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# A Report on

Expert Talkon

“Recent Advanced Trends in Geotechnical Engineering”

Organized by

Civil Engineering Department & GIT-IQAC

On 11/04/2022 & 12/04/2022

Gandhinagar Institute of Technology Academic Year  
2021-22



**Level:** - State

**Category:** - Webinar

**Date:** - 11/04/2022 & 12/04/2022

**No. of Resource Person:** 2

**No. of Participants:** 55

**Coordinator:** Prof. Paresh Umredkar & Prof. Jignesh Vaniya

**Mode:** - Online (Google Meet)

**Inspiration:**

As per new Gujarat technological university syllabus in 6<sup>th</sup> semester Foundation Engineering were introduced for the students. In these subjects, it is mentioned that soil tests, identification of types of soils and forces acting on it, interpretation of soil properties and soil investigation report for the design of foundation for any structure is required for the students, which is useful in the field work. Also 4<sup>th</sup> semester students should know the practical aspects with respect to field examples.

**Objective:**

Civil Engineers should be equipped with technical skills such as soil testing, design of foundations and application of various solutions in required situations because the knowledge of soil is the fundamental requirement for any type of construction to success.

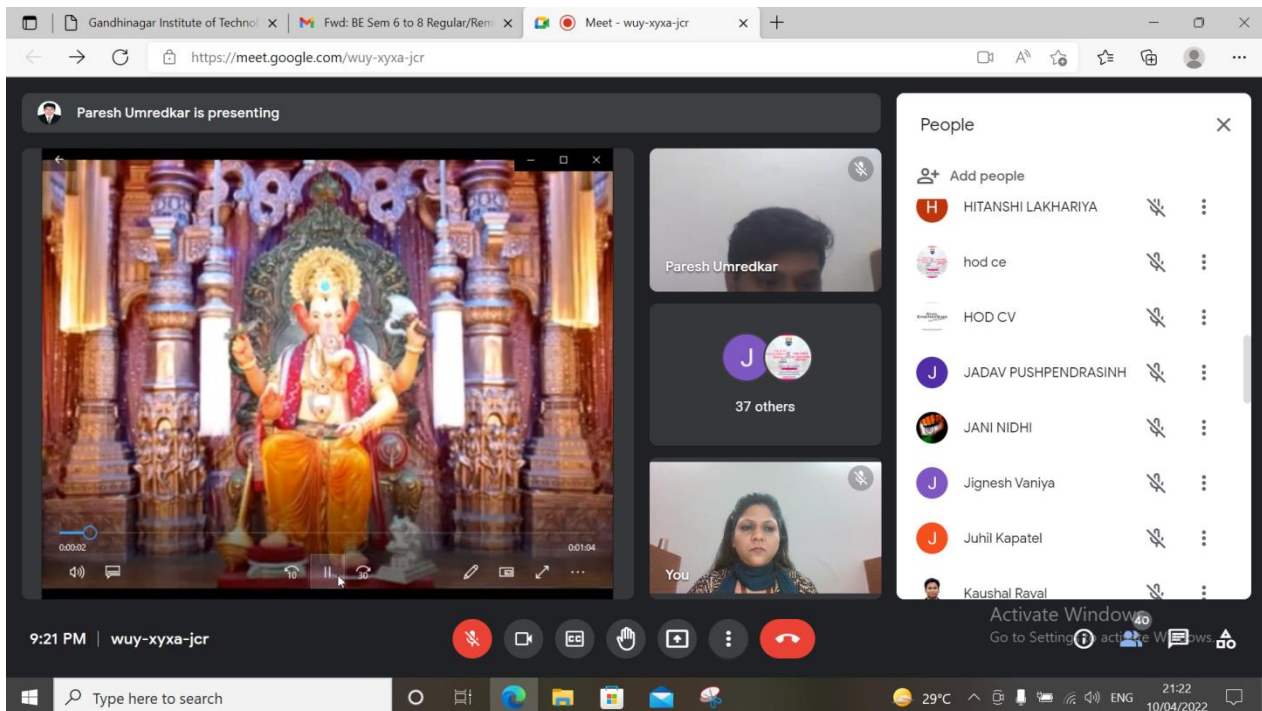
**About Expert talk:**

The 2 days Webinar on "Recent Advanced Trends in Geotechnical Engineering" was attended by around 55 participants. It focused on necessity of technical skills such as identification and solving of civil engineering problems in depth understanding of design techniques and working with different soil types and different structures. Also work in major fields like:

- i. Identification of soil on the site
- ii. Soil Investigation Report
- iii. Foundation Design
- iv. Precautions for poor soils
- v. Use of geosynthetics in road works

**Inaugural Session:**

Prof. Pooja Patanwal (Assistant Professor, IQAC member, CL) started the session with a welcome note about civil engineering & its importance. Prof. Pooja Patanwal introduced experts of the webinar to participants. After the introduction of each expert, prayer was conducted to start webinar.



### **Prof. Pooja Patanwal inaugurating the session with prayer**

#### **Content of speaker:**

For the 2 days webinar total 6 experts were present to deliver their session on different topics related to geotechnical engineering.

#### **11/04/22 – Day 1 – Session 1**

Dr. Vemula Anand Reddy discussed about “Beneficial Utilization of Low Carbon Cementitious Materials for the Remediation of Heavy Metals Contaminated Soils” during his session. He discussed about various sources responsible for contamination of soil and possible location for their occurrence. He also described about how industries are polluting the soil by releasing different types of chemicals which are very harmful for the soil’s structures and properties. He explained few methods as the remedies for the contaminated soils including the various tests to perform to find contamination agent or substance in soil. The physical tests like natural water content, specific gravity, compaction, soil classification, grain size distribution, Atterberg’s limits and unconfined compression strength were discussed in detail to understand the importance of tests for any study in geotechnical engineering. Along with above tests, chemical tests were also discussed like pH test, TCLP test, BCR-SEP test, soil digestion test etc. At the end of session, he discussed about various results and finding that how to decide that soil is contaminated at which level and how much concentration of foreign substances are available.



**Methodology**

**Methodology**  
**Toxicity characteristic leaching procedure test (TCLP)**

**Procedure:**

- **STEP1:** Take 5.7 ml of glacial acetic acid ( $\text{CH}_3\text{COOH}$ ) add in 500 ml beaker
- **STEP2:** Take 4 grams of NaOH granules and add in 80 ml water and dissolve them to make 100 ml in distilled water (1 N solution)
- **STEP3:** Take 64.3ml of **step2** solution in 500ml beaker (**step1**)
- Make it volume of 800 ml and start checking the pH value by adding 50 ml distilled water
- Finally make it to 1000 ml and the pH of the solution must be  $(4.93 \pm 0.05)$

End to end shaker

500 ml HDPE TCLP bottles

TCLP Extract solution

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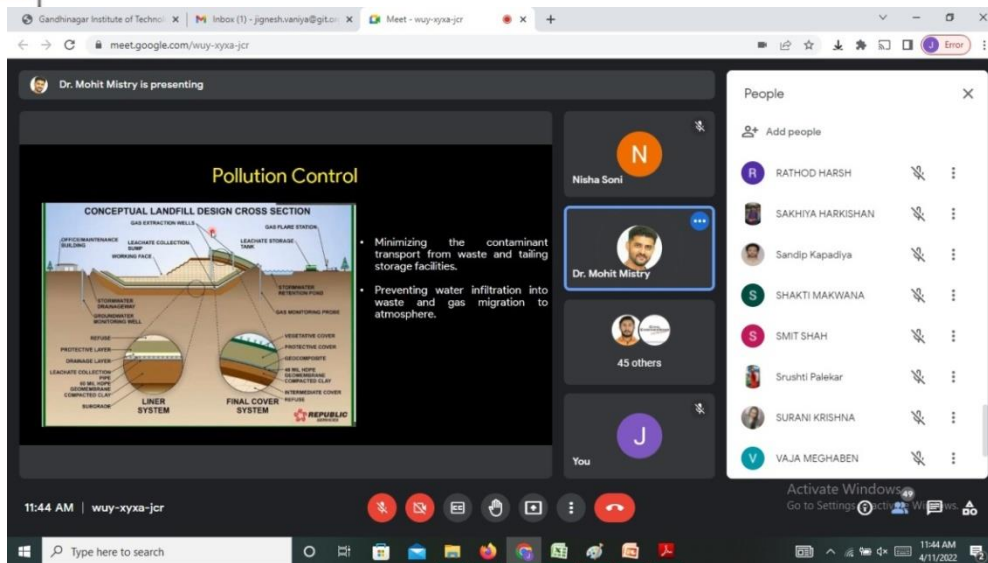
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### Dr. Vemula Anand Reddy discussing about chemical test - TCLP

#### 11/04/22 – Day 1 – Session 2

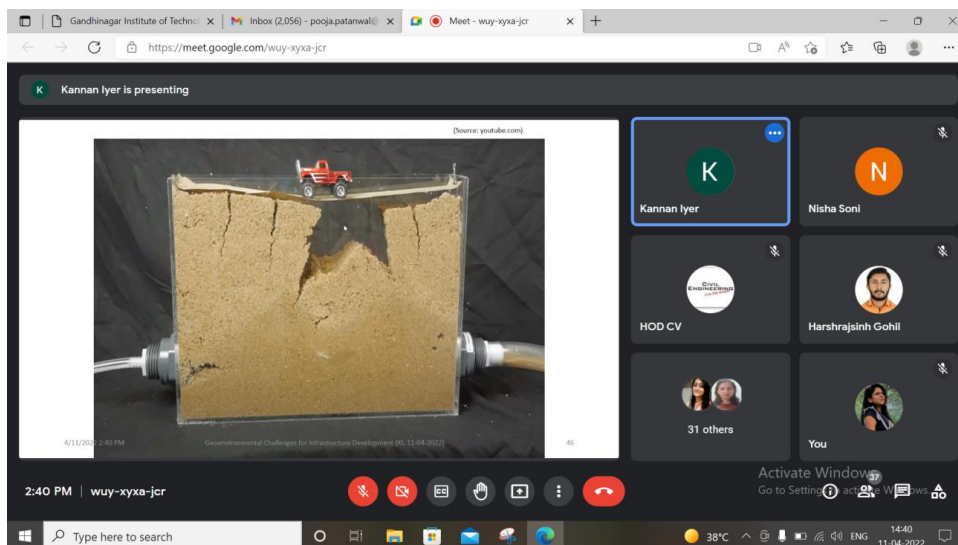
Dr. Mohit Mistry discussed about “Role of Geosynthetics for Sustainable Development” for his session in details. He started with the future scarcity of good qualitative soils for the farming purpose that how we will need better soil conditions in future and how it will affect the present preparation for such future. He further explained about other problems like disasters, scarcity of food, land for better life environment, etc. Dr. Mohit also stated that how we can overcome such problems by adopting the geosynthetic materials like geotextile, geogrids, geomembrane, geo-net, geo clay liner etc. usage in civil engineering works specially related to the geotechnical engineering. He discussed about different types of geosynthetics, and their application based on the design and specification each geosynthetic in details. He also explained that types of problems like pavement failure, foundation failure, slope failure due to the inaccurate treatments. For these problems he described geosynthetic materials and their role to solve the problems. Then he explained an example with the use of geosynthetic for road pavement work along with good diagrams.



### Pollution control by the geosynthetic materials

#### 11/04/22 – Day 1 – Session 3

Dr. Kanan Iyer delivered the session on very informative topic “Geo-environmental Challenges for Infrastructure Development”. His topic was mainly focused on soil liquefaction and collapsible soil. During his session, he discussed about the various types of soil which can be encountered during the construction. He explained the problems related to the liquefaction soil like less shear strength, loose state of particles, less bearing capacity, higher value of Atterberg’s limit etc. then he added about the collapsible soils characteristics to understand its nature and occurrence of expansion and contraction with the cycle of different seasons in India. He also explained about the solution which can be applied to collapsible soils like pre-wetting, replacement of soil, dynamic compaction or preloading and chemical stabilization. He described problems related to the collapsible soils with his projects that he completed in gulf countries. He also shared knowledge on dredged materials, how to utilize these materials as secondary construction materials. He concluded his session with giving the congratulations to the organization and team persons who organized this webinar.

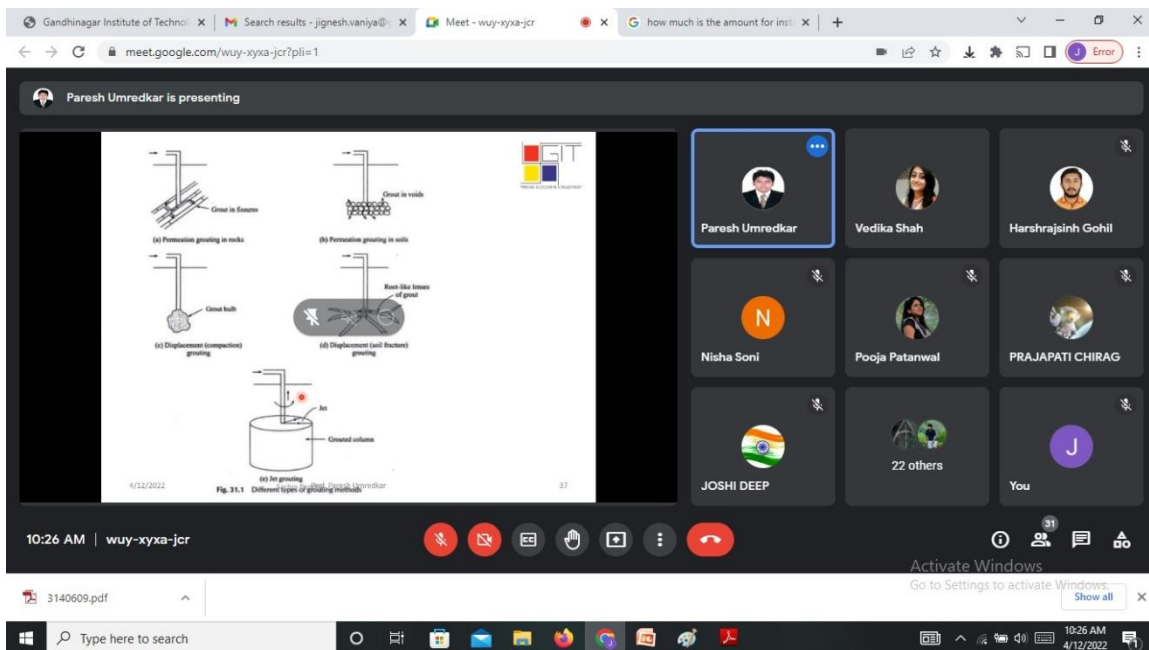


### Dr. Kanan Iyer explaining liquefaction of soil with video reference



## 12/04/22 – Day 2 – Session 1

Prof. Paresh Umredkar discussed about “Grouting Technology” for soil stabilization in details to the participants. He started his session with the introduction of soil stabilization to familiarize participants about the concept of grouting. Then he explained about the need of the grouting in soil that why grouting is needed in first place, how without the grouting soil can fail and causes long term problems in structure. He described various methods and materials for the grouting purpose. The grouting materials are like chemical grout, cement grout, asphalt grout and clayey soil grouts. He also explained in details about when to use which grouting materials to do the soil stabilization. He further added on the methods which are like permeation grouting, compaction grouting, fracture grouting, jet grouting and vacuum grouting with schematic diagrams and videos. He also discussed about the various admixtures and testing that can be performed on the grout materials. These testing will be done to select appropriate grouting materials which can provide better results in terms of improvement in soil properties as well as in its stability. He concluded his session by explaining the conclusion from his study.



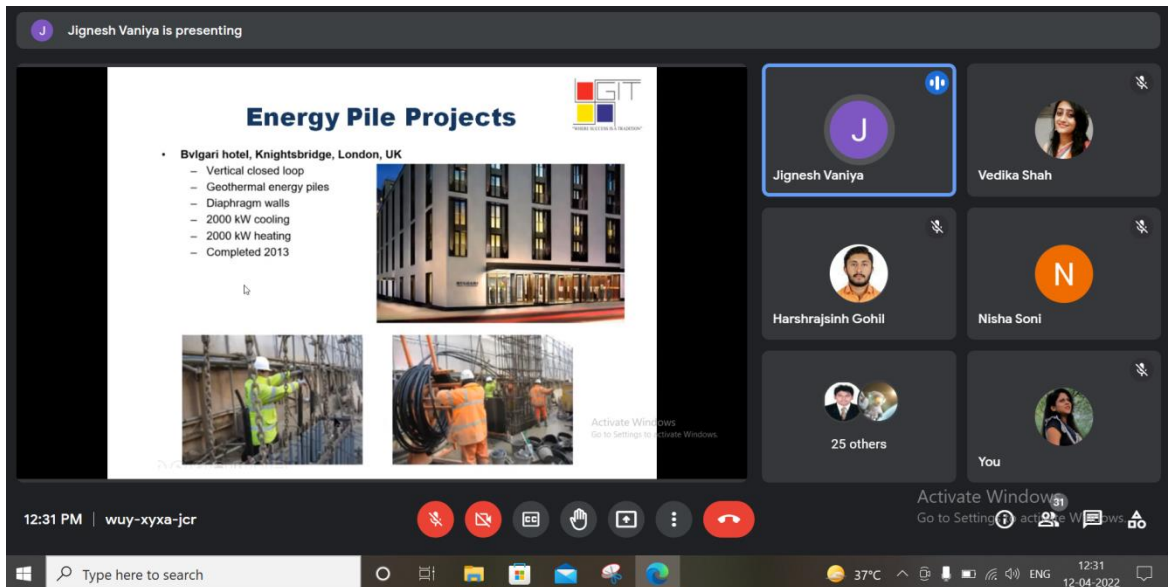
### Prof. Paresh Umredkar describing various grouting methods to the participants

## 12/04/22 – Day 2 – Session 2

Prof. Jignesh Vaniya delivered his session on “Geothermal Energy and Energy Pile” as renewable source and new foundation technique to adopt in future. He started his session with discussion on geothermal energy as what is geothermal energy and why it will be mostly used renewable resource for power generation in future. He further added about the history of geothermal energy that how our ancestor used this geothermal energy concept in their daily life. He explained the applications related to this energy in details with various sketches. He also described about how to utilize geothermal energy for electricity generation with video reference. He discussed about the methods to convert this geothermal energy in electricity like flash steam power plant, dry steam power plant and binary cycle power plant in details. He also discussed about the merits and demerits of this energy and ground source heat pump, the equipment used to cool down and heating of spacing in houses. He further explained the cost variation for the power plant installation in different countries based on the availability of



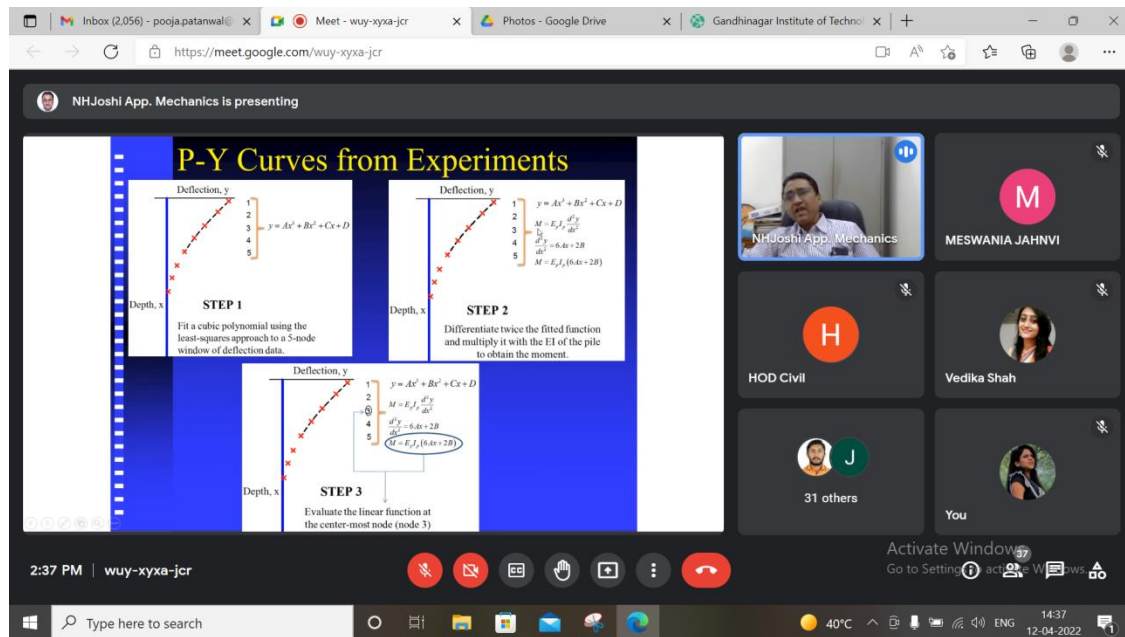
geothermal reservoirs like volcano, boiling mud pot/points, hot springs and geysers. Then he delivered the knowledge of new technique in foundation work as the combination of geothermal energy and pile foundation. He explained how this combination can bring down the usage of electricity or power to run any building especially about heating and cooling of building in summer and winter. He also presented a case study on this combination to explain the various results that were found. He also explained that by adopting this new technique, there is no significance change in pile load capacity and it will work better than the conventional pile foundation. At the end of session, he discussed about conclusions and various findings of other research papers.



### **Prof. Jignesh Vaniya discussing on completed energy pile projects**

#### **12/04/22 – Day 2 – Session 3**

Dr. N. H Joshi has delivered his session on “Laterally loaded Pile foundation” which was very knowledgeable for the participants to understand the various possibilities in pile foundation. He explained in details about how the laterally loaded pile works and which points to consider during installation or cast-in situ of such pile. He explained about the displacement of this pile that can be limited to very little limit. He also added about the partially embedded piles for the detailed explanation of displacement during each cyclic phase. He discussed about the IS codal provisions and standard procedure to analysis of design and behaviour of this pile. After that he described the combination of laterally loaded piles with the different types of soils and their analysis. He explained about modulus of subgrade reaction how it going to affect the stiffness for granular soils. He also added about the deflection that can occur while resisting the horizontal loads or forces. P-Y curve was discussed during this session which is very important for the understanding of the response of the soil resistance per unit length of pile deflection. He also explained the experimental works to do on this pile and which factors to consider while preparation of such set up.



**Dr. N.H Joshi explaining the P-Y curve for laterally loaded piles**

**Outcome: -**

Overall, all the sessions were full of knowledge for the participants. So many new solutions were discussed and how to apply them on the field by experts and because of such new techniques and method's knowledge, participants were convinced that different solutions can be used for same problem in civil engineering filed.

**Feedback: -**

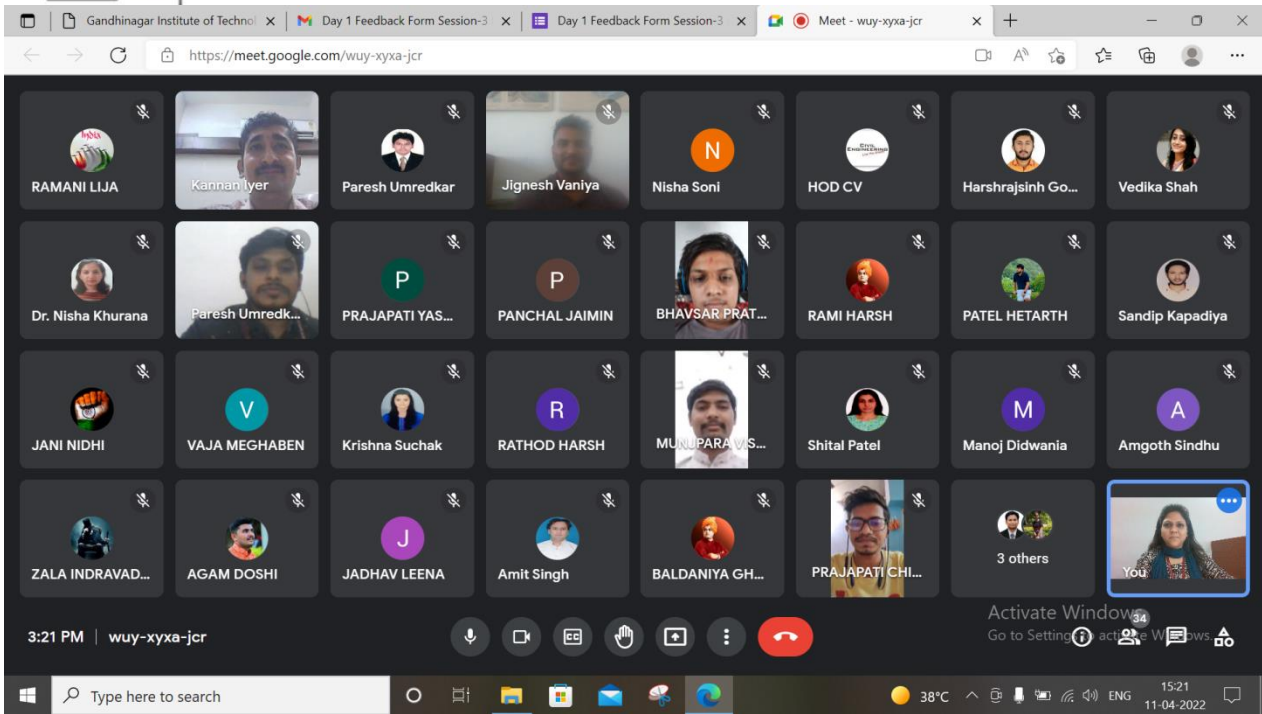
A feedback form was shared with all the participants and got very good feedback from them. All participants found the session useful by understanding all the necessary skills for civil engineering.

**Concluding remark/vote of thanks:**

On behalf of Gandhinagar Institute of Technology & Civil Engineering department Prof. Paresh Umredkar gave vote of thank to all the experts for making this webinar informative as well as useful. He also thanked experts to mention several on field examples like soil investigation report, solutions for collapsible soils, laterally drilled piles, contaminated soils testing and uses of geosynthetic to protect soils from various failures.

Prof Pooja Patanwal gave thanks to dynamic and foresighted leader, respected Director Dr H N Shah sir who source of inspiration & motivation with a clear vision & passion connected with novelty in all the activities of the institute and respected trustees who always act as a pillar of support and strength. He also shows his gratitude to the GIT Research cell, GIT-IQAC cell & Prof. Pooja Patanwal for sorting out the whole session smoothly. He thanked all the faculty members & students for their active participation.





**Group photo with Expert, Faculty members and Participants**