CHRIST
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Notice for the PhD Viva Voce Examination

Mr Thejas H K (Registration Number: 1770070), PhD scholar at the School of Engineering and Technology, CHRIST (Deemed to be University) will defend his PhD thesis at the public viva-voce examination on Thursday, 9 February 2023 at 4.00 pm in the CDI Conference Room, Block V, Bangalore Kengeri Campus, Bengaluru - 560074.

Title of the Thesis	:	**Characterization and Strength Assessment of Alkaliactivated Iron Ore Tailing Composite Bricks**
Discipline	:	**Civil Engineering**
External Examiner (Outside Karnataka)	:	**Dr M Srinivasula Reddy** Associate Professor Department of Civil Engineering G Pulla Reddy Engineering College (Autonomous) Near Pasupula Village, Kurnool – Nandyal Main Road Kurnool, Andhra Pradesh - 518007
External Examiner (Within Karnataka)	:	**Dr Radhakrishna** Professor and Head Department of Civil Engineering R. V. College of Engineering Mysore Road Bengaluru Karnataka- 560059
Supervisor	:	**Dr Hossiney Nabil Jallal** Associate Professor Department of Civil Engineering School of Engineering and Technology CHRIST (Deemed to be University) Kengeri Campus Bengaluru 560074, Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva.

Registrar

Place: Bengaluru
Date: 31 January 2023

ABSTRACT

The current study outlines a process for producing environmentally friendly bricks that can also compete successfully in today's highly competitive market. The use of iron ore tailings (IOT), which are typically disposed of as waste by the mining industry, is the subject of ongoing research for brick production. Bricks were made using IOT, which was obtained from iron ore mines in India's southern region. The study is based on the alkali-activation method of producing IOT bricks, which has been shown to be the most energy-efficient method of production. This is because, in contrast to the traditional method of producing bricks, the alkaliactivation method emits fewer greenhouse gases. India has an abundance of iron ore deposits, which has resulted in extensive mining activities, which has resulted in an increase in waste generation, The waste is typically disposed of by being dumped in one of the dumping sites or dams near the mining area. These tailings pose a significant threat to the environment in their immediate vicinity. As a result, the use of IOT in brick manufacturing will reduce the mining industry's waste disposal burden. Furthermore, the use of IOT in the production of bricks will reduce the use of natural raw materials in the production of conventional bricks. Several types of brick composites were developed in this study by combining Ground Granulated Blast Furnace Slag (GGBS), Flyash, and IOT with a sodium silicate solution. Each raw material is analysed using particle size analysis (PSA), X-ray fluorescence (XRF), X-ray diffraction (XRD) and scanning electron microscopy (SEM. The newly developed IOT bricks were put through a series of tests to determine their strength and durability in accordance with Indian standards. The developed IOT bricks had a maximum compressive strength of up to 18.45N/mm2 while water absorption was not more that 12.6%. Furthermore, the bricks were subjected to a series of wetting and drying tests to determine their long-term durability in accordance with Brazilian regulations. Each of the results obtained was validated using microstructure analysis of the product that was developed. Furthermore, the study sought to determine the compression strength of alkali-activated IOT brick prisms when combined with mortar of varying strengths. Finally, it was determined that more than 50 percent of the IOT can be used in combination with GGBS, flyash, and sodium silicate solution as an alkali activator to produce high-quality bricks under ambient temperature curing conditions.

Keywords: Iron Ore Tailings, Sodium silicate, GGBS, Flyash, Compressive strength, water absorption, Durability, masonry prism

Publications:

1. Compressed unfired blocks made with iron ore tailings and slag **Thejas H K**, Nabil Hossiney, Cogent Engineering. Vol.9, 2022. https://doi.org/10.1080/23311916.2022.2032975
2. Alkali-activated bricks made with mining waste iron ore tailings **Thejas H K**, Nabil Hossiney, Case Studies in Construction Materials, Vol.16, 2022. https://doi.org/10.1016/j.cscm.2022.e00973