National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Synthesis of Slag-Waste Glass Binary Geopolymer and Its Application as a Sustainable Stabilizing Material
Speaker	: Datla Neeraj Varma (Rollno : 519ce1015)
Supervisor	: Prof. Suresh Prasad Singh
Venue	: Civil Engineering Department Seminar Room
Date and Time	: 23 Jul 2024 (11 am)
Abstract	: Slag-waste glass powder (GP) binary geopolymer is synthesized and its suitability as a sustainable stabilizer for geotechnical applications is assessed. The first phase of experimental results showed that the fresh and hardened properties of slag-GP geopolymer were highly influence by the synthesis parameters such as GP content, NaOH concentration, liquid to solid ratio, and curing conditions. At ambient conditions (30 ▌ and 95% RH), 10% GP content attained higher strength and microstructural properties. However, a higher dose of GP (20% to 40%) is beneficial for specimens cured at elevated temperatures (45 °C to 60 °C). At high temperature exposure (800 ºC and 1000 ºC), the GP-rich geopolymer (20% to 40% GP) showed better mechanical performance by filling up of micro-pores with molten glass particles. In the second phase, pond ash (PA) was stabilized with synthesized geopolymer, cement, and lime. The mechanical properties of the PA were significantly enhanced with increased additive contents and curing durations. However, delay in compaction shows negative impact on the mechanical performance of the stabilized material due to the deposition of cementitious products and formation of agglomerates during delay periods. The leachable concentration of Fe, Ca, Mg, Na, Zn, Ni, and Cu from the stabilized PA was within the threshold limits of WHO and IS: 10500-2012 water quality standards. However, the concentration of Pb, Hg, and As were higher than that of the permissible limits. The geopolymer-stabilized PA achieved higher strength, durability, and metal ion encapsulation properties compared to cement and lime-stabilized PA.