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Patent Search

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Inventor

Name	Address	Country	Nationality
K. Sree Kumar	Assistant Professor, Vishnu Institute of Technology, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh534202	India	India
B. Durga Vara Prasad	Assistant Professor, Vishnu Institute of Technology, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh534202	India	India
CH. Bharath Chandra	Assistant Professor, Vishnu Institute of Technology, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh534202	India	India
P. Rohith	Assistant Professor, Vishnu Institute of Technology, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh534202	India	India
M. Manikanta	Assistant Professor, Vishnu Institute of Technology, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh534202	India	India

Applicant

Name	Address	Country	Nationality
Vishnu Institute of Technology	Sri Vishnu Education Society, Kowada Rd, Vishnupur, Kowada, Andhra Pradesh 534202	India	India

Abstract:

The invention provides a sustainable concrete composition incorporating alccofine and quarry dust as partial replacements for cement and natural sand. Alccofine enhances hydration and forms additional C-S-H gel, improving strength and density, while quarry dust increases particle interlocking and reduces voids. Together, they yield higher compressive and tensile strength, lower permeability, and superior durability. The mix reduces CO₂ emissions, conserves river sand, and utilizes industrial byproducts efficiently. This eco-friendly, high-performance concrete is suitable for structural, infrastructural, and environmental applications, achieving optimal results with 10% alccofine and 30-40% quarry dust replacements after 28 days of curing.

[Complete Specification](#)

Description:FIELD OF THE INVENTION

[001] The present invention relates to the field of civil engineering materials and, more particularly, to the development of high-strength, durable, and sustainable concrete compositions. The invention concerns a concrete mixture in which cement is partially replaced with alccofine and natural river sand is partially substituted with quarry dust, thereby improving the mechanical strength, workability, and environmental sustainability of the concrete. The invention specifically addresses the optimization of such combinations to achieve enhanced compressive and tensile strength, reduced permeability, and improved resistance to environmental degradation, while simultaneously reducing the carbon footprint associated with cement production and the ecological impact of river sand mining.

BACKGROUND OF THE INVENTION

[002] Concrete has been universally acknowledged as the most widely used construction material due to its versatility, compressive strength, and adaptability to various structural applications. However, the traditional production of concrete heavily depends on two major natural resources—cement and river sand—whose extensive use has led to serious environmental and economic challenges. Cement manufacture is one of the most carbon-intensive industrial activities, generating approximately 0.9 tons of carbon dioxide per ton of cement produced. This contributes substantially to global greenhouse gas emissions, exacerbating climate change and environmental degradation. Similarly, the extraction of river sand as a fine aggregate for concrete has caused large-scale ecological imbalance, including riverbed erosion, depletion of groundwater levels,

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