

Report on Five Days of Self Sponsored Online Short-Term Course “Recent Advances in Civil and Environmental Engineering” held from 24- 28 June 2024 in collaboration with NIT Delhi

Theme of the STC

The Civil Engineering Department of NITJ in collaboration with NIT Delhi has organized a Five Day Self-Sponsored Online Short-Term Course (STC) on the topic “**Recent Advances in Civil and Environmental Engineering**” held from 24- 28 June 2024. The course was designed to disseminate the knowledge in the domain of civil engineering in general and role of Civil Engineers with respect to innovative solutions in Geotechnical Engineering. The main objective of the course was to demonstrate the latest trends, case studies, field challenges and related remedies in different fields of geotechnical engineering.

Scientists, Academicians, Research Scholars and Masters Students from academia of reputed NITs and IITs as well as scientific organizations participated in this online STC. The program was designed in such a way to achieve the set objectives of the course in stipulated period of five days and to make the participants benefitted at the end.

The STC was enlightened by Professors from esteemed universities like as IIT Kharagpur, IIT Indore, & NITs.

Following themes were covered under this phase:

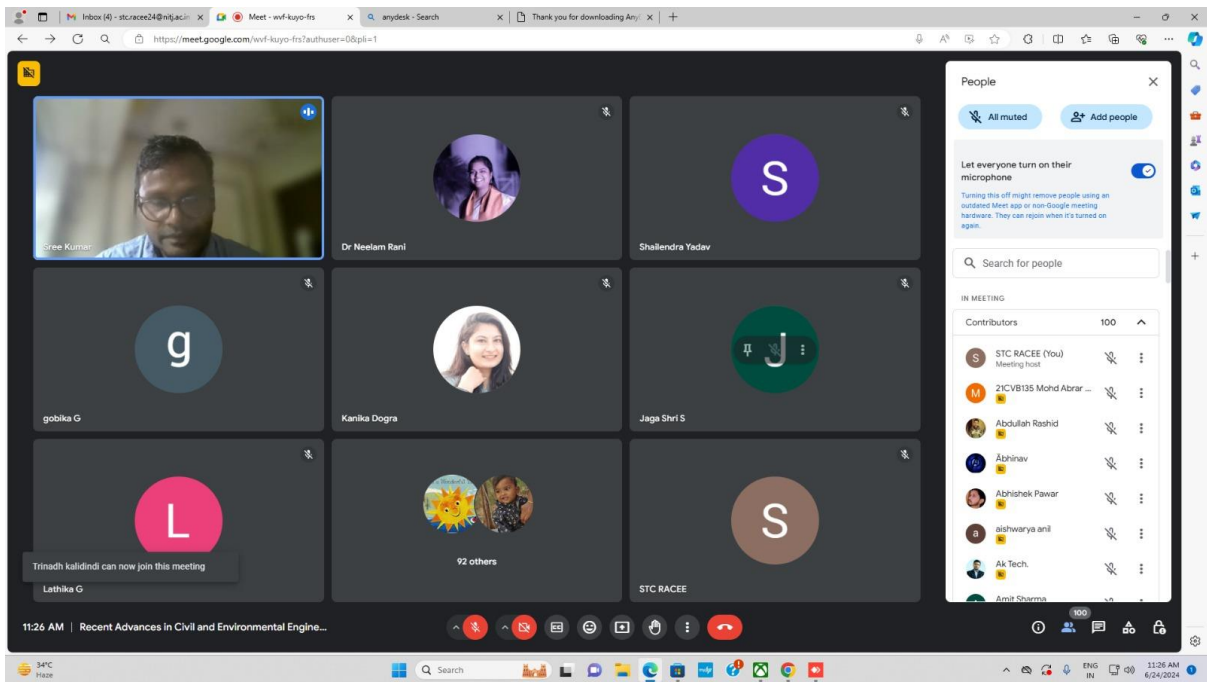
- Advanced computational models used to simulate soil-structure interactions
- Cutting-edge site characterization techniques.
- Resilient design principles to mitigate the impact of climate change and natural disasters on geotechnical infrastructure
- Implementation of real-time monitoring systems to detect geotechnical issues

Itinerary of the STC

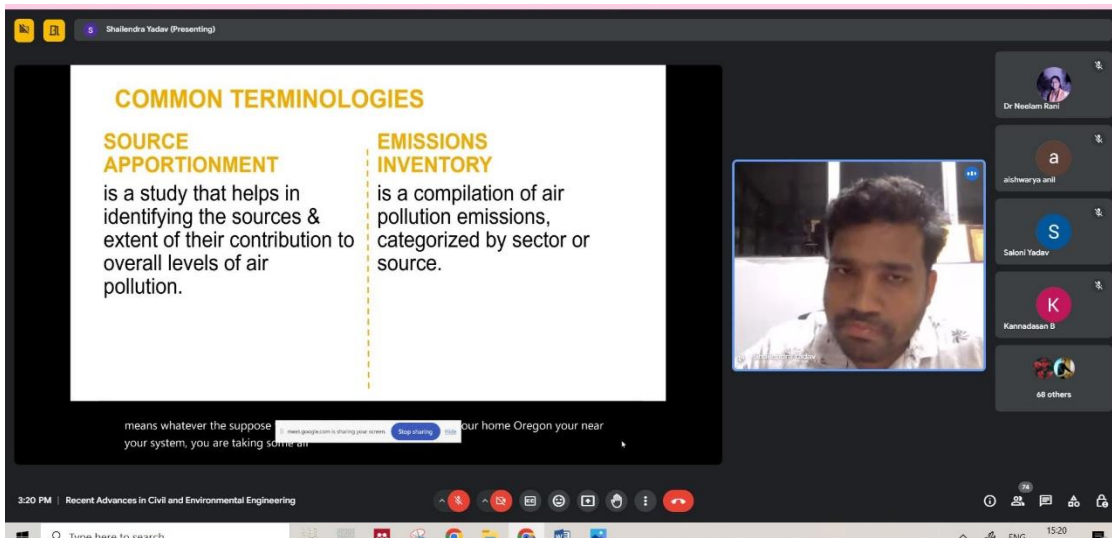
First day:

On the first day, the Online STC was inaugurated by Dr. Sree Kumar Kumaraswamy, Director, Clean Air Action, WRI India as its chief guest. The organising team of the STC, Dr. Neelam Rani, Dr. Rahul Kumar Meena, Dr. Ajay, and Dr. Shashi Kant Sharma, were present. As the Inaugural Speaker, Dr. Sree Kumar Kumaraswamy, was felicitated by the organizing team.

Dr Neelam Rani briefly introduced the key objectives and themes of this Self-Sponsored One Week Online Short-Term Course. She also briefly introduced the eminent speakers and offered warm welcome to the participants. Dr Rahul Kumar Meena also graced the inauguration with his valuable insights on the need of familiarizing the young students, academicians, research scholars with the recent advancements and challenges faced in geotechnical engineering.



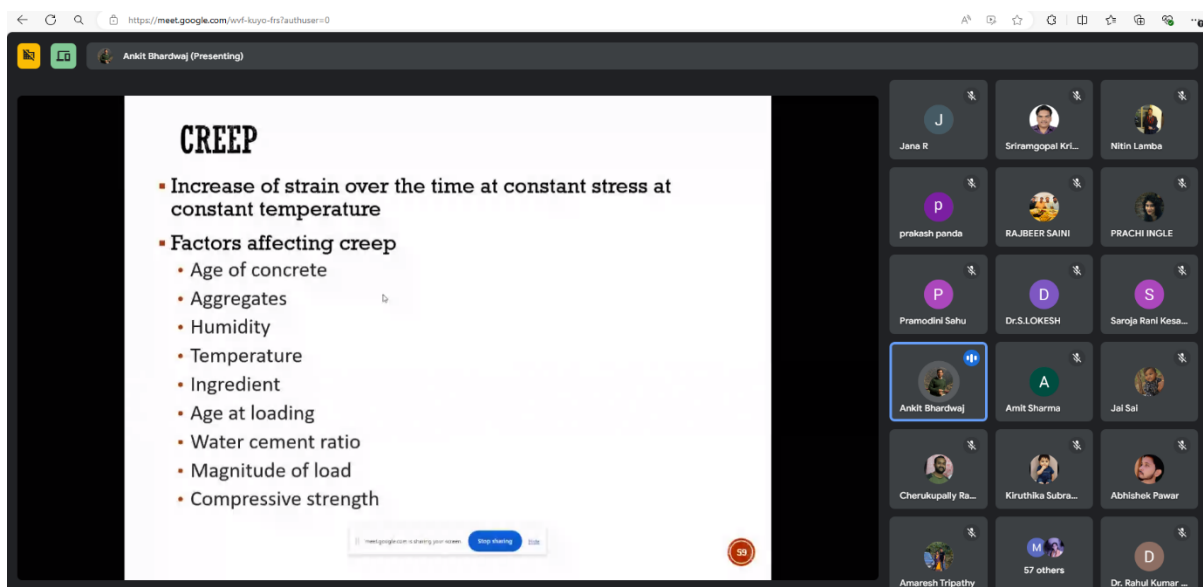
After the inauguration, **Dr Sree Kumar Kumaraswamy**, delivered an expert lecture on the topic “Clean Construction Transition to Reduce Air Pollution in Indian cities.” He presented the Clean Construction Transition in Indian cities focuses on reducing air pollution from the construction sector by adopting sustainable practices, advanced technologies, and stringent regulations. This includes using eco-friendly materials, energy-efficient machinery, and dust control measures. Proper waste management and enhanced regulatory frameworks are also critical. By establishing robust monitoring systems and promoting public awareness and training, this transition aims to improve air quality and public health, fostering environmental sustainability in urban areas.



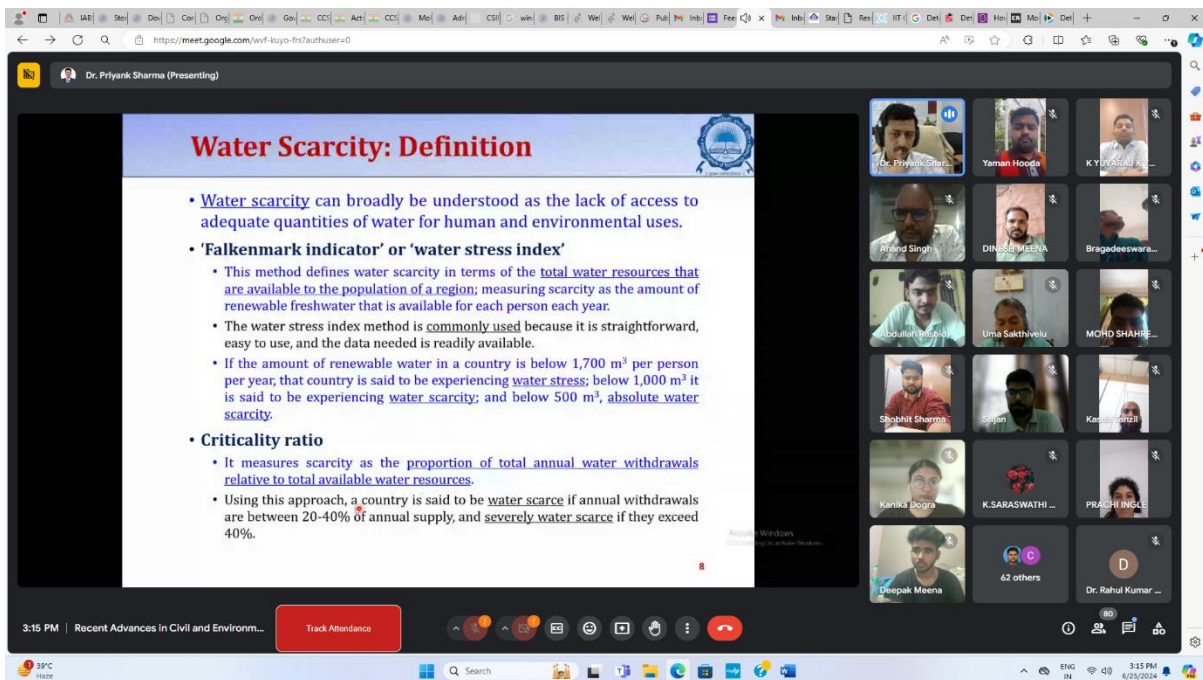
In the afternoon session, Dr. Shailendra Kumar Yadav, Assistant Professor, Babasaheb Bhimrao Ambedkar University, Lucknow, India delivered lecture on the topic “Urban air pollution due to traffic” Urban air pollution due to traffic is a major environmental and public health issue in cities worldwide. Emissions from vehicles, including cars, trucks, and buses, release pollutants such as nitrogen oxides, particulate matter, carbon monoxide, and volatile organic compounds into the atmosphere. These pollutants contribute to the formation of smog and ground-level ozone, which can cause respiratory problems, cardiovascular diseases, and other health issues. Traffic congestion exacerbates the problem, leading to higher emission levels. Addressing urban air pollution from traffic requires comprehensive strategies, including promoting public transportation, implementing stricter emission standards, encouraging the use of electric and hybrid vehicles, and improving urban planning to reduce reliance on private vehicles.

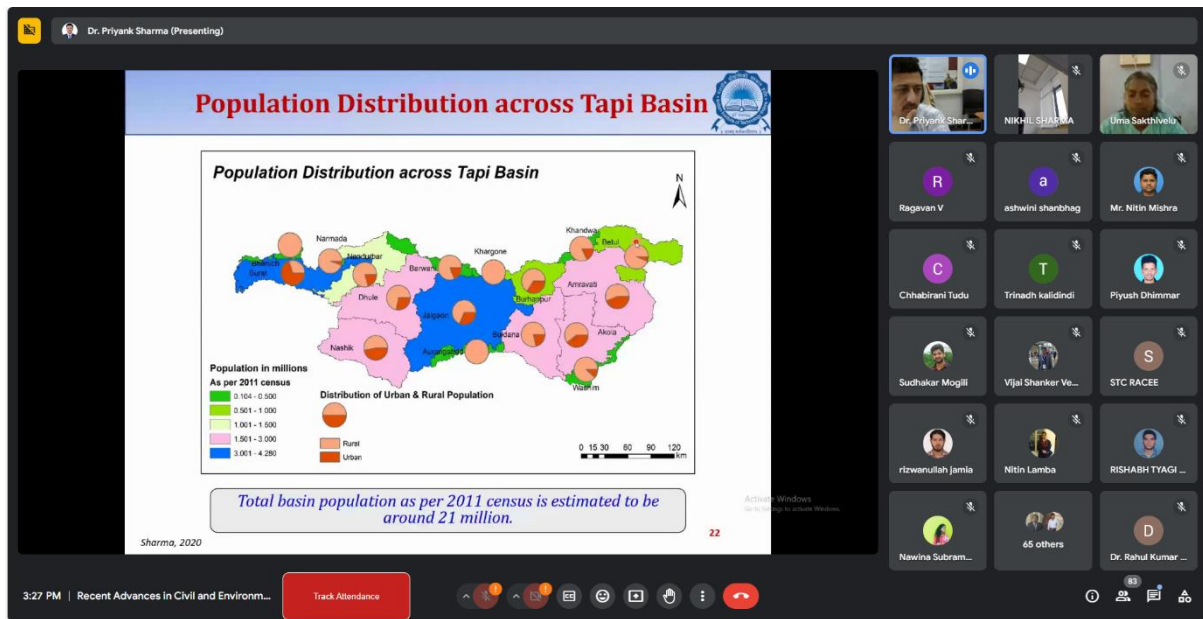
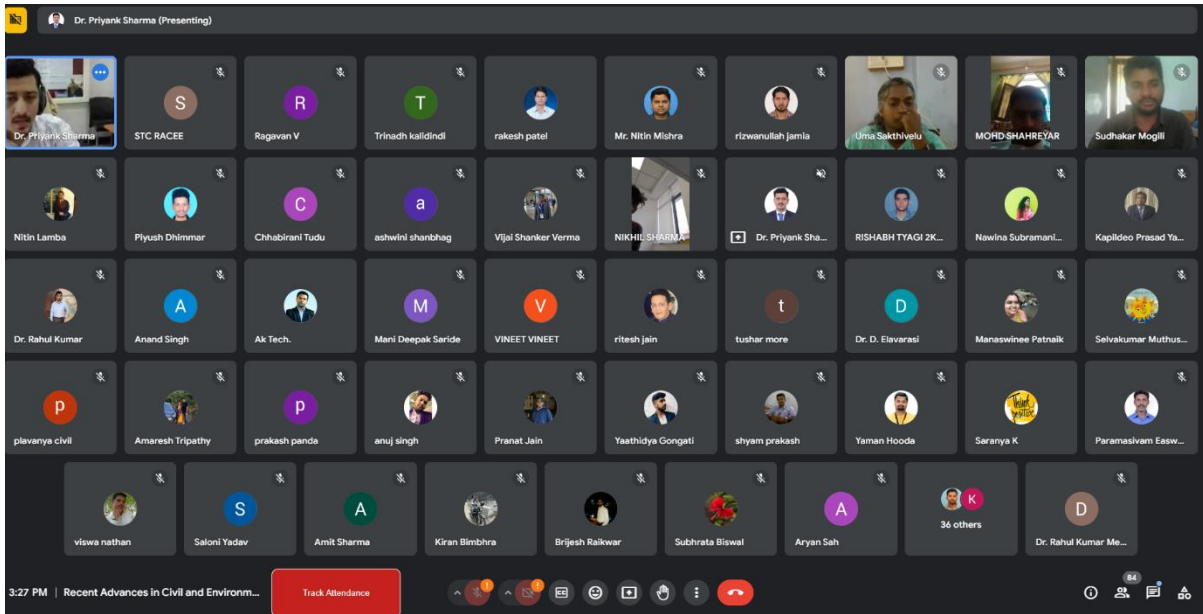
Second day:

In the first session of day two, Dr. Ankit Bhardwaj, Assistant Professor, NIT Sikkim, India talked on the one of the most trending topics of construction technology in engineering “steel concrete composite sections” Steel concrete composite sections are structural elements that combine the strengths of both steel and concrete to enhance performance and efficiency in construction. These sections typically consist of a steel beam or column encased in concrete or a concrete slab connected to a steel beam. The synergy between steel's high tensile strength and concrete's excellent compressive strength results in a composite section that can bear greater loads and span longer distances than either material alone. This combination also improves fire resistance, reduces overall material usage, and can lead to faster construction times. Steel concrete composite sections are widely used in buildings, bridges, and other infrastructure projects to achieve optimal structural performance and cost-effectiveness. ‘



In the second session of day two, Dr Dr Priyank J Sharma, Assistant Professor, IIT Indore, India talked about the “Water and Food Security in a Changing Climate” and elaborate Water and food security are increasingly threatened by the changing climate, as rising temperatures, altered precipitation patterns, and more frequent extreme weather events disrupt agricultural productivity and water availability. Droughts, floods, and shifts in growing seasons challenge farmers' ability to produce consistent and adequate food supplies, while diminishing water resources strain communities and ecosystems. These impacts are particularly severe in vulnerable regions, exacerbating existing inequalities and food insecurity. Addressing these challenges requires adaptive agricultural practices, improved water management, investment in resilient infrastructure, and policies that support sustainable resource use to ensure that both water and food remain accessible and sufficient in a changing climate. ‘

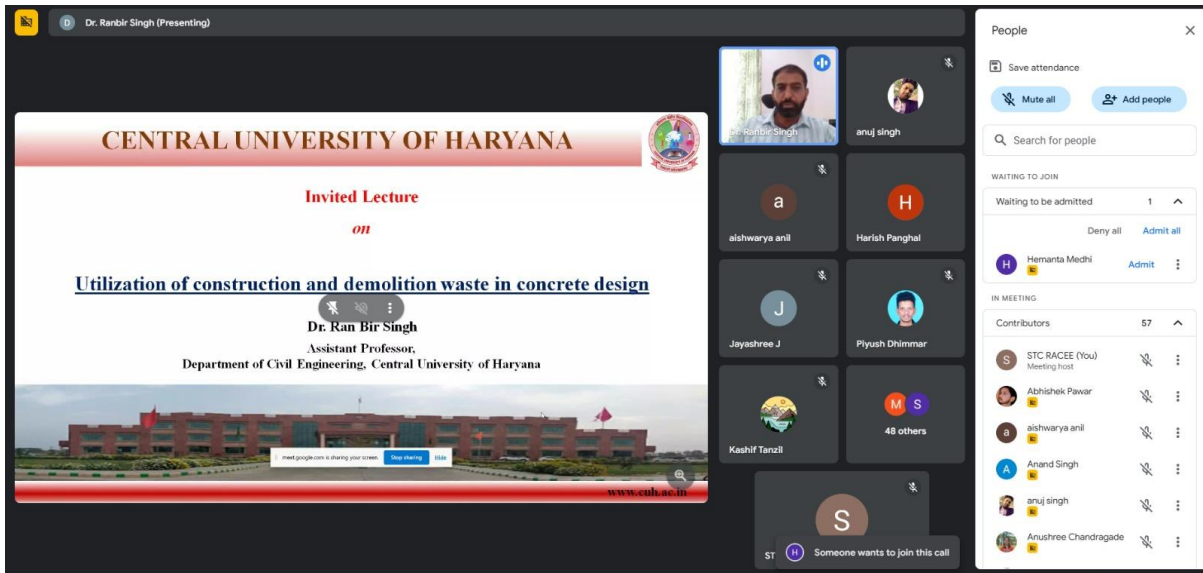
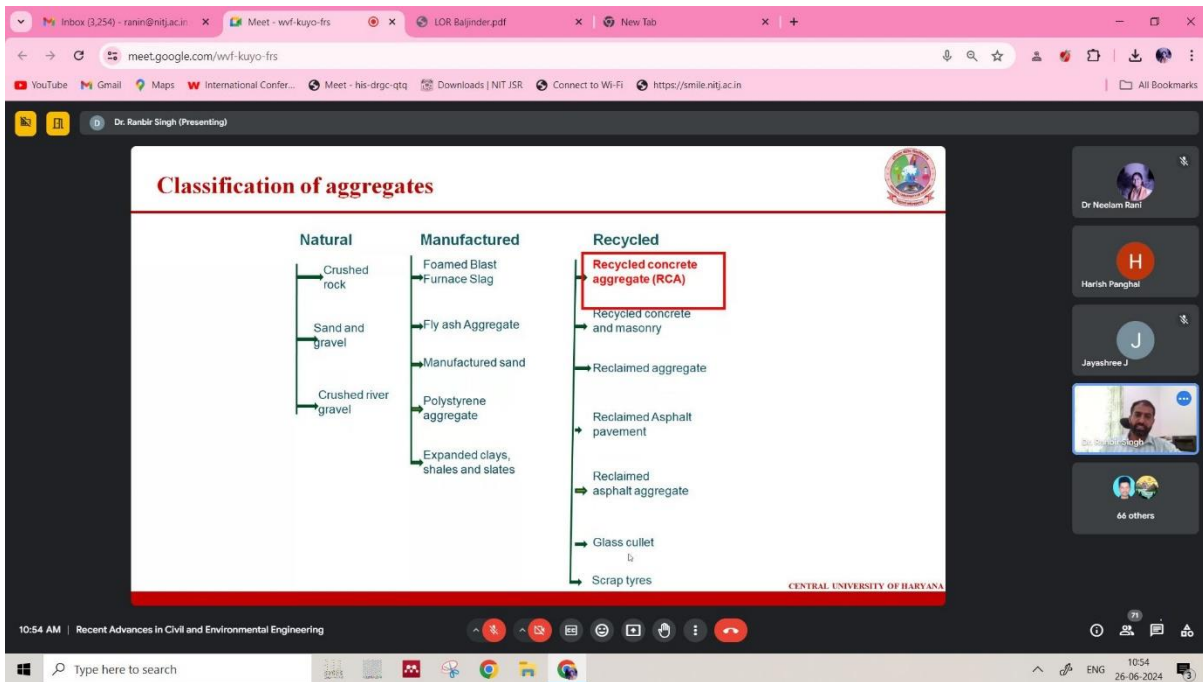




Third day:

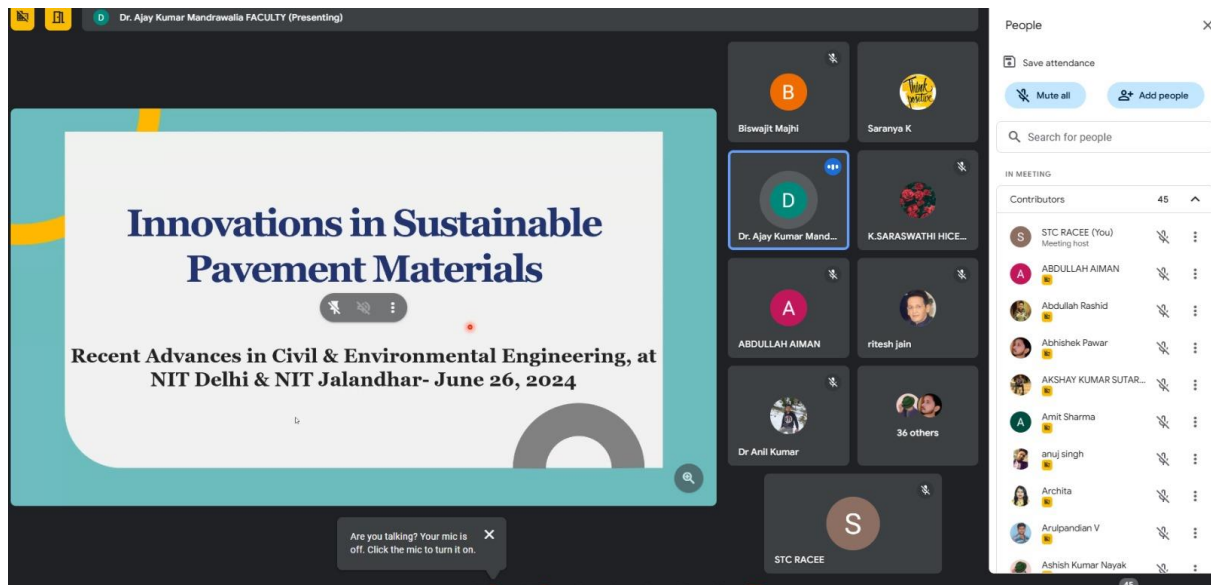
In first session of day three was honoured by Dr. Ran Bir Singh, Assistant Professor, Central University, Haryana, India who talked about the “Utilization of construction and demolition waste in concrete design” and the utilization of construction and demolition (C&D) waste in concrete design is a sustainable practice that addresses both waste management and resource efficiency. By incorporating recycled aggregates from C&D waste into concrete production, the construction industry can reduce the demand for natural aggregates, minimize landfill use, and lower the environmental impact of construction activities. This practice not only conserves natural resources but also enhances the properties of concrete, such as its durability and

strength, through innovative mix designs. Utilizing C&D waste in concrete aligns with circular economy principles and contributes to more sustainable and eco-friendly construction practices.



The second session of third day of this online short term course titled “Recent Advances in Civil and Environmental Engineering” delivered by Dr. Ajay Kumar Mandrawalia, Assistant Professor, MNNIT Allahabad delivered lecture on ‘Innovations in Sustainable Pavement Materials’ and give various insight as Innovations in sustainable pavement materials are transforming the construction and maintenance of roads to be more environmentally friendly and cost-effective. These advancements include the development of materials like recycled

asphalt, which incorporates reclaimed asphalt pavement (RAP) to reduce waste and resource consumption. Other innovations involve the use of warm-mix asphalt, which is produced and applied at lower temperatures, cutting energy use and emissions. Additionally, incorporating industrial by-products, such as fly ash and slag, into concrete mixtures enhances durability while minimizing environmental impact. Permeable pavements are another significant innovation, allowing water to pass through and reducing runoff, thus improving urban water management. These sustainable materials not only contribute to reducing the carbon footprint of road construction but also enhance the longevity and performance of pavements.



Fourth day:

In the first session, Dr Richa Ahuja, Assistant Professor, IIT Kharagpur, delivered lecture on 'Road Safety for the pedestrian and accidental studies and there impact'. Dr Ahuja An accidental study on pedestrian comfort in roadways often arises from unintended observations or data collection during other urban research projects. This kind of study may reveal insights into how various factors, such as road design, traffic flow, and infrastructure amenities, impact the comfort and safety of pedestrians. Findings might include unexpected observations about the effects of sidewalk width, crossing signals, or the presence of street furniture on pedestrian experiences. Such studies can provide valuable, albeit incidental, data that informs urban planning and road design, highlighting areas where improvements can enhance pedestrian comfort and encourage more walkable environments. She showcased the traffic engineering aims and objectives and principles adopted for managing traffic. It was elaborated that how traffic engineering could be made more efficient and sustainable. Measures like traffic monitoring, lane use, overbridge and under bridge design, design of alternate routed like bypass etc. were showcased in the talk. Efficiency and future aspect of each such measure was contemplated and proper suggestions and guidelines to improve them was communicated to the listeners.

The screenshot shows a Zoom meeting interface. On the left, a slide titled "Transportation Engineering" is displayed. The slide content is as follows:

- Construction
- Planning
 - Involves demographic analysis
 - environmental studies
 - forecasting
- Design
 - Safety
 - Structural integrity of bridges
 - visibility on roadways
 - ergonomics of transportation terminals
- Sustainability
 - Optimizing fuel efficiency in transport vehicles
 - integrating electric and hybrid vehicles into public transport fleets
 - designing roadways that accommodate bicycles

On the right side of the slide, there is a list of topics:

- and pedestrians
- Technological innovation
 - Smart traffic management systems- AI/ML
 - autonomous vehicles
- Implementation and Maintenance
 - physical construction
 - budgetary, regulatory constraints and societal expectations

On the right side of the Zoom window, there is a grid of participant avatars. The visible participants are:

- Dr. Richa Ahuja
- Rishi chauhan
- ABDULLAH AIMAN
- Jayati Singh
- Dr. Rahul Kumar
- Chetan Kadlag (CK)
- 60 others
- STC RACEE


Dr. Chandan Singh, Assistant professor, NIT Raipur, he has delivered “Application for civil and water resources engineering” to the participants in the online short-term course “Recent advances in civil and environmental engineering. Some valuable insight from his topic is as Applications in civil and water resources engineering are crucial for addressing both infrastructure development and sustainable management of water resources. Civil engineering involves the design, construction, and maintenance of infrastructure such as roads, bridges, buildings, and urban systems, aiming to create functional and resilient environments. In water resources engineering, the focus is on managing water supply, flood control, and wastewater treatment to ensure efficient and sustainable use of water resources. This includes designing systems for safe drinking water, optimizing irrigation practices, and developing flood prevention measures. Both fields are interconnected, as effective civil engineering projects often rely on careful water management to prevent issues like erosion or structural damage. Advancements in technology and innovative practices in these areas are essential for addressing the challenges of urbanization, climate change, and environmental sustainability.

Fifth day:

In the first session of fifth day, Prof (Dr.) V. L. Manekar, Professor, NIT Surat delivered an expert talk on the topic “Experimental vs Numerical modelling” and delivered Experimental and numerical modelling are two fundamental approaches used to study and understand complex systems and phenomena. Experimental modelling involves physical testing and observations in controlled environments to gather empirical data. This method provides direct insights and real-world validation but can be time-consuming, costly, and sometimes impractical for large-scale or hazardous scenarios. Numerical modelling, on the other hand, uses mathematical models and computational techniques to simulate the behaviour of systems. It allows for extensive exploration of scenarios, including those that are difficult to replicate experimentally. While numerical models can handle large datasets and complex interactions, they rely on the accuracy of the underlying mathematical assumptions and require significant computational resources. Both approaches are complementary; experimental data can validate and refine numerical models, while numerical simulations can guide and optimize experimental design.

Prof. V. L. Manekar SVNIT (Presenting)

EXPERIMENTAL Vs NUMERICAL MODELLING



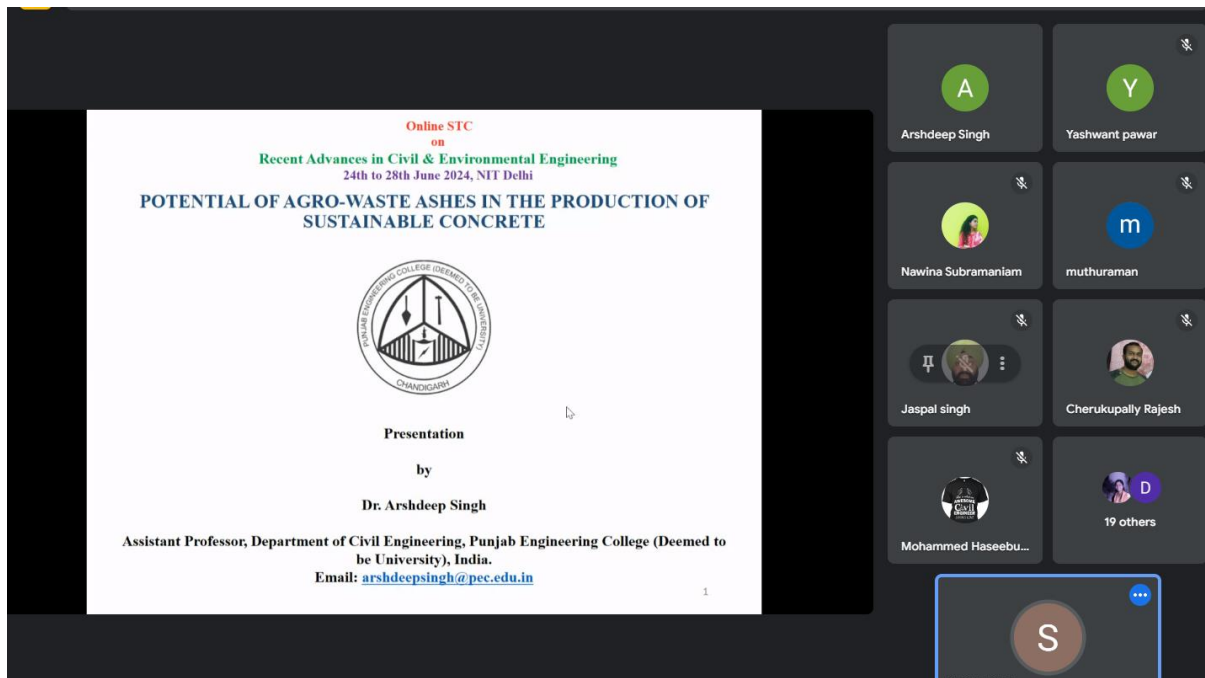
Dr. V. L. Manekar
Professor in Civil Engg
Sardar Vallabhbai National Institute of Technology, Surat
(M) 09904003865 e-mail: vlm@ced.svnit.ac.in

June 28, 2024 Experimental Vs Numerical Modelling

Kapildeo Prasad Yadav can now join this meeting

Participants: Prof. V. L. Manekar S..., Yashwant pawar, Dr. A. Sumathi, Dr. Saif Ullah Khan, Bragadeeswaran T, Dinesh Kumar, Sudha Natesan, 34 others, STC RACEE

In the second session of the fifth day, Dr. Arshdeep Singh, assistant professor at the Department of Civil Engineering, Punjab Engineering College, Chandigarh, delivered an informative talk on the topic “Potential of agro waste ashes in the production of sustainable concrete”. Dr Singh give his insight as Argo waste ashes, derived from agricultural by-products such as rice husk, sugarcane bagasse, and coconut shells, hold significant potential in the production of sustainable concrete. These ashes, rich in silica and other beneficial compounds, can be used as supplementary cementitious materials, partially replacing traditional cement. This not only reduces the carbon footprint of concrete production by lowering cement consumption but also offers a productive use for agricultural waste that would otherwise be discarded. The incorporation of agro waste ashes in concrete enhances its durability, strength, and resistance to various environmental stresses, making it a viable and eco-friendly alternative in the construction industry. This sustainable approach promotes circular economy principles, reducing waste and environmental impact while supporting greener construction practices.



Closing Ceremony:

The five-day Online STC on "Recent Advances in Civil and Environmental Engineering" conducted by the Department of Civil Engineering, NIT Delhi, in association with NIT Jalandhar, successfully concluded on 28th June 2024. Scheduled from 24-28 June, the course was on innovative solutions in the domain of Geotechnical Engineering. Advanced computational models, techniques of site characterization, resilient design principles, and real-time monitoring systems are some of the sessions contents. Expertise from eminent professors of IIT Kharagpur, IIT Indore, and several NITs have expressed their intention to share knowledge with the participants.

The course was inaugurated by Dr. Neelam Rani and Dr. Rahul Kumar Meena. The first lecture was given by Dr. Sree Kumar Kumaraswamy, Director of Clean Air Action at WRI India, followed by insights from experts such as Dr. Shailendra Kumar, Assistant Professor at Babasaheb Bhimrao Ambedkar University, Lucknow. On the second day, Dr. Ankit Bhardwaj, Assistant Professor at NIT Sikkim, delivered the first lecture, while Dr. Priyank J. Sharma, Assistant Professor at IIT Indore, presented the second session on "Water and Food Security in a Changing Climate." The third day featured Dr. Ran Bir Singh, Assistant Professor at Central University, Haryana, discussing "Utilization of Construction and Demolition Waste in Concrete Design," and Dr. Ajay Kumar Mandrawalia, Assistant Professor at MNNIT Allahabad, speaking on "Innovations in Sustainable Pavement Materials." On the fourth day, Dr. Richa Ahuja, Assistant Professor at IIT Kharagpur, presented on "Road Safety for Pedestrians and Accident Studies," followed by Dr. Chandan Singh, Assistant Professor at NIT Raipur, who discussed "Applications for Civil and Water Resources Engineering." On the fifth day, Prof. (Dr.) V. L. Manekar, Professor at NIT Surat, gave a talk on "Experimental vs. Numerical Modeling," explaining the differences between physical testing and theoretical

simulations. The second session of the fifth day featured Dr. Arshdeep Singh, Assistant Professor at Punjab Engineering College, Chandigarh, who presented on “Potential of Agro-Waste Ashes in the Production of Sustainable Concrete.

STC provided valuable insights and practical knowledge, therefore fulfilled the objectives laid down, and provided a platform for collaboration between participants from these esteemed institutions. From the organizing team, gratitude was expressed to all contributors and attendees for their engagement and valuable contributions to the organizing team.