Summary Report

of

Five Days Workshop

on

Interdisciplinary Approaches in Geotechnical and Geoenvironmental Engineering

17 Feb 2025 – 21 Feb 2025

Organized by

Department of Civil Engineering

Harcourt Butler Technical University, Kanpur

DAY 1 – INAUGURATION AND TECHNICAL SESSIONS

TECHNICAL SESSION SPEAKERS:

1. **Prof. G V Ramana, Indian Institute of Technology Delhi, India - High Resolution Site Characterization (HRSC) Studies at IIT Delhi**
2. **Prof. Neelima Satyam, Indian Institute of Technology, Indore, India - Geophysical Tests in Infrastructure Projects**

The Five-Day Online Workshop on "Interdisciplinary Approaches in Geotechnical and Geoenvironmental Engineering" commenced on 17th February 2025 with an impactful inaugural session that laid a strong foundation for the days to follow. The event brought together esteemed dignitaries, renowned experts, faculty members, and participants from diverse academic and professional backgrounds.

The session began with a warm welcome address delivered by Dr. Kavita Tandon, Co-Convenor and Assistant Professor, Civil Engineering Department, HBTU Kanpur. She introduced the theme of the workshop, highlighting its significance in addressing contemporary environmental and geotechnical challenges through multidisciplinary collaboration. She emphasized that the aim of the workshop is to foster academic discourse and technical advancement by blending geotechnical and geoenvironmental approaches for sustainable development. This was followed by the address of the Workshop Convenor, Dr. Rajiv Ganguly, who shared insights into the strategic planning and vision behind the workshop. He stressed the need to align educational efforts with field practices to enhance the scope of civil engineering solutions to real-world environmental problems.

The Chairman of the Organizing Committee, Prof. Deepesh Singh, Head of the Department of Civil Engineering, emphasized the department's commitment to academic excellence and innovation. He welcomed the participants and appreciated the collaborative efforts of the organizing team and technical experts for curating such an insightful workshop. The Guest of Honour, Prof. Vinay Pratap Singh, Dean, School of Engineering, shared his views on how interdisciplinary convergence is the way forward for solving complex engineering problems, especially those involving environmental sustainability and infrastructure resilience. Prof. Dipteek Parmar, Pro Vice-Chancellor of HBTU, graced the session as

Patron and delivered a compelling speech on the importance of nurturing such platforms for young researchers and academicians to learn, explore, and contribute to scientific advancements. He commended the efforts of the Civil Engineering Department in organizing this workshop and reiterated the university's commitment to fostering interdisciplinary research and knowledge exchange. His speech resonated with themes of academic integrity, innovation, and sustainable engineering.

A comprehensive overview of the workshop schedule, themes, and objectives was shared, which include:

a. Encouraging interdisciplinary research in geotechnical and geoenvironmental engineering.
b. Exploring sustainable practices and innovative remediation techniques.
c. Understanding environmental risk mitigation and challenges in infrastructure design.

The session concluded with expressions of gratitude to all the dignitaries, speakers, and participants by the Faculty Coordinators and Student Team, whose diligent efforts ensured the smooth execution of the event.

The workshop commenced with the inaugural technical session delivered by Prof. G. V. Ramana, a renowned expert in geotechnical engineering from the Indian Institute of Technology Delhi. Prof. Ramana's presentation focused on the theme of High Resolution Site Characterization (HRSC)—a critical aspect in modern infrastructure development that ensures precise understanding of subsurface conditions. He emphasized how accurate site characterization plays a vital role in enhancing the safety, economy, and reliability of geotechnical designs, particularly in densely built urban areas and complex geological settings. The session provided a comprehensive overview of advanced geophysical and geotechnical methods, including Seismic Tomography, Electrical Resistivity Imaging (ERI), Multi-Channel Analysis of Surface Waves (MASW), and Ground Penetrating Radar (GPR). Prof. Ramana discussed how these tools, when used in conjunction with borehole investigations and laboratory testing, allow engineers to capture a more holistic and high-resolution image of the subsurface. Through select case studies from ongoing and

completed projects at IIT Delhi and other parts of India, he showcased how HRSC supports risk assessment, foundation optimization, and the safe planning of large-scale infrastructure such as metro tunnels, highways, and high-rise structures.

Prof. Ramana's talk was deeply insightful and well-received by the participants. It successfully highlighted the importance of integrating data from diverse sources and adopting an interdisciplinary approach for reliable geotechnical decision-making. The session not only introduced participants to the state-of-the-art tools available in HRSC but also demonstrated the practical implementation of these methods in real-world scenarios. His lecture set a strong academic and professional foundation for the rest of the workshop, aligning perfectly with its objectives of promoting innovative and interdisciplinary practices in geotechnical and geoenvironmental engineering.

Following the inaugural technical session, the second lecture of the day was delivered by **Prof.** Neelima Satyam, an eminent academician from IIT Indore known for her expertise in geotechnical earthquake engineering and geophysics. Her presentation on Geophysical Tests in Infrastructure Projects offered the participants an in-depth understanding of non-invasive methods for subsurface exploration—an essential component of safe and economical infrastructure design.

Prof. Satyam began by establishing the growing importance of geophysical methods in infrastructure development, particularly in large-scale projects such as metro systems, bridges, dams, and highways. She elaborated on commonly used techniques like Seismic Refraction, Electrical Resistivity Tomography (ERT), Multi-Channel Analysis of Surface Waves (MASW), Crosshole and Downhole Seismic Testing, highlighting their respective strengths, limitations, and applications. These methods, she emphasized, help in assessing soil stratification, detecting anomalies, locating utilities, and estimating dynamic soil properties—often in areas where conventional methods may be time-consuming or infeasible.

The session was enriched with illustrative case studies and field data that demonstrated the integration of geophysical tests with geotechnical investigations for better subsurface modeling and risk mitigation. Prof. Satyam emphasized the importance of data validation

and interpretation through multi-method approaches to achieve higher reliability. Her engaging delivery and ability to translate complex field techniques into practical knowledge made the session particularly impactful for young researchers, engineers, and faculty members. The lecture strongly reinforced the workshop's objective of promoting interdisciplinary and technologically advanced approaches in the field of geotechnical and geoenvironmental engineering.

DAY 2 –TECHNICAL SESSIONS

SPEAKERS:

1. **Dr. Prasun Halder, Indian Institute of Technology Jammu, India - Disconnected Piled Raft System: Concept and Application**
2. **Prof. Rajesh Satyamoorthy, Indian Institute of Technology, Kanpur, India - New insight on hydraulic and gas migration through unsaturated geosynthetic clay liners**

The second day of the workshop commenced with a thought-provoking lecture by Dr. Prasun Halder from IIT Jammu, focusing on the Disconnected Piled Raft System (DPRS)—an innovative and efficient foundation system designed for modern structures subject to complex loading conditions. Dr. Halder, a well-recognized expert in deep foundation systems and soil-structure interaction, delivered a detailed and technically enriching session that aligned closely with the workshop's objective of introducing innovative practices in geotechnical design.

Dr. Halder began by introducing the concept of DPRS, which combines the load-sharing mechanisms of both rafts and piles, but with a distinct separation between them to optimize their individual contributions. He explained how this configuration mitigates the problems associated with differential settlements, improves bearing capacity, and offers cost-effective alternatives to conventional piled rafts. Using analytical formulations, finite element modeling, and field monitoring results, he demonstrated the mechanical behavior and design considerations of DPRS in real-world applications. A key highlight of the session was the presentation of case studies involving tall buildings and industrial structures founded on soft to medium-stiff soils, where DPRS provided substantial improvements in foundation performance. Dr. Halder also discussed the challenges in installation, modeling assumptions, and long-term behavior of these systems under static and dynamic loads. The session was highly appreciated by participants for bridging the gap between theory and practice and opening new avenues for research and design in the area of foundation engineering.

The second session on Day 2 of the workshop was delivered by Prof. Rajesh Satyamoorthy from IIT Kanpur, who presented a deeply analytical and research-driven talk on the behavior of unsaturated Geosynthetic Clay Liners (GCLs) under varying hydraulic and gas migration conditions. Prof. Satyamoorthy, known for his significant contributions in geoenvironmental engineering, focused on understanding the transport phenomena that govern the performance of GCLs used in landfills and contaminated site containment.

Beginning with the fundamentals of GCL composition and the importance of unsaturated conditions, he discussed how hydraulic conductivity and gas permeability vary with factors such as overburden pressure, temperature, hydration, and desiccation. The session shed light on the microstructural mechanisms that influence fluid retention and gas migration pathways in GCLs, emphasizing the critical role of interface behavior and swelling potential of bentonite.

Through laboratory experiments, theoretical models, and recent advancements in coupled flow simulation, Prof. Satyamoorthy showcased the long-term performance implications of GCLs in engineered barriers. He also highlighted how improper assumptions during design can lead to underperformance or failure, especially in arid and semi-arid environments. The session enriched the participants' understanding of geo-barrier systems, offering key takeaways for both academic research and practical landfill engineering.

DAY 3 –TECHNICAL SESSIONS

SPEAKERS:

1. **Dr. Amit Kumar Rathi, MNIT Jaipur, India - Legacy Waste Processing: Insights, Case Studies & Opportunities**
2. **Dr. S V A R Sastry, Harcourt Butler Technical University, Kanpur, India- Innovative Remediation Techniques for Sustainable Environmental Management**
3. **Dr. Sanjit Biswas, NIT Warangal - Performance of Y-shaped pile subjected to rotating machine induced harmonic vibration**

The third day of the Online Faculty Development Program on "Innovative Approaches in Dynamics of Soils and Structures" at HBTU Kanpur maintained the momentum of technical excellence established in earlier sessions. The day's focus transitioned toward sustainable geotechnical practices, including environmental rehabilitation, soil remediation, and dynamic behavior of foundations under mechanical loading. With a rich blend of applied research and practical case studies, the sessions attracted high engagement and fostered an environment of collaborative learning.

Dr. Amit Kumar Rathi initiated Day 3 with a compelling presentation that addressed one of the most pressing urban challenges—legacy waste management. He began by defining legacy waste and its environmental impact, particularly in the context of urban landfills that pose threats to soil and groundwater quality. The session detailed modern approaches to bio-mining and bio-remediation of legacy waste, supported by extensive case studies from municipal projects in Rajasthan and Delhi.

Dr. Rathi emphasized the multi-disciplinary nature of sustainable waste management, highlighting the role of civil engineers in designing engineered landfills and remediation systems. He presented insightful data on recovery percentages of inert waste, recyclables, and bio-stabilized material during actual waste processing projects. The audience appreciated the visual documentation of on-site processes like trenching, sieving, and leachate treatment, making complex field operations comprehensible. The session was

interactive, with participants raising queries about policy gaps, design criteria of landfill capping, and challenges in public-private partnerships.

Dr. Sastry's session delved into cutting-edge technologies in soil and groundwater remediation. His talk began with a background on common contaminants such as heavy metals, hydrocarbons, and pesticides found in Indian industrial zones. The session progressed into detailed discussions on **in-situ** and **ex-situ** remediation methods including bioremediation, electrokinetic remediation, phytoremediation, and advanced oxidation processes. What made the session particularly enriching was Dr. Sastry's ability to link lab-based research to real-world scenarios. He shared experimental results from pilot-scale remediation at industrial waste sites and emphasized the role of microbial kinetics and geochemical interactions in deciding remediation timelines and effectiveness. The session also offered insights into the regulatory frameworks for contaminated site management in India and the limitations of existing infrastructure. With live demonstrations and simplified process flow diagrams, Dr. Sastry made complex remediation processes easy to grasp.

The final session of the day brought a shift in focus toward **machine foundation dynamics**, a topic of critical importance in power plants and industrial machinery installations. Dr. Sanjit Biswas introduced the audience to **Y-shaped pile geometry**, an innovative alternative to conventional vertical piles for supporting dynamically loaded foundations. He elaborated on the experimental setup used for simulating harmonic vibrations caused by rotating machines, and how soil-structure interaction mechanisms were influenced by pile geometry. Analytical and finite element models were discussed to explain the damping behavior and resonance characteristics observed during the tests. The session also included parameter sensitivity studies showing the impact of frequency, amplitude, and subsoil conditions on the performance of the foundation system. Participants were captivated by the visual outputs of dynamic response spectra, displacement amplitudes, and frequency domain analyses. The interactive Q&A session sparked interest in extending this research to machine clusters and cyclic loading from rail or wind-induced vibrations.

The sessions concluded with a healthy interaction between the speakers and participants, where practical queries and case-specific discussions added depth to the learning

experience. Day 3 not only broadened the participants' understanding of sustainable practices in geotechnics but also connected experimental research with field applications. The interdisciplinary relevance of each session reflected the core theme of the FDP and further strengthened the collaborative ethos of the workshop.

DAY 4 –TECHNICAL SESSIONS

SPEAKERS:

1. **Mr. Amit Gautam, SMEC - The Engineering of Dams and Tunnels**
2. **Prof. S K Singh, Punjab Engineering College, Chandigarh - Raising of Coal Ash Dyke through Upstream Method**
3. **Prof. Bappaditya Manna, Indian Institute of Technology Delhi, India - Optimized Design Approach for Geocell-Stabilized Flexible Pavements on Expansive soil - A Case Study**

The fourth day of the FDP began with an insightful and engaging session delivered by Mr. Amit Gautam from SMEC, an internationally renowned consultancy firm in infrastructure and engineering. With his extensive field experience and global exposure in dam and tunnel design, Mr. Gautam brought a highly practical dimension to the discussion, focusing on the integrated challenges of hydraulic, structural, and geotechnical aspects in underground and hydropower infrastructure. His session set a strong technical tone for the day, as participants were introduced to the complexities of real-life engineering applications beyond academic modeling.

Mr. Gautam's lecture offered a deep dive into the fundamentals and advanced principles of dam and tunnel engineering, beginning with an overview of classification and site selection criteria. He emphasized the geotechnical investigations required for the safe design of embankment and gravity dams, such as seismic hazard assessment, seepage control, slope stability, and instrumentation monitoring. A major portion of the session was dedicated to tunnel engineering, where he explained the New Austrian Tunneling Method (NATM), Rock Mass Rating (RMR), and Tunnel Boring Machine (TBM) operations. Through meticulously curated case studies from ongoing projects across the Himalayas and Southeast Asia, Mr. Gautam explained challenges such as rock bursts, water ingress, and overburden stresses, along with their engineering solutions. Participants greatly appreciated the session for its field-oriented examples, clarity in technical narration, and visual documentation of real construction stages. The speaker also highlighted the importance of multidisciplinary coordination in large-scale dam and tunnel projects,

linking civil, structural, hydraulic, and environmental considerations. The session concluded with an interactive Q&A where queries ranged from stress redistribution in tunnel linings to reservoir-induced seismicity, which Mr. Gautam addressed with clarity and expertise.

The second session of Day 4 was delivered by Prof. S. K. Singh, an eminent expert in geotechnical engineering from Punjab Engineering College, Chandigarh, who brought a wealth of academic and field-based knowledge on a subject of increasing importance—coal ash dyke stability and its progressive elevation using upstream methods. His session was a seamless blend of theoretical frameworks, empirical studies, and real-life case applications that deeply resonated with the participants, especially those involved in geo-environmental and energy sector projects.

Prof. Singh began the session by contextualizing the critical role of fly ash management in India, given the substantial generation of coal combustion residuals from thermal power plants. He emphasized the engineering necessity of constructing and raising ash dykes to safely contain this material while ensuring structural stability and environmental compliance. The focus of the talk centered on the upstream method of dyke raising, the most economically favorable yet geotechnically challenging technique.

Detailed discussions were held on foundation preparation, phreatic surface control, shear strength behavior of fly ash, and the implications of slope instability under saturated conditions. Prof. Singh provided clarity on design methodologies and stability analysis using limit equilibrium and finite element methods. Notably, he presented findings from field investigations, laboratory model tests, and instrumentation data from operating ash dyke sites, which gave participants critical insights into real-world performance, failure mechanisms, and mitigation strategies.

The interactive session witnessed robust participation, with several queries on seepage analysis, construction sequencing, and geo-synthetics reinforcement, all of which were addressed with academic depth and practical wisdom by Prof. Singh. The session was widely appreciated for highlighting the sustainability aspect of ash reuse, and participants rated it highly for its relevance, clarity, and depth. It effectively reinforced the day’s theme

of combining geotechnical rigor with infrastructural innovation in complex field conditions.

The final session of Day 4 was conducted by Prof. Bappaditya Manna from IIT Delhi, who delivered a technically profound lecture on the use of geocell-reinforcement techniques for enhancing the performance of flexible pavements laid over expansive soils. His talk was an exceptional combination of mechanistic design principles, advanced modeling techniques, and real-world applications that addressed the growing infrastructure challenges posed by problematic soil conditions across India and other developing regions. Prof. Manna began by outlining the geotechnical behavior of expansive soils, particularly their cyclical swell-shrink characteristics, low bearing capacity, and severe impact on pavement durability. He then transitioned to explain the engineering rationale behind adopting geocell-reinforcement—a three-dimensional honeycomb-like cellular confinement system—as a cost-effective ground improvement technique. His presentation highlighted how geocells significantly distribute loads, enhance modulus, and reduce vertical and lateral deformation, especially under repetitive traffic loading.

Using a comprehensive case study from a national highway project, Prof. Manna walked participants through the design methodology, numerical simulation using PLAXIS 3D, and field performance assessment of geocell-reinforced pavements. The optimized design approach was elaborated with reference to Indian Road Congress (IRC) guidelines, stress-strain response analysis, and long-term serviceability. He also emphasized the importance of material selection, infilling strategies, and installation best practices for achieving durable performance. Participants were particularly engaged in the Q&A session, where discussions revolved around life-cycle cost benefits, comparisons with other reinforcement methods, and applicability in rural road development schemes. The session was hailed as both innovative and pragmatic, offering clear direction for incorporating sustainable ground improvement technologies in highway infrastructure.

Day 4 of the FDP proved to be a highly impactful academic journey, focusing on geotechnical innovations in large-scale infrastructure, including hydraulic structures, ash containment systems, and transportation networks. The day's sessions provided a cohesive blend of theory, field experience, and advanced modeling, offering practical insights to

overcome some of the pressing geotechnical challenges in India's developmental context. The participants not only deepened their understanding of soil-structure interaction, geosynthetics, and dynamic loading conditions but also appreciated the real-life applicability of the topics discussed. The enthusiastic engagement during all three sessions reflected the high relevance and quality of the lectures delivered. Day 4 successfully reinforced the FDP's overarching goal—to foster innovative approaches for sustainable and resilient geotechnical engineering solutions.

DAY 5 –TECHNICAL SESSIONS

SPEAKERS:

1. **Dr. Janaki Ramaiah, IIT Tirupati - Geotechnical Characterization of MSW: Field and Large-Scale laboratory Studies**
2. **Dr. Mohit Somani, Indian Institute of Technology, Bhubaneshwar - Bio-mining of Legacy Municipal Solid Waste: Challenges & Opportunities**

The final day of the Faculty Development Program (FDP) on "Innovative Approaches in Dynamics of Soils and Structures" commenced with renewed energy and enthusiasm. Day 5 was meticulously curated to emphasize cutting-edge research and experimental investigations in the domain of geoenvironmental engineering and soil dynamics, with a focus on sustainable and resilient practices. Participants were eager to engage in sessions that bridged the gap between waste management, dynamic characterization, and real-world applications, setting the stage for insightful discourse and knowledge sharing.

Dr. Janaki Ramaiah initiated Day 5 with a highly engaging and scientifically detailed session on the geotechnical characterization of municipal solid waste (MSW), which addressed the growing importance of understanding the mechanical behavior of waste materials in engineered landfills. His lecture was a thoughtful synthesis of field studies, large-scale laboratory investigations, and real-world challenges associated with assessing and managing legacy and active waste dumpsites. Beginning with an overview of the heterogeneous and evolving nature of MSW, Dr. Ramaiah emphasized the limitations of traditional soil testing methods when applied to municipal waste. He then presented detailed findings from instrumented field trials and large-scale triaxial and shear tests, carried out under controlled conditions, to evaluate parameters such as unit weight, compressibility, shear strength, and moisture retention characteristics of MSW. The session highlighted the differences in behavior between fresh and degraded waste and illustrated how composition, degradation stage, and moisture content critically influence MSW's engineering properties.

A key highlight was the use of in-situ testing techniques, including cone penetration testing (CPT) and geophysical methods, integrated with laboratory modeling of landfill behavior

under static and dynamic loads. Participants gained insight into how such experimental approaches can enhance the reliability of stability assessments, settlement predictions, and design of containment systems. The session concluded with a discussion on the implications for landfill mining, reclamation, and sustainable urban waste management. Dr. Ramaiah's session was praised for its technical clarity, data-rich presentation, and its relevance to geoenvironmental research and practice. The Q&A segment witnessed enthusiastic interaction, with participants discussing the potential for re-engineering dump sites using such advanced characterization techniques.

The second session of Day 5 was delivered by Dr. Mohit Somani from IIT Bhubaneswar, who addressed one of the most pressing issues in urban waste management—bio-mining of legacy municipal solid waste (MSW). In an era where cities are grappling with the dual challenges of space scarcity and environmental degradation, Dr. Somani's lecture offered participants a forward-thinking and actionable framework to approach sustainable landfill remediation. He began by contextualizing legacy waste dumpsites within the larger framework of India's urbanization and municipal infrastructure. Through informative case studies and real-life data, he emphasized the environmental hazards, including groundwater contamination, greenhouse gas emissions, and land scarcity, posed by unengineered and aged dumpsites. Dr. Somani then introduced the concept of bio-mining as an eco-friendly and economically viable alternative to conventional capping and closure methods.

The session covered the process flow of bio-mining, detailing key stages such as waste segregation, composting, resource recovery, and final disposal of inert residues. He highlighted the role of mechanical screening, biological stabilization, and the use of microbial cultures in accelerating degradation. The importance of regulatory support, public-private partnerships, and community engagement were also underlined as critical enablers for successful implementation. Participants were particularly engaged during the discussion on technological interventions and monitoring strategies, including gas emission controls, leachate management, and remote sensing for progress assessment. Dr. Somani also presented comparative analyses of projects undertaken across India, helping attendees understand the financial, logistical, and environmental trade-offs involved in large-scale bio-mining initiatives. Feedback from attendees reflected strong appreciation

for the clarity, practical insights, and interdisciplinary relevance of the session. Several participants expressed keen interest in initiating similar projects in their regions, reflecting the inspiring and application-oriented tone of the lecture.

The five-day journey through the technical sessions of the FDP on *"Innovative Approaches in Dynamics of Soils and Structures"* offered participants a rich blend of academic depth, industry relevance, and innovative research perspectives. From dynamic modeling of offshore structures and soil-structure interaction to geoenvironmental remediation, experimental investigations, and sustainable waste management techniques, the sessions were carefully curated to foster interdisciplinary learning and collaboration.

Overall, the sessions on Day 5 successfully concluded the technical proceedings of the workshop on a high note—emphasizing research-driven, interdisciplinary approaches to managing solid waste and improving infrastructure resilience. The quality of interaction, relevance of the topics, and the practical knowledge shared were deeply appreciated by all participants. The enthusiastic engagement of speakers and participants alike underscored the urgency and importance of integrating innovation with traditional geotechnical practices. The FDP succeeded in not only advancing technical understanding but also inspiring actionable ideas and future research directions. The collective feedback highlighted the practical relevance, technical clarity, and holistic approach adopted across all sessions—making this academic event a meaningful and memorable experience for all involved.

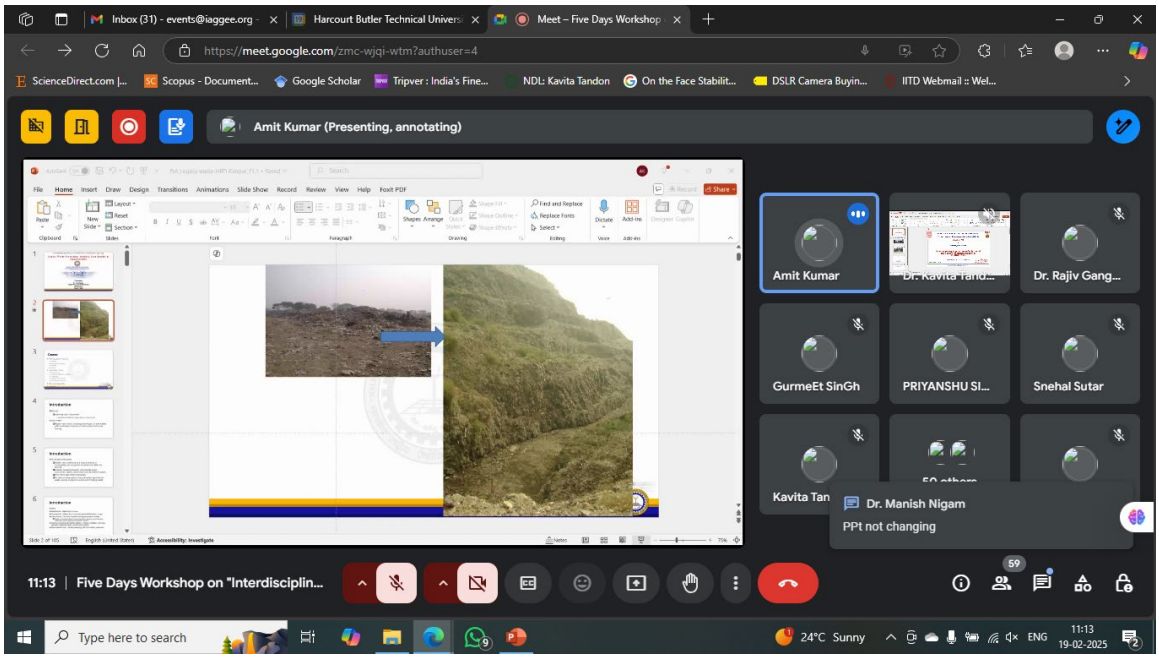
DAY 5 –VALEDICTORY SESSION

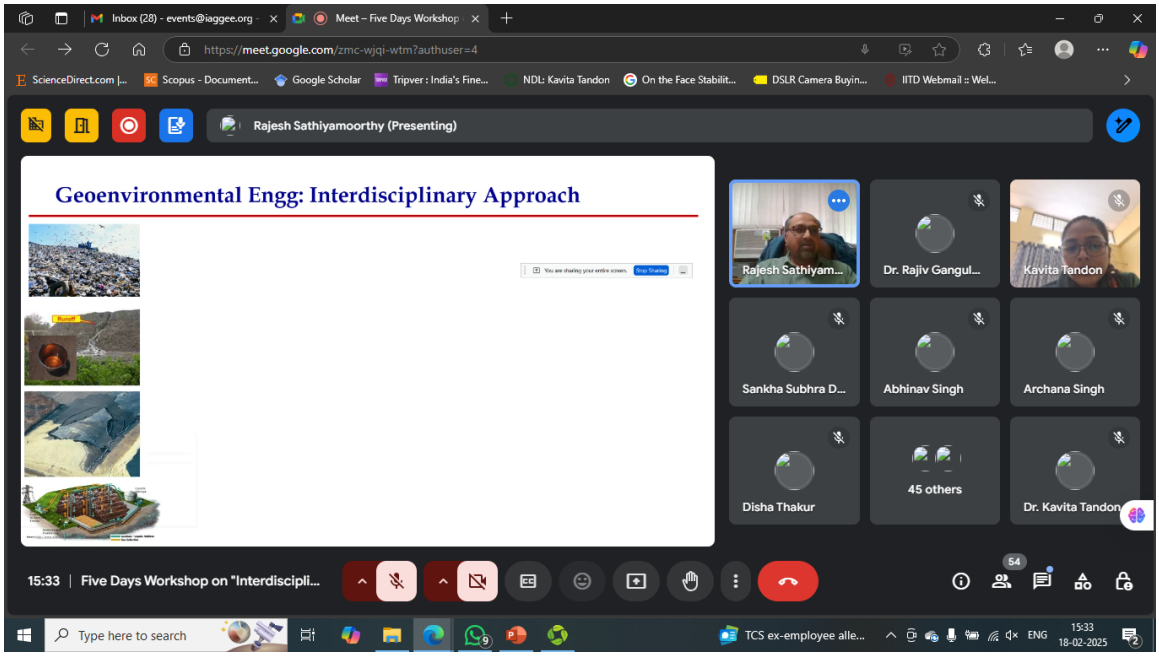
The five-day workshop on "Interdisciplinary Approaches in Geotechnical and Geoenvironmental Engineering", organized by the Department of Civil Engineering, Harcourt Butler Technical University, Kanpur, successfully concluded with enthusiastic participation from professionals, researchers, and students across India. With a total of 121 registered participants, the workshop served as an impactful knowledge-sharing platform, enabling diverse disciplinary perspectives to converge on contemporary geotechnical and environmental issues. Throughout the sessions, eminent speakers from reputed national institutions such as IIT Delhi, IIT Jammu, IIT Bhubaneswar, IIT Kanpur, IIT Tirupati, IIT Indore, NIT Warangal, MNIT Jaipur, Punjab Engineering College, Chandigarh, SMEC. The topics covered ranged from site characterization, geosynthetics, municipal solid waste management, geocell-stabilized pavements, tunnelling, to cutting-edge methods for seismic and dynamic analysis. Each session was followed by live Q&A discussions and consistently received excellent feedback from attendees, reflecting both relevance and high academic rigor.

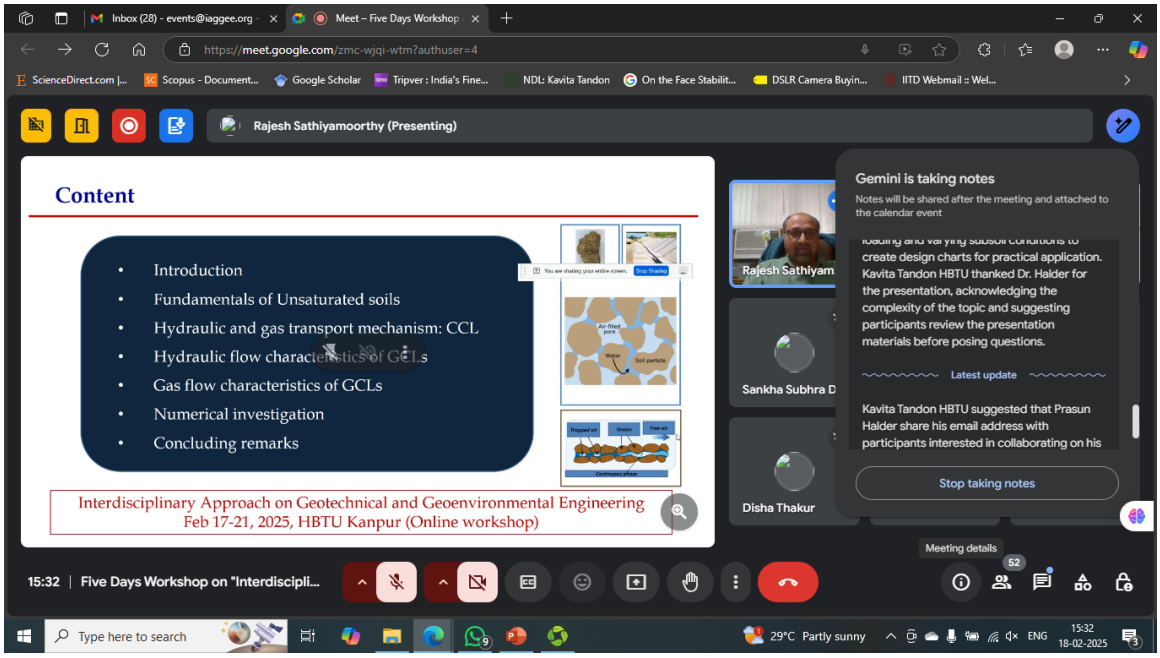
The valedictory session, graced by Prof. Vinay Pratap Singh (Dean, School of Engineering), Prof. Dipteek Parmar (Pro Vice Chancellor), and Prof. Deepesh Singh (Head, Department of Civil Engineering and Workshop Chairman), marked the formal closing of the event. Dr. Kavita Tandon welcomed all dignitaries and presented a comprehensive summary of participant engagement, feedback received, and workshop outcomes. She highlighted that all participants successfully completed the workshop and were awarded e-certificates. The vote of thanks was proposed by Dr. Rajiv Ganguly, the workshop convenor, expressing gratitude to all speakers, participants, and coordinators. Dr. Tandon concluded the session with an announcement of more such academic events and training programs in the near future from the department. The workshop not only achieved its stated objectives but also fostered meaningful interdisciplinary dialogue, paving the way for innovative approaches to solving complex geoenvironmental challenges. The Department of Civil Engineering looks forward to continuing this momentum through future collaborative initiatives.

GLIMPSES OF THE EVENT

INTERDISCIPLINARY APPROACHES IN GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING






Rajesh Sathiyamoorthy (Presenting)
Content
Introduction
Fundamentals of Unsaturated soils
Hydraulic and gas transport mechanism: CCL
Hydraulic flow characteristics of GCLs
Gas flow characteristics of GCLs
Numerical investigation
Concluding remarks
Interdisciplinary Approach on Geotechnical and Geoenvironmental Engineering
Feb 17-21, 2025, HBTU Kanpur (Online workshop)
Gemini is taking notes
Notes will be shared after the meeting and attached to the calendar event
create design charts for practical application. Kavita Tandon HBTU thanked Dr. Halder for the presentation, acknowledging the complexity of the topic and suggesting participants review the presentation materials before posing questions.
Latest update
Kavita Tandon HBTU suggested that Prasun Halder share his email address with participants interested in collaborating on his
Stop taking notes
Rajesh Sathiyam
Sankha Subhra D
Disha Thakur
Meeting details
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29°C Partly sunny
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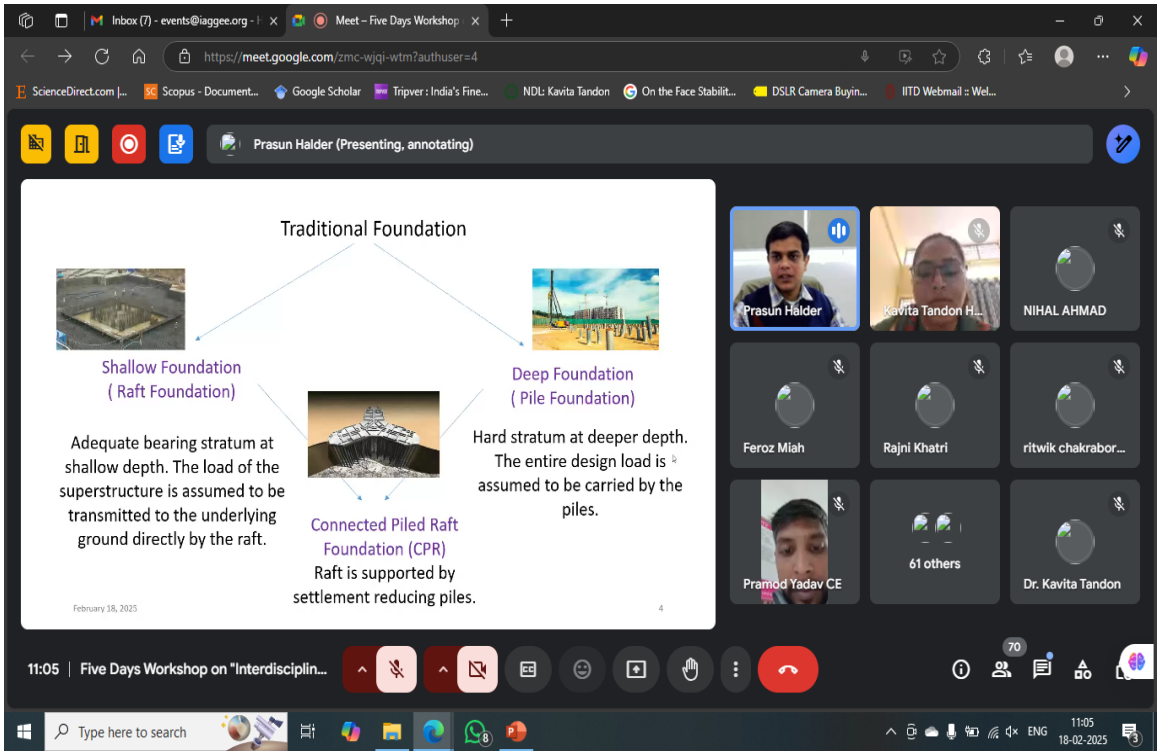
18-02-2025


Prasun Halder (Presenting, annotating)
Traditional Foundation
Shallow Foundation
(Raft Foundation)
Adequate bearing stratum at shallow depth. The load of the superstructure is assumed to be transmitted to the underlying ground directly by the raft.
Deep Foundation
(Pile Foundation)
Hard stratum at deeper depth. The entire design load is assumed to be carried by the piles.
Connected Piled Raft Foundation (CPR)
Raft is supported by settlement reducing piles.
February 18, 2025
4
Prasun Halder
Kavita Tandon H...
NIHAL AHMAD
Feroz Miah
Rajni Khatri
ritwik chakrabor...
Pramod Yadav CE
61 others
Dr. Kavita Tandon
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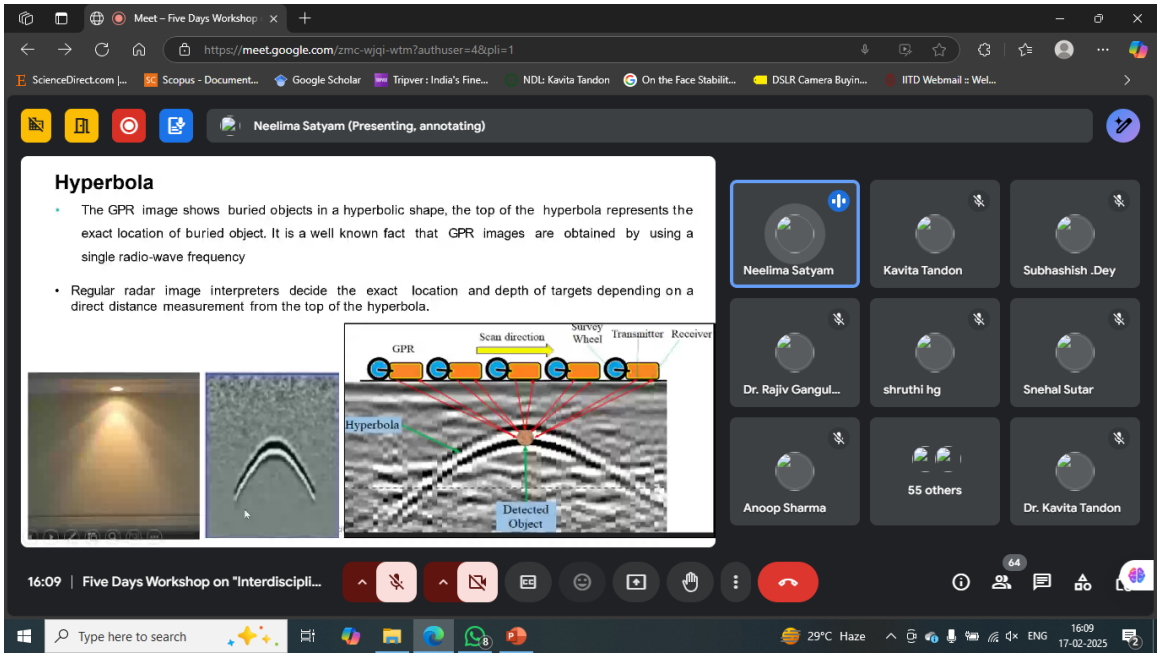
Meet – Five Days Workshop
https://meet.google.com/zmc-wjqi-wtm?authuser=4&pli=1
Neelima Satyam (Presenting, annotating)
Hyperbola
The GPR image shows buried objects in a hyperbolic shape, the top of the hyperbola represents the exact location of buried object. It is a well known fact that GPR images are obtained by using a single radio-wave frequency
Regular radar image interpreters decide the exact location and depth of targets depending on a direct distance measurement from the top of the hyperbola.
GPR
Scan direction
Survey Wheel
Transmitter
Receiver
Hyperbola
Detected Object
Neelima Satyam
Kavita Tandon
Subhashish .Dey
Dr. Rajiv Gangul...
shruthi hg
Snehal Sutar
Anoop Sharma
55 others
Dr. Kavita Tandon
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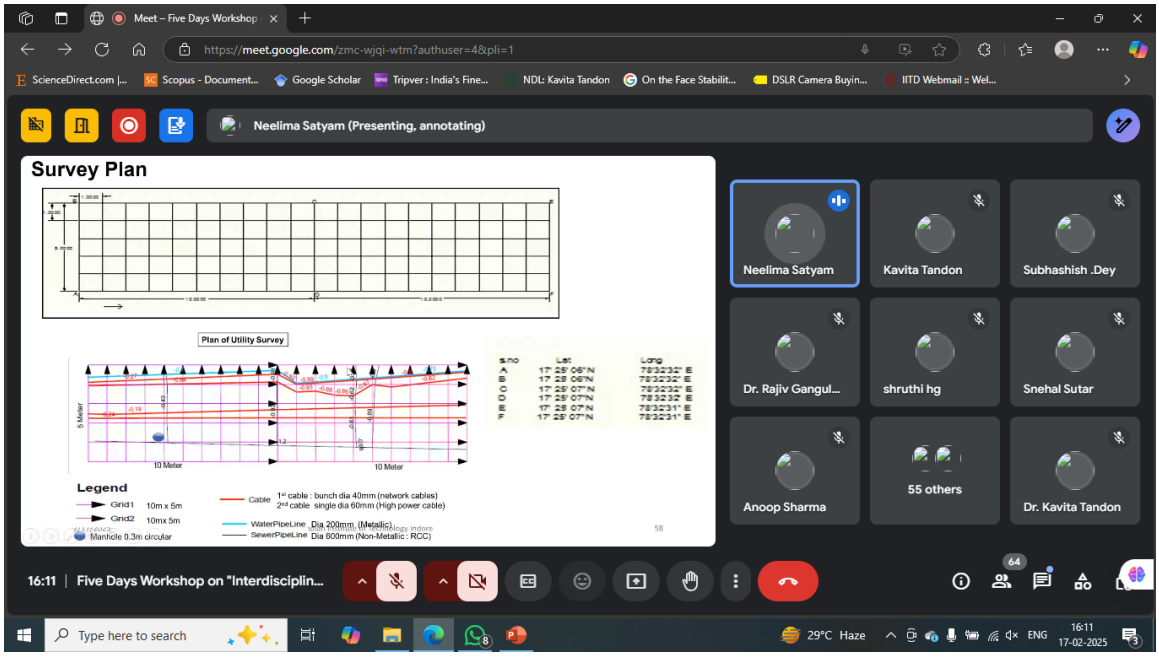
Meet – Five Days Workshop
https://meet.google.com/zmc-wjqi-wtm?authuser=4&pli=1
Neelima Satyam (Presenting, annotating)
Survey Plan
Plan of Utility Survey
Legend
Grid1 10m x 5m
Grid2 10mx 5m
Manhole 0.3m circular
Cable 1st cable : bunch dia 40mm (network cables) 2nd cable single dia 60mm (High power cable)
WaterPipeLine Dia 200mm (Metallic)
SewerPipeLine Dia 600mm (Non-Metallic : RCC)
Neelima Satyam
Kavita Tandon
Subhashish .Dey
Dr. Rajiv Gangul...
shruthi hg
Snehal Sutar
Anoop Sharma
55 others
Dr. Kavita Tandon
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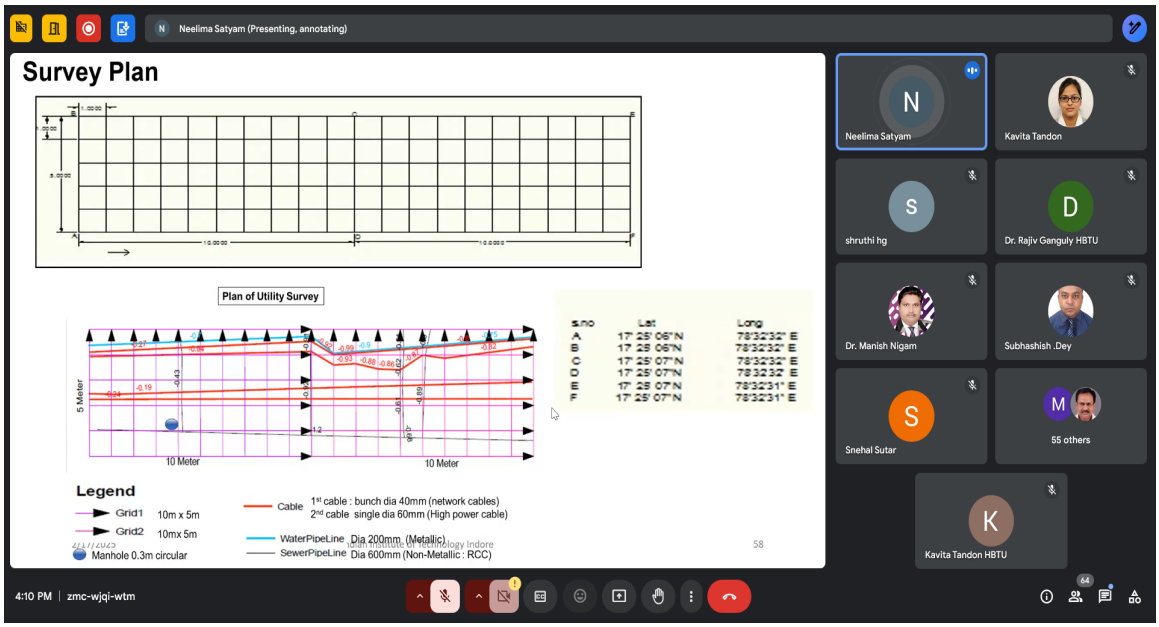
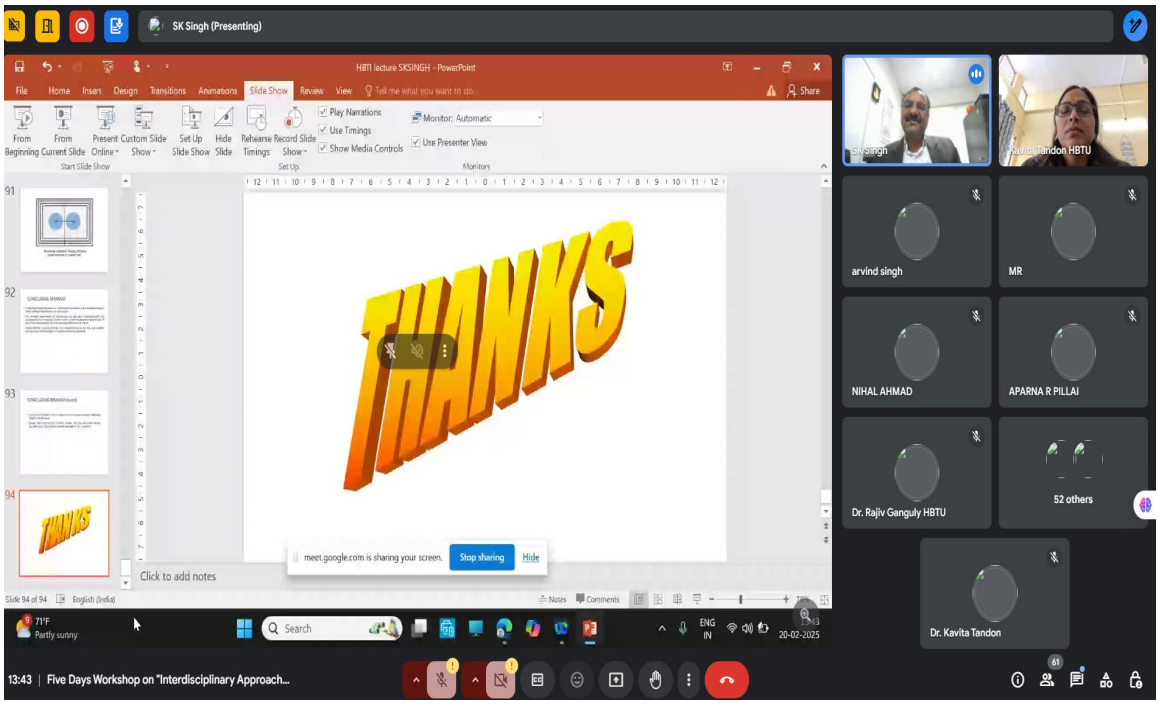

Neelima Satyam (Presenting, annotating)
Survey Plan
Plan of Utility Survey
10 Meter
10 Meter
5 Meter
Legend
Grid1 10m x 5m
Grid2 10mx 5m
Manhole 0.3m circular
Cable 1st cable : bunch dia 40mm (network cables)
2nd cable single dia 60mm (High power cable)
WaterPipeLine Dia 200mm (Metallic)
SewerPipeLine Dia 600mm (Non-Metallic : RCC)
Indian Institute of Technology Indore
58
Neelima Satyam
Kavita Tandon
shruthi hg
Dr. Rajiv Ganguly HBTU
Dr. Manish Nigam
Subhashish .Dey
Snehal Sutar
55 others
Kavita Tandon HBTU
4:10 PM | zmc-wjqi-wtm


SK Singh (Presenting)
HBTI lecture SKSINGH - PowerPoint
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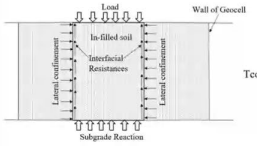
SK Singh
Kavita Tandon HBTU
arvind singh
MR
NIHAL AHMAD
APARNA R PILLAI
Dr. Rajiv Ganguly HBTU
52 others
Dr. Kavita Tandon
13:43 | Five Days Workshop on "Interdisciplinary Approach...

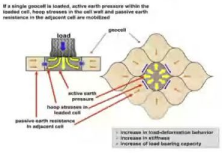
Bappaditya Manna (Presenting, annotating)

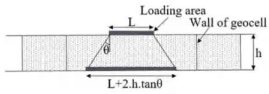
Geocell

Geocell Reinforcement as a ground improvement material in Road Pavement

- **Structure:** Three-dimensional honeycomb-like structure made from high-density polyethylene, polyester, or other polymers.
- **Mechanism:**
  - Confinement: Generate lateral stresses on cell walls under pressure, confining soil particles, and reducing lateral movement.
  - Membrane Effect: Tension generated in the curved geocell layer during deformation counteracts wheel loads, reducing pressure on the subgrade.
  - Load Distribution: Creates a "stiff mattress" effect, distributing loads over a wider area and improving bearing capacity.







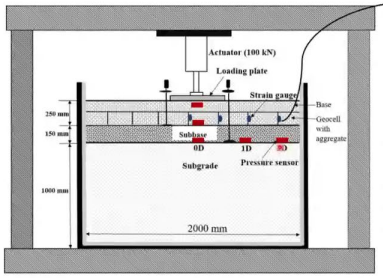
Geocell mechanism

Dr. Rajiv Ganguly HBTU
Dr. Dharmesh Modi
Princy Verma
Neeraj Kumar
Madhusudhana Rao Killu
Bappaditya Manna
Kavita Tandon HBTU
43 others
Dr. Kavita Tandon

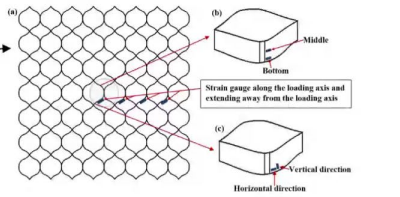
15:47 | Five Days Workshop on "Interdisciplinary Approach...

Bappaditya Manna (Presenting, annotating)

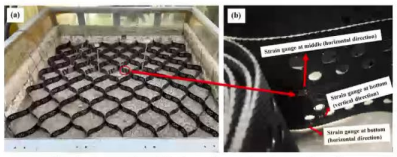
Instrumentation Details



Schematic diagram of instrumented different pavement sections with geocell



Installation of strain gauge at the geocell wall: (a)first configuration; (b) second configuration; (c) third configuration



Strain gauge installation along the geocell wall

24

Dr. Rajiv Ganguly HBTU
Dr. Dharmesh Modi
Neha Joy
Neeraj Kumar
Madhusudhana Rao Killu
Bappaditya Manna
Kavita Tandon HBTU
55 others
Dr. Kavita Tandon

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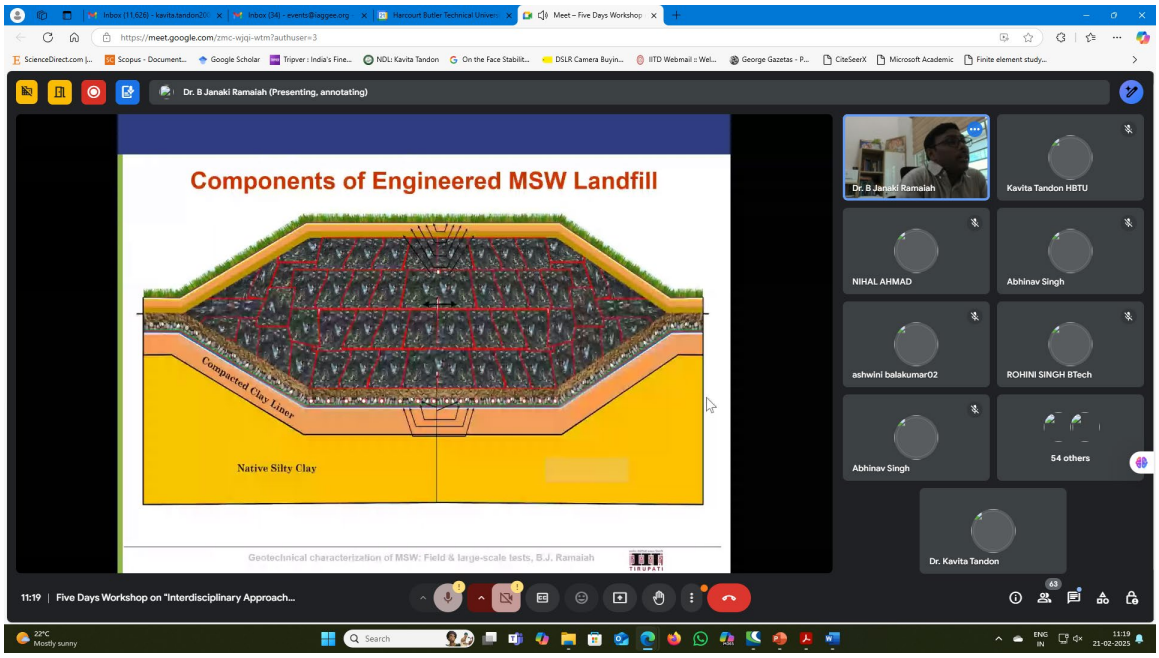
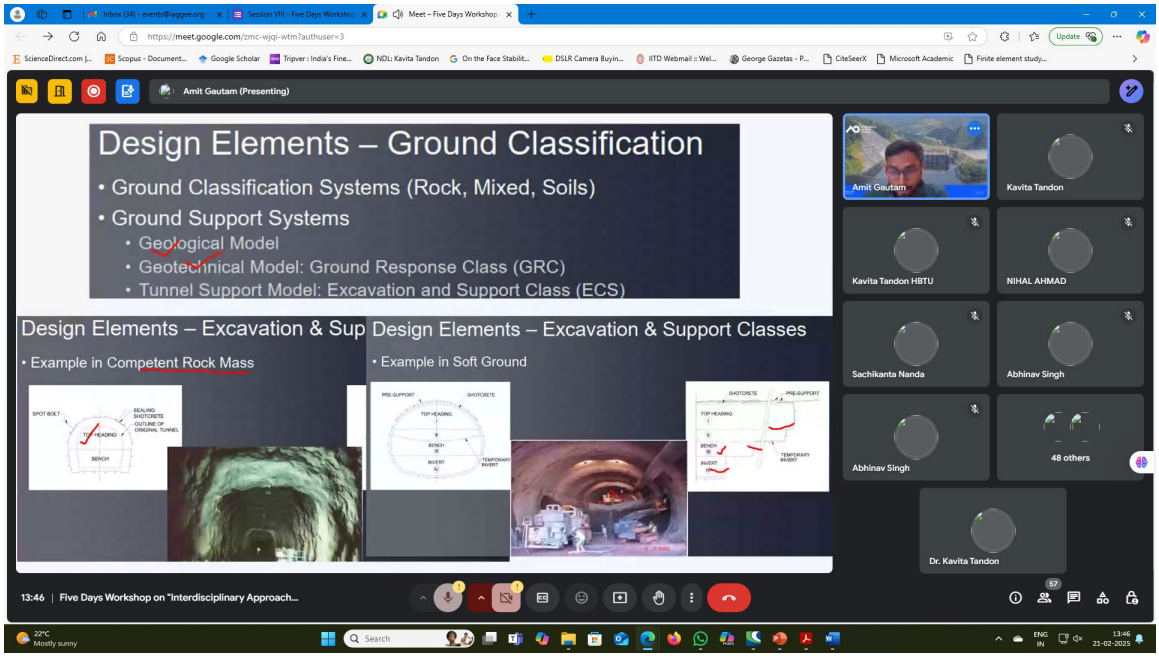
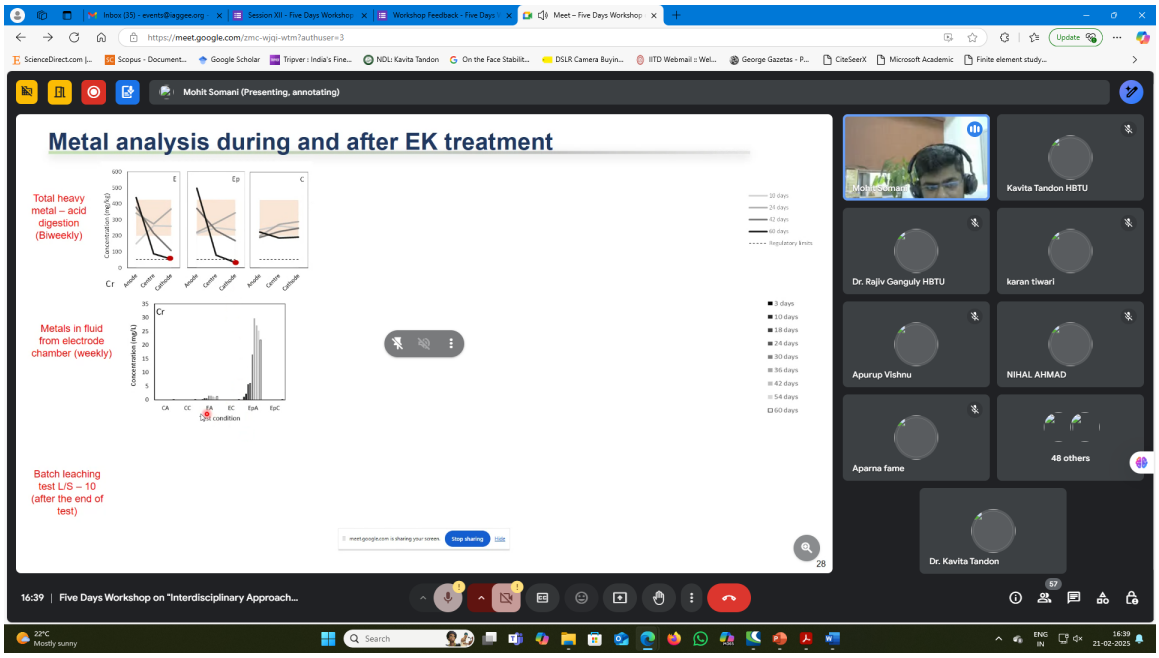
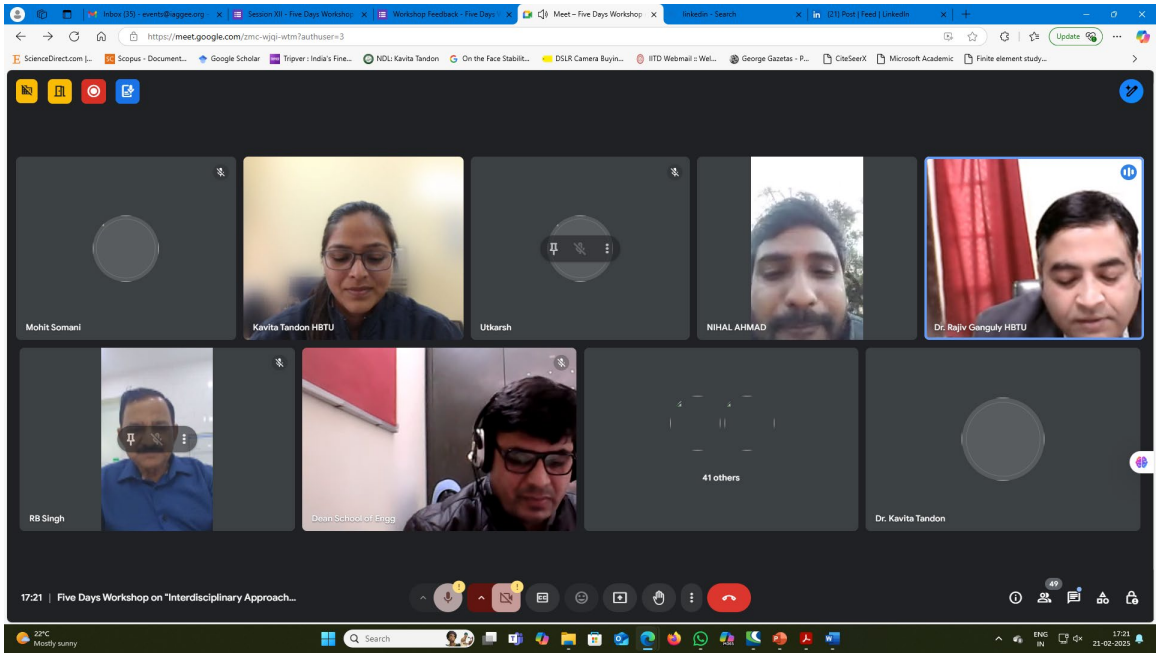
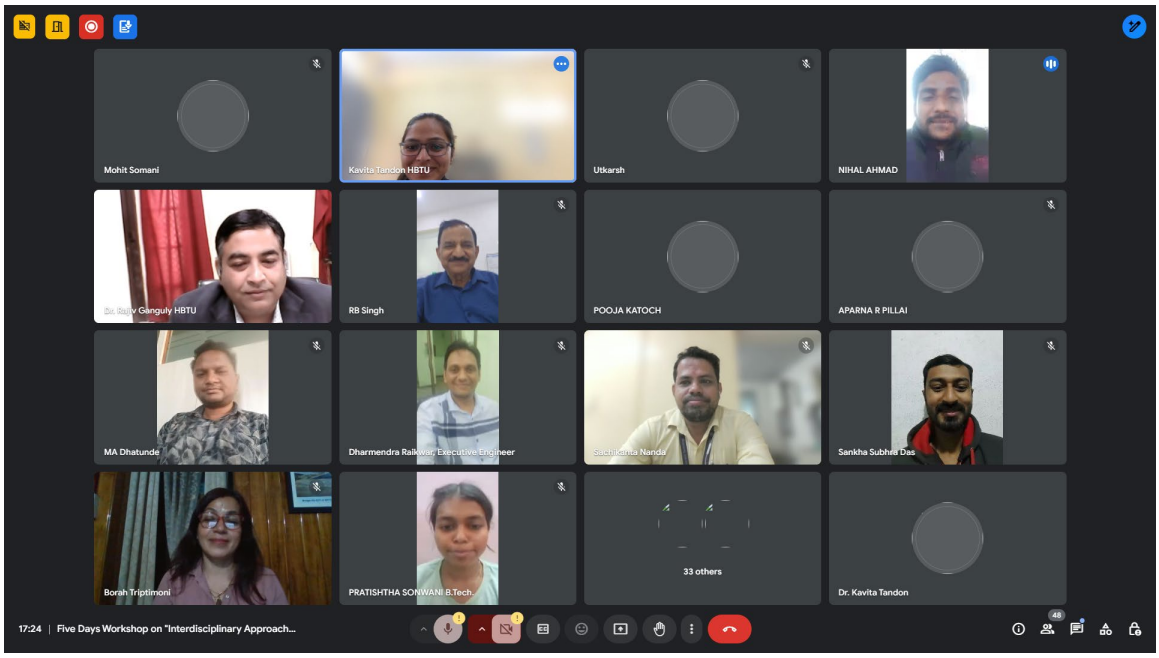

Dr. B Janaki Ramaiah (Presenting, annotating)
Components of Engineered MSW Landfill
Compacted Clay Liner
Native Silty Clay
Geotechnical characterization of MSW: Field & large-scale tests, B.J. Ramaiah
Dr. B Janaki Ramaiah
Kavita Tandon HBTU
NIHAL AHMAD
Abhinav Singh
ashwini balakumar02
ROHINI SINGH BTech
Abhinav Singh
54 others
Dr. Kavita Tandon
11:19 | Five Days Workshop on "Interdisciplinary Approach...


Amit Gautam (Presenting)
Design Elements – Ground Classification
• Ground Classification Systems (Rock, Mixed, Soils)
• Ground Support Systems
• Geological Model
• Geotechnical Model: Ground Response Class (GRC)
• Tunnel Support Model: Excavation and Support Class (ECS)
Design Elements – Excavation & Sup
• Example in Competent Rock Mass
Design Elements – Excavation & Support Classes
• Example in Soft Ground
Amit Gautam
Kavita Tandon
Kavita Tandon HBTU
NIHAL AHMAD
Sachikanta Nanda
Abhinav Singh
Abhinav Singh
48 others
Dr. Kavita Tandon
13:46 | Five Days Workshop on "Interdisciplinary Approach...


Mohit Somani (Presenting, annotating)
Metal analysis during and after EK treatment
Total heavy metal – acid digestion (Biweekly)
Metals in fluid from electrode chamber (weekly)
Batch leaching test L/S – 10 (after the end of test)
Kavita Tandon HBTU
Dr. Rajiv Ganguly HBTU
karan tiwari
Apurup Vishnu
NIHAL AHMAD
Aparna fame
48 others
Dr. Kavita Tandon
16:39 | Five Days Workshop on "Interdisciplinary Approach...


Mohit Somani
Kavita Tandon HBTU
Utkarsh
NIHAL AHMAD
Dr. Rajiv Ganguly HBTU
RB Singh
Dean School of Engg
41 others
Dr. Kavita Tandon
17:21 | Five Days Workshop on "Interdisciplinary Approach...



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DEPARTMENT OF CIVIL ENGINEERING

Convenor(s)

Dr. Rajiv Ganguly

Dr. Kavita Tandon

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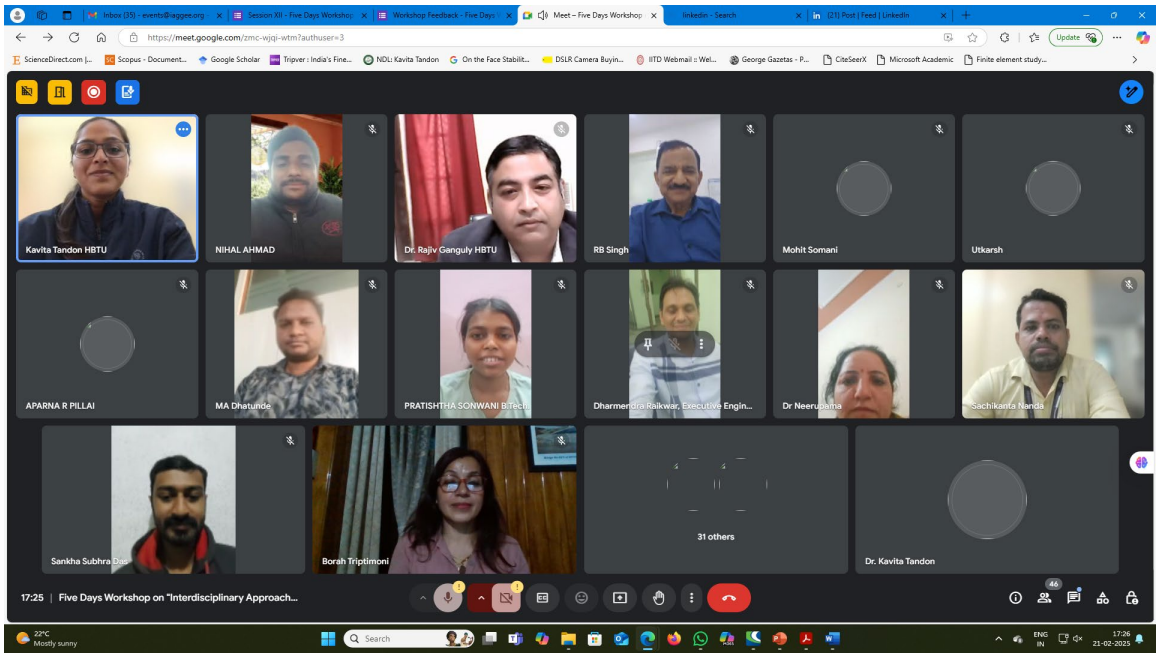
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APARNA R PILLAI
MA Dhatunde
PRATISHTHA SONWANI B.Tech...
Dharmendra Raikwar, Executive Engin...
Dr Neeru Jain
Sachikanta Nanda
Sankha Subhra Das
Borah Triptimoni
31 others
Dr. Kavita Tandon
17:25 | Five Days Workshop on "Interdisciplinary Approach...