ABSTRACT

Concrete has low tensile strength, low energy absorption capacity and negligible ductility. To overcome this, reinforced cement concrete came into existence. Along with this, the practice of adding mono fibres or hybrid fibres brought a revolution in the field of concrete technology. Addition of fibres can transform the brittle concrete to a ductile material and substantially increase the energy absorption characteristics and its ability to withstand cyclic/repeated monotonic shocks and impact loading. Thus, the addition of mono fibres or hybrid fibres can significantly improve the characteristic properties of concrete. In a similarly way, use of fibre reinforced plastics (FRP) can also bring substantial change in the behavioural characteristics of concrete. FRP can be considered as a substitute for conventional steel reinforcement owing primarily to their high corrosion resistance. FRP is also playing an important role in the retrofitting and rehabilitation of structures under distress. The field of concrete technology is still open for research to enhance the characteristic properties of concrete that can satisfy the specific needs of construction industry.

In the present work an effort is made to study the possible improvements in the characteristic properties of concrete using fibre reinforced composites. The effect of incorporation of micro and macro fibres, hybrid fibres, GFRP plate reinforcements on the characteristic properties of concrete are studied. The effect of plain GFRP wrapping and sandwich GFRP wrapping on flexural and shear behaviour of beams; axial compression behaviour of short columns are also investigated. Various studies included in this research are,

- Flexural behaviour of concrete beams reinforced with GFRP plate reinforcements.
- Flexural behaviour of concrete beams containing GFRP plate reinforcements along with micro and macro fibres.
• Flexural behaviour of hybrid fibre reinforced concrete beams with sandwich GFRP wrapping.

• Effect of GFRP wrapping and sandwich GFRP wrapping on shear strength of RCC beams.

• Behaviour of short columns reinforced with GFRP sections of different shapes along with micro and macro fibres.

• Behaviour of fibre reinforced short columns confined with GFRP wrapping and sandwich GFRP wrapping.

• Impact strength of concrete panels reinforced with GFRP plates.

Entire study is experiment oriented and the conclusions are drawn based on experimental results. The research carried out reveals that the findings are encouraging. Fibre reinforced composites has enhanced the characteristic properties of concrete by improving load carrying capacity and ductility characteristics. These improved characteristics can be adopted in structures subjected to shock and impact loading.