam on both the ends. For a T-beam a force is applied at $L/3$ distance and result obtained for the T-Beam composite (closed section) shows the deflection of 49.201 mm against the ordinary T-Beam 63.883 mm and T-Beam (open section) 54.208 mm. For the same T-Beams wrapping is done the results are, ordinary T-Beam with wrapping deflects 63.469 mm, composite T-Beam (open section) wrapped deflects 53.591 mm and composite T-Beam (closed section) with wrapped deflects 49.107 mm. By using composite closed section the use of concrete can be decreased due to hollow section against T-Beams open section. The T-beam is externally wrapped with Glass fiber reinforced polymer sheet to increases the ultimate load carrying capacity of RCC beams.