

# ICES 2024

**TITLE OF PROJECT:**

**Exploring The Mechanical and Thermal Properties of Mortars Reinforced with Jute Fibers**

**NAME OF ALL AUTHORS:**

- 1) *Yogendra Singh* (CE 4<sup>th</sup> yr. student at Rajkiya engineering college mainpuri)
- 2) *Shantanu Gupta* (CE 3rd yr. student at Rajkiya engineering college mainpuri)
- 3) *Ravi Prajapati* (CE 3rd yr. student at Rajkiya engineering college mainpuri)
- 4) *Shubhranshu Patel* (CE 2nd yr. student at Rajkiya engineering college mainpuri)

**NAME OF YOUR MENTOR:**

*Mr. Manish Sharma*

*(Faculty of Department of Civil Engineering at Rajkiya Engineering College Mainpuri)*

**NAME OF YOUR COLLEGE:**

Rajkiya Engineering College Mainpuri

**ABSTRACT :**

This study explores the mechanical and thermal properties of mortars reinforced with jute fibers, emphasizing their potential for sustainable construction. The increasing demand for eco-friendly construction materials has led to an exploration of alternative, cost-effective options with minimal environmental impact. The research specifically focuses on fabricating jute fiber composite mortars, incorporating three fiber lengths (5 mm, 10 mm, and 30 mm) and four percentages (0.5%, 1%, 1.5%, and 2%) relative to mortar masses.

Experimental methods assess the mechanical and thermal performance of composite mortars. Unreinforced mortar samples show fragility in flexural and compression tests, while fiber-reinforced samples exhibit higher ductility and strain energy but lower strength. The results reveal a significant trade-off between thermal and mechanical properties. Longer fibers (30 mm) contribute to increased mechanical energy dissipation, while shorter fibers (5 mm) enhance thermal insulation.

The findings underscore the dual objectives of energy efficiency and structural safety in contemporary buildings within the broader context of sustainable and integrated design. The study indicates that adding fibers increases porosity, reduces density, and consequently lowers thermal conductivity,

impacting both thermal and mechanical characteristics. Fibers offer the potential for enhancing thermal insulation while accepting a reduction in mechanical properties.

In conclusion, this abstract encapsulates the research focus on jute fiber-reinforced mortars, the experimental methods used, and key findings regarding the trade-off between thermal and mechanical properties. The study highlights the potential of fibers to achieve specific composite mix behaviors and recommends further exploration in real structures, such as masonry walls, with comprehensive consideration of both thermal performance and mechanical behavior.

#### KEYWORDS:

Jute fiber-reinforced mortars, sustainable construction, mechanical properties, thermal properties, eco-friendly materials, composite mix, fiber lengths, percentages, energy efficiency, structural safety, integrated design.

#### CATEGORY:

Materials Science, Sustainable Construction, Composite Materials, Mechanical Engineering, Thermal Properties, Building Materials, Eco-Friendly Construction, Structural Safety, Energy Efficiency

