National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Conference Return Seminar: Seismic Bearing Capacity of Conical Footing in c-ϕ Soil Using Finite Element Limit Analysis
Speaker	: Anurag Raj
Supervisor	: Dr. M. Gattu
Venue	: CE Seminar Hall
Date and Time	: 06 Jan 2025 (05:15 pm)
Abstract	: Mobile jack-up rigs are vital in offshore oil and gas exploration and production, particularly in increasingly harsh environments. These rigs typically feature three independent legs, each equipped with a spudcan foundation, which serves as a critical component for ensuring stability and support. Modern rigs with spudcans face limited research on seismic loading. The present study investigates the seismic bearing capacity of conical footings in homogeneous c - ϕ soil, crucial for designing safe spud can foundations in offshore oil and gas exploration. Using finite-element limit analysis (FELA) with Mohr – Coulomb (MC) yield criterion and pseudo-static approach, the research examines the impact of key parameters such as cone apex angle (β), angle of internal friction (ϕ), and horizontal seismic coefficient (kh) on seismic bearing capacity factors due to cohesion (NcE), surcharge load (NqE) and unit weight of soil (NγE). The seismic bearing capacity factors reduces notably with increasing β and kh. NcE, NqE and NγE increase with ϕ and footing base roughness (α) for each apex angle (β). The findings indicate that the maximum the bearing capacity factors for rough base conical footing with lower apex angle. The results have been presented in the form of charts that can be useful for field engineers.