



Faculty Development Programme

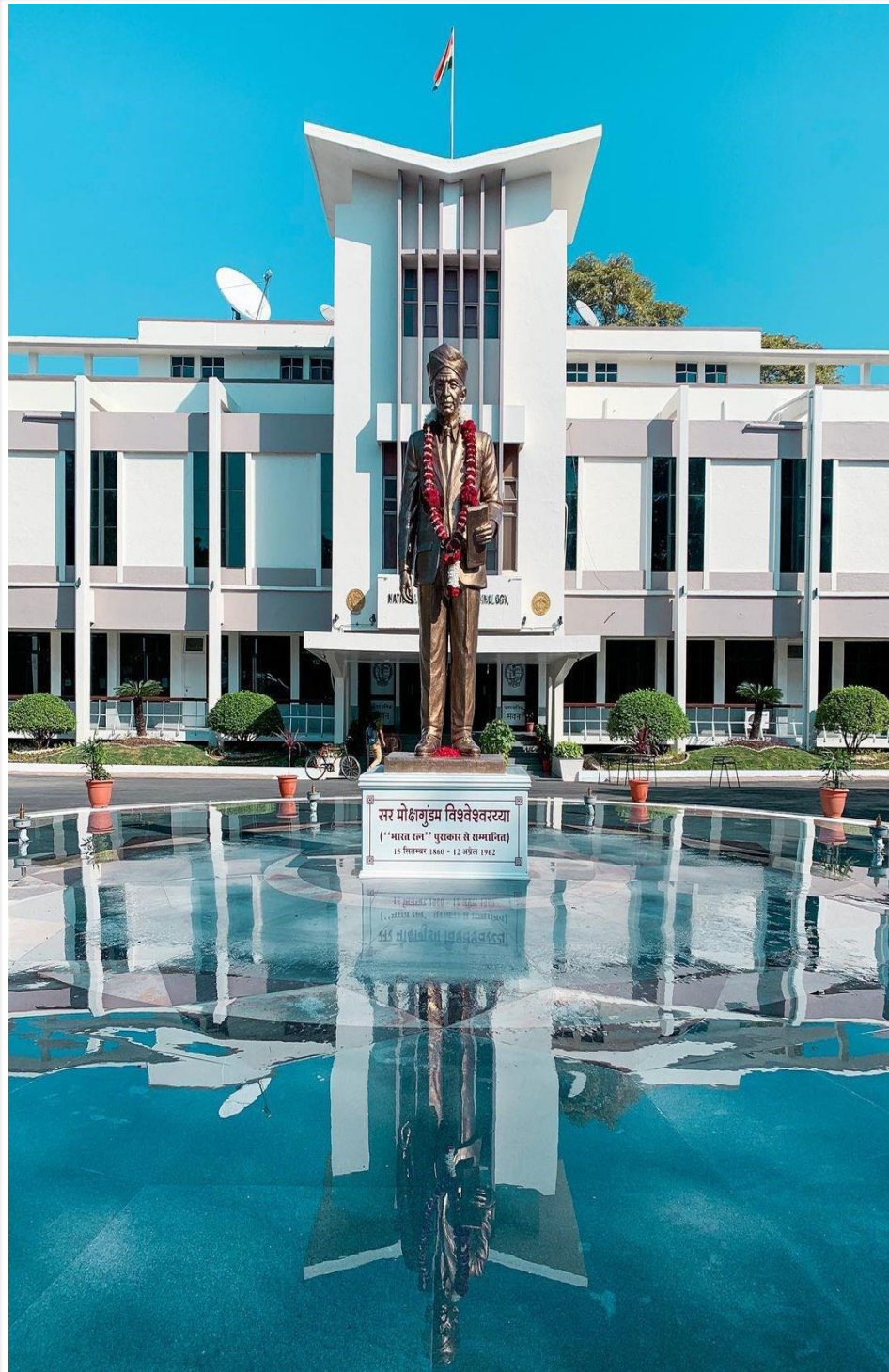
On

Experiential Learning in Geotechnical Engineering

Duly Sponsored by AICTE Training and Learning Academy



06th TO 10th December 2021
Department Of Civil Engineering
VNIT Nagpur



About the Institute

Visvesvaraya National Institute of Technology, Nagpur is one of the thirty National Institutes of Technology in the country. It is an Institute of National Importance, named after Bharat Ratna Sir M. Visvesvaraya. Earlier, the Institute was known as Visvesvaraya Regional College of Engineering (VRCE). It was established in the year 1960 under the scheme sponsored by Govt. of India and Govt. of Maharashtra. The vision of institute is to contribute effectively to the national endeavor of producing quality human resource of world class standard by developing a sustainable technical education system to meet the changing technological needs of the country incorporating relevant social concerns and to build an environment to create and propagate innovative technologies for the economic development of the nation.

About the Department

The Department of Civil Engineering is one of the finest and oldest engineering department of the Institute and stands with an immortal reputation. The department was formed along with the institute itself and therefore is as old. The Department has highly educated and well experienced faculty members who endeavor to produce finest engineers, contributing incredibly to the nation. The alumni of the department are widespread in India and abroad, occupying high positions in their respective fields. The Department has an intake of 120 students per year under UG Course and 100 students per year under PG Courses.

About the Course

As we know, National Educational Policy (NEP) is at our doorstep for implementation. Across the country, several academicians, innovators, researchers & technocrats are mulling over it. It is also been addressed at several fora by the industry, that most job-seeking graduates do not have the required skillset & hence do not find a niche in the competitive market, in short, the employability rate is nose-diving. As an educationalist, one of the possibilities to enhance their skills is to incorporate "Experiential learning" or "Learning by doing" through project-based or product-based wherein the student is involved in real-time problems and case studies. Secondly, it is also important to imbibe the thought process to connect the dots of basic fundamentals learned in various subjects for a feasible scientific solution. Thirdly, to adopt elements of multi-disciplinary subjects like Agricultural Engineering, Chemical Technology, Artificial Intelligence, Machine Learning, Data Science, 3D Printing, etc. The program will cover all the aspects of experimental learning in Geotechnical Engineering through a series of sessions conducted by reputed subject experts from various parts of the country.

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Date	Time	Title	Speaker
6th Dec 2021 (Mon)	10:30 AM - 11:30 AM	Inaugural Ceremony	N/A
	12:00 PM - 01:30 PM	Emerging Trends in Geoenvironmental Engineering for the Waste Containment	Dr. T V Bharat, IIT Guwahati
	03:00 PM - 04:30 PM	Geosynthetic Reinforced Earth Walls with Marginal Backfills: New Trends	Dr. Mainak Majumder, L & T Construction
7th Dec 2021 (Tues)	10:00 AM - 11:30 AM	Application of Industrial and Agricultural Waste Materials in Stabilization of Soft Soil	Dr. Anasua Guharay, BITS Pilani @ Hyderabad
	12:00 PM - 01:30 PM	Cellular Confinement Systems in Soils for Disaster Resilience	Dr. Sreevalsa Kolathayar, NIT Karnataka
	03:00 PM - 04:30 PM	Introduction to Soil Science	Dr. Somsubhra Chakraborty, IIT Kharagpur
8th Dec 2021 (Wed)	10:00 AM - 11:30 AM	Emerging Trends in Offshore Geotechnical Engineering	Dr. Sumanta Halder, IIT Bhubaneswar
	12:00 PM - 01:30 PM	Geosynthetics in Transportation Infrastructure Facilities	Dr. B Umashankar, IIT Hyderabad
	03:00 PM - 04:30 PM	Constitutive Modeling of Geomaterials: Importance and its Dissemination	Dr. Gyan Vikash, SNU Delhi-NCR
	05:00 PM - 06:30 PM	Academic Stress: the causes, effects and ways to deal	Dr. Karthik B, VNIT Nagpur
9th Dec 2021 (Thurs)	09:00 AM - 10:30 AM	Mechanics of Unsaturated Soils for Geotechnical Engineers	Dr. S Rajesh, IIT Kanpur
	12:00 PM - 01:30 PM	Fire Dynamics in Underground Structures	Dr. Dhananjay K Singh, National Fire Service College, Nagpur
	03:00 PM - 04:30 PM	Characterisation of Geomaterials for Pavement Subgrade	Dr. Srinivasan V, VNIT Nagpur
10th Dec 2021 (Fri)	10:00 AM - 11:30 AM	Improvement of soft and compressible foundation soil using cemented stone column technology	Dr. Amit H Padade, VNIT Nagpur
	12:00 PM - 01:30 PM	Application of AI & ML in Geotechnical Engineering	Dr. Saurav Rukhaiyar, CSIR-CIMFR Nagpur
	02:30 PM - 03:30 PM	Course Assessment & Evaluation	N/A
	05:00 PM - 06:00 PM	Valedictory	N/A



**Dr. Tadikonda
Venkata Bharat**
Indian Institute of
Technology Guwahati

Dr. T V Bharat is currently a Professor of Civil Engineering at IIT Guwahati. He has received both his M.Sc. (Eng.) and Ph.D. from the Indian Institute of Science (IISc), Bangalore, in 2004 and 2009, respectively. He worked as a visiting fellow and post-doctoral fellow during 2009 – 2012 at the University of Saskatchewan, Canada. He worked as an Assistant Professor and Associate Professor subsequently at IIT Guwahati from 2012 – 2021. He has nearly 19 years of research experience and 11 years of teaching experience in India and Canada. He has published over 50 peer-reviewed journals, book chapters, and conference papers. He has received numerous awards in India and abroad for his contribution to computational Geotechnical and Geoenvironmental engineering research. He is the editorial board member of the Indian Geotechnical Journal and is an active reviewer of over 25 peer-reviewed journals. He has developed lab-scale models at IIT Guwahati to study the landslides, the flow behavior of various contaminants in bentonites, and the hydro-chemo-mechanical behavior of clays. He has created a web-based course on unsaturated soil mechanics for NPTEL and MOOCs.

EMERGING TRENDS IN GEOENVIRONMENTAL ENGINEERING FOR THE WASTE CONTAINMENT FACILITIES

Rapid industrialization and enormous increase in population density has contributed immensely to increase in domestic, industrial, and nuclear waste contaminants. In order to address the huge waste disposal needs of a particular region, clay soils are inevitable. Landfills are the engineered waste containment facilities. The guidelines provided by the environmental protection agencies of various countries advocate the use of soil as bottom liners that has hydraulic conductivity lower than 1×10^{-9} m/s. Compacted clay liners (CCLs) comprising of highly plastic clays viz., powdered bentonite were initially used to achieve the required hydraulic conductivity and the thickness of the CCLs varies from ~ 0.75 -1 m. The thick CCLs allowed minimal leachate flux to the surrounding land and water table. However, since the last two decades, geosynthetic clay liners (GCLs) have gained more popularity. The existing studies indicate that the osmotic potential of the granular bentonites decreases in the presence of high ionic strength salt solutions. A very few studies showed the sealing and swelling ability of granular bentonite under high ionic strength salt solutions are scarce. The emerging developments in the liner system for the waste containment facilities in order to address the state problems will be presented in this talk.



Dr. Mainak Majumder

Research & Development
department of Larsen &
Toubro, Transportation Infra

Dr. Mainak Majumder is currently working as a Engineering Research Manager in the Research & Development department of Larsen & Toubro, Transportation Infra Business. He completed his doctoral degree in 2019 from the Department of Civil Engineering, IIT Kanpur in Geotechnical engineering. His doctoral thesis was primarily aimed at exploring vibration screening using different infill trench materials under different dynamic conditions. He was awarded Shankar Dayal Sharma Gold Medal for the best all rounder PhD student among all the PG disciplines. He completed his M.tech in Geotechnical Engineering from IIT Kanpur. He completed his B.Tech from Jadavpur University, Kolkata on 2012. His broad research interest lies in soil dynamics, sustainability of geomaterials, pavement geotechnique, Behavior of Expansive soils. He has published 23 peer-reviewed research articles in reputed journals and international conferences. He is also serving as a reviewer for research manuscripts from geotechnical engineering from almost all leading publishers and international conferences for the last three years.

GEOSYNTHETIC REINFORCED EARTH WALLS WITH MARGINAL BACKFILLS: NEW TRENDS

Geosynthetic-reinforced retaining (GRR) walls have been increasingly used to support roadways and bridge abutments in highway projects. In recent years, advances have been made in construction and design of GRR walls for highway applications. The guidelines of the backfill material in GRS was is very stringent in all the codal guidelines. The unavailability of well graded granular soil from borrow area forces to use of the marginally or poorly graded soil as the reinforced backfill. The alternative backfill can be any soil with certainly high cohesions, low permeability or other granular materials like Pond Ash which ultimately deviates from the criteria of well drained granular soil. In the present lecture the utility of these alternative backfill material has been shown which has impact on design and construction. The lecture divides in to three parts, first part is related to present and future of the marginal back fill where detailed case studies have been shown. Failure history of the GRS wall has been discussed from various projects across the India. In the second part of the study, the long term creep behavior of the GRS wall has been discussed due to the use of marginal backfill. In the third part of the lecture influence of water infiltration has been discussed on the GRS wall with standard backfill and poorly graded backfill. The modern trends and future recommendations for the GRS wall construction have been discussed in the conclusive remarks.



**Dr. Anasua
GuhaRay**
BITS-Pilani
Hyderabad

Dr. Anasua GuhaRay is presently an Associate Professor in Geotechnical Engineering Division of Department of Civil Engineering, BITS-Pilani Hyderabad Campus and a cross-appointed faculty in the Department of Civil and Environmental Engineering, Hiroshima University in Japan. She is a university gold medalist in B.E. Civil Engineering from Jadavpur University, Kolkata. She has completed her M.Tech. and Ph.D. in Geotechnical Engineering from IIT Kharagpur. Her major areas of research include reliability application in geotechnical engineering, utilization of industrial and agricultural waste materials for ground improvement, stabilization of expansive soil with activated binders and smart cities. She has published a number of papers in peer reviewed journals and conferences. She is the principal investigator of a number of funded projects including Early Career Research grant, Indo-Austria bilateral project grant, SERB-Power Grant from Department of Science and Technology and Asian smart Cities for Research and Innovation. She is the recipient of “Outstanding Reviewer” from International Journal of Geomechanics, ASCE in the year 2015, 2017 and 2018.

APPLICATION OF INDUSTRIAL AND AGRICULTURAL WASTE MATERIALS IN STABILIZATION OF SOFT SOIL

The basic principles of ‘Sustainable Development’ were formulated originally by Hans Carl von Carlowitz, a forester in Saxony, Germany, who called for “sparing use of trees to give the forest a chance to regenerate and sustain itself”. In the modern age of rapid urbanization and infrastructural development, large quantities of waste materials are generated at a global level, annually. Rapid industrialization has resulted in the generation of huge quantity of solid wastes in industrial and agricultural sectors such as fly ash, slag, construction and demolition waste, plastic waste, recycled asphalt pavement, shredded rubber tyres, crushed glass, rice husk ash, sugarcane bagasse ash, biochar etc. Despite requirements for pollution control measures, these wastes are generally dumped on land or discharged into water bodies, without adequate treatment, and thus become a large source of environmental pollution and health hazard. Proper recycle and reuse of these materials in civil engineering applications will serve a bifold benefit of reducing need for new landfills and the transportation cost associated with its disposal as well as reduce the production of greenhouse gas, thereby leading to a eco-friendly and sustainable solution. In this talk, I will discuss the different ways these waste materials can be reused in practice. I will also highlight some of our work focused on the utilization of different waste materials in geotechnical engineering applications.



Dr Sreevalsa Kolathayar

National Institute of
Technology Surathkal

Dr Sreevalsa Kolathayar pursued M.Tech from IIT Kanpur, PhD from Indian Institute of Science (IISc) and served as International Research Staff at UPC BarcelonaTech Spain. He is presently Assistant Professor in the Department of Civil Engineering, National Institute of Technology Karnataka, Surathkal, India. Dr Sreevalsa has authored Five books that are now subscribed by worldwide university libraries including MIT and Stanford. He published over 80 research papers. He is Associate Editor of two International Journals and acted as a reviewer for many international journals. His research interests include Ground Motion Attenuation & Seismic Hazard Assessment, Local Site effects & Liquefaction Susceptibility, Pseudo-dynamic approach for Seismic Loading, Disaster Risk Reduction, Geogrids and Geocells, and Water geotechnics. He is currently the Secretary Indian chapter of International Association for Coastal Reservoir Research and Executive Committee Member of Indian Society of Earthquake Technology.

CELLULAR CONFINEMENT SYSTEMS IN SOILS FOR DISASTER RESILIENCE

This talk will discuss the concepts of disaster risk reduction and its relation to the discipline of geotechnical engineering in general and soil reinforcement in particular. It is important to have the infrastructure resilient to disaster. In addition, geotechnical engineering has the potential to offer solutions that can reduce the risk during a disaster. The disaster risk can be reduced by reducing the exposure and vulnerability. This talk will cover the geotechnical applications in earthquake hazard mitigation, landslide prevention and ensuring water security and cross-cutting issues. Types of soil reinforcement techniques, mechanism of cellular confinement in soil etc will be discussed along with their applications and case studies. Research and innovations in geotechnical engineering have the potential to offer solutions towards disaster resilient infrastructures. The vision of this talk is set in line with the priorities set by UN-SFDRR and UN-SDGs to promote a global culture of risk-awareness and disaster reduction.



Dr. Somsubhra Chakraborty

*Indian Institute of
Technology Kharagpur*

Dr. Somsubhra Chakraborty is currently serving as an Assistant Professor (Soil Science) at the Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur. He was awarded various prestigious fellowships, including the Australia Awards Fellowship from the Australian Department of Foreign Affairs and Trade. He did his PhD degree in Agronomy (Soil Science emphasis) from Louisiana State University, USA. He started his career as a post-doctoral researcher at West Virginia University, USA. He joined IIT Kharagpur as faculty in 2016. His research interest is the use of proximal and non-invasive sensors with machine learning for soil management. He has around 85 international journal publications with an h-index of 28. He is currently serving as the editorial board member of Sensors journal and a member of the editorial advisory board of Geoderma, the global journal of soil science.

INTRODUCTION TO SOIL SCIENCE

Soil is the foundation of our world's agroecosystems which provide us with feed, fiber, food and fuel. It acts as a water filter and a growing medium; delivers a snapshot of geologic, climatic, biological, and human history; provides habitat for billions of macro and micro-organisms, preserves biodiversity; and provides most of the antibiotics used to fight diseases. Humans use soil as a holding facility for solid waste, filter for wastewater, and foundation for our cities and towns.

As a discipline, Soil Science plays an important role to realize several of the United Nations Sustainable Development Goals (SDGs). Therefore, a comprehensive understanding of soil processes and contemporary sensor-based approaches in soil science is utmost necessary. My talk will be aimed to provide a basic understanding of various aspects of soil science along with some state-of-the-art technologies. The objective is to provide knowledge of different physical and chemical properties of soil. Most importantly this presentation will discuss different unconventional soil sensors for profitable and sustainable farming.



Dr. Sumanta Haldar

Indian Institute of
Technology
Bhubaneswar

Dr. Sumanta Haldar is currently an Associate Professor in Civil Engineering at the Indian Institute of Technology Bhubaneswar, India. His research interests are offshore geotechnics, soil-structure interaction, and dynamics of soil and foundations. He obtained a doctoral degree from the Indian Institute of Science, Bangalore. He was also visiting professor at Lassonde School of Engineering, York University, Canada. The focus of his research is on the application of the fundamental principles of mechanics and mathematics in the experimental and computational aspects of geotechnical engineering that can be implemented in practice. He is the recipient of Prof. Leonard's best Ph.D. thesis award from Indian Geotechnical Society, Excellent Paper Award from the International Association for Computer Methods and Advances in Geomechanics (IACMAG), IGS-ONGC Biennial Award from the Indian Geotechnical Society. He is a member of the International Technical Committee TC-209 on Offshore Geotechnics of the ISSMGE. He has more than 50 peer-reviewed international and national journal and conference publications and book chapters.

EMERGING TRENDS IN OFFSHORE GEOTECHNICAL ENGINEERING

India is venturing into deep and ultra-deep-sea waters for petroleum exploration and production, and alternative offshore energy. In offshore geotechnical engineering, site investigation are expensive, soil condition are unusual and applied loads are large and complex. These pose special challenges to geotechnical engineers as far as site investigation and foundation designs are concerned. In addition, there are many issues related to shallow water areas which also need attention, update and further research. An overview of recent developments in geotechnical analysis and design associated with shallow and deep water will be deliberated. The importance of offshore wind research is evident due to the green and alternate energy demand globally. The long-term dynamic behaviour of the foundations for offshore wind turbine in seismically active area is also challenging due to the complex nature of dynamic loads. Therefore, an assessment of the long-term dynamic behaviour of surrounding soil and the foundation of the offshore wind turbine structure is essential due to the various loading conditions. A recent developments on design aspects of large offshore wind turbine foundations will also be addressed.



Dr. Balunaini Umashankar

Indian Institute of
Technology Hyderabad

Dr. Balunaini Umashankar is Professor in the Department of Civil Engineering, IIT Hyderabad. He has been with IIT Hyderabad since 2009 after completing his PhD from Purdue University. He did his Bachelors from S V University in 2000 and Masters from IIT Kanpur in 2002. He specializes in geotechnical engineering with research focus on geosynthetics in pavements, reinforced earth structures, foundation engineering, recyclable materials in geotechnics, and soil-structure interaction. He is presently involved with research to use drone technology to monitor geoinfrastructre facilities. He has been involved with several research projects funded by National Highway Authority of India (NHAI), Ministry of Road Transport & Highways (MoRTH), Neyveli Lignite Co. Ltd. (NLC), Department of Science and Technology (DST), etc. He is a technical advisor to the Irrigation & CAD Department, Government of Telangana, for the recently concluded project in the State- 'The Kaleshwaram Lift Irrigation Project'.

GEOSYNTHETICS IN TRANSPORTATION INFRASTRUCTURE FACILITIES

In recent times, geosynthetics have found their way in many geotechnical engineering applications. The talk will focus on the use of geosynthetics in pavements and retaining structures in association with conventional and nonconventional fill materials. It will also discuss on the design aspects of IRC SP 59 used to design pavements with geosynthetic materials. Some case studies will also be highlighted in the talk.



Dr. Gyan Vikash
Shiv Nadar University,
Delhi NCR

Dr. Gyan Vikash is an Associate Professor in Department of Civil Engineering in Shiv Nadar University, Delhi NCR. His research area is Theoretical and Computational Geomechanics. His research pursuit is primarily focused on development of Unified Constitutive Law for Geomaterials, Multiscale Analysis and Modelling of Mechanics of Soil-Solid Interface, and Development of Physics Based Data Driven Model to solve open-ended problems in geotechnical engineering. Since the last few years, his research group has been working on the various important problems in Geotechnical Engineering, such as, development of a robust method to interpret CRS consolidation test data, seismic response of bridge structure founded on large diameter caisson, evaluation of effect of spatial random variation of soil mechanical properties on geotechnical system response, and development of physics based-data driven model for early prediction of landslide.

CONSTITUTIVE MODELLING OF GEOMATERIALS: IMPORTANCE AND ITS DISSEMINATION

Constitutive modelling of Geomaterials is a rational, comprehensive and unifying approach to describe mathematically the mechanical response of Geomaterials. In a simple words, it is an attempt to define the stress-strain-time-temperature relation of soils. Since the evolution of soil mechanics, various attempts have been taken to establish a consistent mathematical description of some of the important but specific aspects of soil behaviour. Most of the constitutive models developed before the Cam Clay Model, which is proposed in the 1960s by Roscoe and collaborators, do not provide a rational unified framework to capture the complex behaviour of soils. The Cam Clay Model was the first model to unify relevant aspects of soil behaviour under isotropic and shearing stress states. Thereafter, many constitutive models have been developed to incorporate various important features of the soil behaviour. In this talk, the mechanical behaviour of soils and its important features will be discussed in detail. An attempt will be taken to give an overview of the journey of development of constitutive models of soils since the evolution of soil mechanics. Importance of constitutive modelling, and the prerequisite and a way to disseminate the existing knowledge of this field to the students will also be discussed in this talk.



Dr. Karthik Balasundaram

Visvesvaraya National
Institute of
Technology, Nagpur

Dr. Karthik Balasundaram has completed his Ph.D. in Environment Engineering from IIT Kanpur and is currently working as Assistant Professor in the Department of Civil Engineering at VNIT Nagpur. He has also worked with ERM India Pvt limited in the capacity of Asst. Consultant (Contaminated Site Management). His research interests include physicochemical processes for air pollution control, water and waste water treatment. Dr. Karthik Balasundaram has been associated with the Art of Living Foundation since 2008. He has successfully completed several levels of advanced meditation programme offered by the organization. He has been teaching meditation since the year 2010 first as a volunteer of the Art of Living Organization and since 2017 as a certified trainer.

ACADEMIC STRESS: THE CAUSES, EFFECTS AND WAYS TO DEAL

As per WHO, “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. A state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community”. It is a general perception that academics is a calm and relaxed place of work, with long holidays, and small workloads. However, in their recent study, Erikson et.al have reported “an acute situation of endemic bullying and harassment, chronic overwork, high levels of mental health problems, general health and wellbeing problems, and catastrophically high levels of demoralisation and dissatisfaction across the UK higher education (HE) sector”. Similar results have been reported by Srivastava and Shukla for the HE sector in India. The session will introduce “Meditation” as a tool to cope with everyday stress. Current research findings on the general benefits of Meditation and specific benefits for academicians will be shared. A live guided meditation session along with desktop stretching exercise will be conducted to give a first-hand experience to the audience.



**Dr. Rajesh
Sathiyamoorthy**
Indian Institute of
Technology Kanpur

Dr. Rajesh Sathiyamoorthy is an Associate Professor of the Department of Civil Engineering at Indian Institute of Technology Kanpur. He received Ph.D. in Civil Engineering from IIT Bombay. Prior to joining the IIT Kanpur, Dr. Rajesh worked as a Post-Doctoral research fellow at LTHE, Grenoble, France. His research studies focus on hydro-mechanical behaviour of geomaterials, numerical and physical modelling of geostructures, application of geosynthetics, and engineered cover systems. He has successfully completed four sponsored research projects and several consulting projects, and is currently involved in three sponsored research projects. Dr. Rajesh has published more than 95 technical papers in journals and conferences, and delivered more than 25 keynote/ invited lectures at various conferences and other events. He is ISSMGE, TC-106 (Unsaturated Soils) committee member representing India.

MECHANICS OF UNSATURATED SOILS FOR GEOTECHNICAL ENGINEERS

In the field of geotechnical engineering practice, compacted soils are commonly encountered in a variety of applications. Analysis of the supporting geostructures and sustainability concerning these geostructures often requires quality information about compacted soils for proper assessment. Often, they are assumed to be saturated to avoid complications in analysis, while an inherent property of a compacted soil is its unsaturated nature. The effects of unsaturation in compacted soils cause changes in permeability and strength aspects which can pose substantial threats and create detrimental effects, if not judged carefully during analysis. In recent years, several concepts and methodologies were developed to include soil suction and net stress in theoretical framework to understand the response of unsaturated soils. In this lecture, relevance of unsaturated soils in field problems, how different is mechanics of unsaturated soils from saturated soils and need for the inclusion of suction and net stress in the analysis and design of geostructures will be discussed.



Dr. Dhananjay K Singh

National Fire Service
College, Nagpur

Dr. Dhananjay K Singh has completed his graduation in Civil Engineering from Government College of Engineering Aurangabad in 2008, later on he has done post-graduation in Construction Technology & Management from National Institute of Technology Warangal in 2011. He has completed his PhD from Visvesvaraya National Institute of Technology Nagpur in 2019. He has 1.5 years of industrial experience in construction of tunnel and teaching experience of 5 years. At present he is working in National Fire Service College Nagpur as Assistant Professor.

FIRE DYNAMICS IN UNDERGROUND STRUCTURES

Construction of underground structures are increasing day by day in India. This significant growth in construction of underground structures raised concerns about the life safety of the users. In fast few years, fire in underground structures have led to life and financial loss.

In the lecture, the characteristics of fire, fire development and various tests related to fire will be covered. Then various aspects of life safety, fire protection and fire prevention will be taught followed by various codal provisions related fire safety, means of egress and effect of fire on various construction material. At the last few case studies of actual fire incident in a tunnel will be discussed along with future trends.



Dr. Srinivasan V.
Visvesvaraya National
Institute of
Technology, Nagpur

Dr. Srinivasan V is an Assistant Professor in the Department of Civil Engineering at VNIT Nagpur since 2018. He obtained his Master's and Doctorate from IIT Kanpur in 2011 and 2017 respectively. His area of expertise include: Coalescence of shallow foundations and anchor systems, Physical and Numerical modeling of geotechnical systems. His research contributions include 10 peer-reviewed journals of international repute and 9 articles in prestigious conference indexed in SCI/Scopus. He is also a lifetime member of Indian Geotechnical Society, Institute of Engineers (India), Indian Concrete Institute, Indian Road Congress.

CHARACTERISATION OF GEOMATERIALS FOR PAVEMENT SUBGRADE

Road Pavements are designed and laid on soil subgrade. Modulus of Subgrade reaction is the key component in the design of pavements. Before designing the pavements, it is important to understand the characteristics of pavement materials, i.e., soil subgrade, aggregates, and bitumen. In this lecture, fundamental aspects related to geomaterial characterization shall be discussed in detail. It shall include all attributes like field identification, physical and mechanical properties, classification of soil & aggregates, etc. Furthermore, relevant details of conventional testing methods and best practices shall be illustrated. This lecture shall also embark upon the Geotechnical interpretations and engineering assessment to make appropriate judgments. The failure of pavements is generally due to failure of the soil subgrade under repetitive loading of vehicles. Understanding pavement material characteristics can lead to future prospects in Geotechnical Engineering to improve and design stable subgrades for better roads in the country. This talk will cover the characteristics and properties of such materials used in pavement construction. The talk will further discuss how the material properties are essential for road pavements and how there is always ongoing research works focused towards improving these material properties for better and more sustainable roads.



Dr. Amit Harihar Padade

Visvesvaraya National
Institute of
Technology, Nagpur

Dr. Amit Padade is currently working as an Assistant Professor in the department of Civil Engineering VNIT Nagpur since April 2018 . He completed his M.Tech in Geotechnical Engineering from National Institute of Technology (NIT) Warangal in 2010. Immediately, after his P.G he persuade Ph.D at Indian Institute of Technology (IIT) Bombay where he studied for four years got Ph.D (Geotechnical Engineering) in November 2014. Dr. Padade has published 25 original research papers in prestigious conferences and journals. 4 of these were presented and discussed in first grade prestigious international conferences abroad viz. Australia, Germany, USA, Thailand etc. He has completed major consultancy and testing projects worth Rs. 1.75 Cr in overall. He is a life member of Indian Geotechnical Society and also Member of Institute of Engineers (I), Kolkata. He has also delivered numerous invited expert lectures at several technical institutes and forums. He is also a reviewer of renowned International Journal of Geomechanics and also served as reviewer for many other reputed journals.

IMPROVEMENT OF SOFT AND COMPRESSIBLE FOUNDATION SOIL USING CEMENTED STONE COLUMN TECHNOLOGY

The stone column technique is vertical column of compacted aggregate is formed through the soil to be improved. It reduces the foundation settlement and increases the load-bearing capacity of the deposit by its high density, strength, and stiffness. From previous studies, it is found that there is large scope to improve the performance of the stone column with additional stiffness and improvement in permeability. A new concept consisting of the use of a semirigid-type cemented stone column for enhancing the performance of stone columns in treated soft clay ground has been recently introduced by Golait and Padade (2017). In the cemented stone column approach, the conventionally used coarse fill material will be converted into a semirigid-type porous mass. This was accomplished by mixing it with a marginal amount of cementitious admixtures, such as cement and fly ash. This admixture forms a thin film around aggregate which restricts the bulging effect because of its cemented properties. The cemented stone column formed in soft clay ground must be highly pervious to enable free draining of water. the analytical and experimental methods to analyze the cemented stone column will be discussed. Moreover, the results of analytical and experimental studies on underreamed columns for soft clay ground improvement will also be discussed.



Dr. Saurav Rukhaiyar

*CSIR-Central Institute of
Mining and Fuel
Research, Nagpur*

Dr. Dr. Saurav Rukhaiyar is working as Scientist in Central Institute of Mining & Fuel Research, Nagpur with specialization in Artificial intelligence application in Geotechnical Engineering. His accolades include Best Paper Awards for the paper titled ‘Stability Analysis of a slope section using Neural Network’ from Indian Society of Rock Mechanics and Tunneling Technology (ISRMTT) during his M.Tech course from Indian Institute of Technology (IIT), Roorkee. Dr. Saurav Rukhaiyar was awarded PhD in Geotechnical Engineering from Indian Institute of Technology (IIT), Roorkee. He has published 17 technical papers in various National and International Journals and conferences.

APPLICATION OF AI AND ML IN GEOTECHNICAL ENGINEERING

The advancement in computational prowess has led to a revolution in every field known to mankind. The ease of data collection and its application in development of high precision decision making models has been used all over the world. The geotechnical engineering field has also taken a leap taking advantages of the Artificial Intelligence and Machine Learning (AI and ML) method. Since a large part of geotechnical engineering research is related to collection of field/experimental data and development of analytical/empirical models to predict the behaviour, hence a greater ingress of data science is observed in this field also. The simplicity and high accuracy of these AI and ML based model has excited researcher since last three decade to explore these in context of geotechnical engineering. Researcher all around the world are developing very high accuracy prediction model based on AI and ML for the prediction of almost all the geotechnical behaviour for soil and rock. Soil classification, soil improvement, bearing capacity prediction, slope stability analysis, stability of retaining wall are some of the examples where in large number of publications has been made for AI and ML based model. Similarly, for rock engineering AI and ML has been used. The present article/lecture give a detailed review and presents the developed AI and ML model in four distinct area of Geotechnical/Rock engineering.

Experiential Learning in Geotechnical Engineering VNIT, Nagpur From 06th TO 10th December 2021

Support Team



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