National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Conference Return Seminar: Strength and Design Thickness of Pavements Using Geopolymer-Stabilized Pond Ash as Subbase and Base Material
Speaker	: Amruta Dash
Supervisor	: Dr. M. Gattu
Venue	: CE Seminar Hall
Date and Time	: 06 Jan 2025 (04:35 pm)
Abstract	: Huge quantities of pond ash (PA) are left unutilized in ash ponds without any practical application due to its poor pozzolanic/cementitious properties. For effective utilization of PA as a subbase and base material in pavements, it has been treated with conventional stabilizers (cement/lime). However, environmental issues with conventional stabilizers raised the necessity of using alternative eco-friendly stabilizers. Hence, in this study, PA is stabilized with different mix ratios of geopolymer (3%, 6%, 9%, 12%, and 15%), and laboratory investigations are made to assess its mechanical and mineralogical properties. Based on the results, the suitability of stabilized PA as a cementitious subbase (CTSB) and cementitious bases (CTB) of flexible pavement is assessed. Thereafter, pavement design is carried out using IITPAVE software for higher traffic load conditions. The PA-additive mixes achieved lower optimum moisture content and higher maximum dry unit weight with the inclusion of additives. The stabilized PA achieved higher unconfined compressive strength (UCS) due to the formation of cementitious products such as sodium alumina silicate hydrate, sodium alumina silicate, calcium alumina silicate hydrate, and calcium silicate hydrate. As per IRC: 37 (2018), PA stabilized with 3% and 6% geopolymer contents satisfied the requirements of CTSB material of flexible pavement, while 9%, 12%, and 15% geopolymer contents satisfied the requirements of CTB material. The overall thickness of the pavement is significantly reduced by using stabilized PA as CTSB and CTB materials when compared to granular subbase and base material. Hence, this study recommends the use of geopolymer- stabilized PA for sustainable construction practices.