



GIAN Lecture Series – 2 Weeks Course

On

Integrated Approach on Geological & Geotechnical Aspects of Earthquake Engineering: Review & Revisit

Overview:

It is evident through many precursor events that earthquake is one of the major natural hazard which causes detrimental effects on life and infrastructure and in turn growing economy. Engineers & Scientists are aware of the fact that the dynamic or cyclic behaviour of any solid or fluid is rather a complex phenomenon than static behaviour. Understanding and simulating its nature and mechanism involves deeper insight of physics, mechanics and mathematics.

Over many decades, geologists have made noble contribution towards this field of Earthquake Engineering wherein we have understood the origin & composition of earth's surface, volatility of the crustal plate movements, major classification of the globe based on seismic activity etc. On the other hand geotechnical researchers made scientific breakthrough like site specific ground characterization and micro-zonation of the terrain for better understanding of ground acceleration during earthquake; base isolation (to prevent the damage to foundation systems), design of earthquake resistant structures to safeguard from vulnerable damage,

With considerable advancements in both (Geological & Geotechnical) the aspects on earthquake, it is very much necessary and essential to share and understand the know-hows which can culminate into a multi-disciplinary area covering geology, geophysics, geodynamics, and dynamics of soil-fluid-structure interaction.

Primary objectives:

The main objective of this course are as follows:

- To discuss the basic fundamentals and recent advancements on earthquake engineering.
- The first part of the course covers the phenomenon of earthquake, source mechanics of earthquake, wave propagation, ground deformations, structural geology which deals with the geometry, kinematics and forces involved in earthquake, deformation of crustal rocks and failure mechanisms, rock discontinuities, stresses and deformations, earthquake hazards and its consequences, event recurrence intervals and also covers earthquake measurement and instrumentation.
- The second part of the course covers dynamic soil properties, liquefaction phenomena and seismic design of various geotechnical structures, time-dependent dynamic loading, and dynamic behaviour of foundations, seismic hazard analysis (Probabilistic & Deterministic), site response analysis, site characterization and monitoring in geotechnical engineering, soil stabilisation and structural isolation techniques in seismic environment.

Schedule	04 – 15 Jul 2022
Maximum No. of participants	60 (Not more than 50% of registrants shall be postgraduate/doctoral students)
Course Content	<p>Module A: Geological Aspects Geodynamics; Engineering Seismology; Seismic Hazard Analysis; Structural Geology; Rock Engineering; Rock Mechanics; Mechanics behind Structural Geology; Field Case studies of Geological formation, identification & Exploration in Central India; Geological maps & Profiling of Folds, Faults, dykes; Problems on Strike, Dip, thickness and depth of strata. Paleo-seismic, Reconnaissance study & Reminiscence of Jabalpur and adjacent Region.</p> <p>Module B: Geotechnical Aspects Soil Behaviour under Dynamic and Cyclic Loading; Dynamic Soil Properties; Liquefaction and Post-liquefaction; Site Response Analysis; Dynamics of Shallow & Deep Foundations; Dynamic Soil Structure Interaction; Seismic response of Shallow and Deep Foundations; Seismic Analysis of Retaining Structures, Slopes and Dams; Numerical Modelling of Earth structures in Seismically Active Zones; Seismic Design Codes & Provisions; Performance-based Design; Ground Stabilisation; Case Studies.</p>
Number of Credits	04 (Lecture + Tutorial + Technical Tour)
You Should Attend If...	<ul style="list-style-type: none"> ♣ You are a student at post-graduate (M.E./M.Tech./M.S./M.Sc) or higher level (Ph.D.) specialized in Geotechnical Engineering, Earthquake Engineering, Applied Geology, Earth Science or any other allied areas. ♣ You are a Faculty / Scientist / Research Staff / Technical Personnel from academic institutions / research organizations / National laboratories specialized in above mentioned areas. ♣ You are an Executive / Practising Engineer / Proficient Employee from private (consultancy firm / Design studios etc.) or public (PSUs / PSC etc.) sectors working in relevant areas.
Course Fees	<p>The course fee is been nominally charged (excluding 18% GST) as mentioned below:</p> <p>Practising Engineers from Public & Private Sectors – 8000 INR + GST Academic (Faculty) & Research (Scientists) Staff – 6000 INR + GST Postgraduate & Doctoral Students – 3000 INR + GST Participants from Abroad – 200 USD + GST</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 × 7 internet facility, working lunch and refreshments on course session days. It will be very helpful if you can bring your laptop for the course.</p>
Accommodation	<p>The participants may be provided hostel/guesthouse accommodation, depending on the availability, on additional payment basis. Extra charges shall be incurred on breakfast & dinner.</p> <p>Request for accommodation may be submitted to: rahul.shende1996@gmail.com</p>
Technical Tour Details	<p>A field visit on 09-10 Jul 2022 (intermediate weekend) for paleo-seismic study, reminiscence and reconnaissance survey on the traces of damages & failures of past major earthquake is also a part of the course which is optional for participants @ 3500 INR (GST not applicable) per participant against travel, boarding & lodging.</p> <p>Request for participation in technical tour may be submitted to: omkarpnavagire@gmail.com</p>

<p>Registration Procedure</p>	<p>Please follow the following steps for the registration</p> <p>Step 1: <u>GIAN Web (Portal) Registration</u> (Individuals who have already registered to GIAN earlier do not need to repeat) Go to GIAN website (http://www.gian.iitkgp.ac.in/GREGN/index) and create login user ID and Password. Fill up the registration form and do web registration. First time users need to register and pay a one-time fee of INR 500/-. Please do not confuse GIAN web registration with course registration. The course registration fee is separate. The candidate has to pay course registration fee as per step 3 given below.</p> <p>Step 2: <u>Course Registration (Through GIAN Portal)</u> Click on “Course Registration” option given at the top of the registration form. Select the Course titled “Integrated Approach on Geological and Geotechnical Aspects of Earthquake Engineering – Review & Revisit” from the list and click on “Save” option. Confirm your registration by Clicking on “Confirm Course”. Once you enrol for the course, an Enrolment/ Application number will be generated, and the course coordinators will be notified.</p> <p>Last date for Registration: 05th Jun 2022</p> <p>Step 3: <u>Course Fee Payment (Only selected candidates)</u> Only Selected Candidates will be intimated through E-mail by the Course Coordinator. They have to remit the necessary course fee in the form of Demand Draft drawn in favour of “Director, VNIT Nagpur” payable at Nagpur. The DD along with the signed hard copy of the filled in application should be sent to the following address:</p> <p>Dr. Shrabony Adhikary, Assistant Professor (G-I), Department of Civil Engineering, Visvesvaraya National Institute of Technology, South Ambazari Road, Nagpur – 440010</p> <p>For any queries, you may contact: aakash@students.vnit.ac.in</p> <p>Also send internal registration form (https://bit.ly/3H8IX9q) and Demand Draft for accommodation and technical tour along with above mentioned.</p>
<p>Course Assessment & Evaluation</p>	<p>Active participation in lectures & tutorials along with preliminary evaluation shall fetch GIAN Course Completion Certificate. Active participation in lectures, tutorials & technical tour along with preliminary & advanced evaluation shall fetch GIAN Course Completion Certificate and GIAN Grade sheet for 4 equivalent credits.</p>
<p>Course Feedback</p>	<p>As per GIAN guidelines, mandatory anonymous course feedback shall be taken in the stipulated format.</p>

Foreign & National Faculty



Dr. Sanjay Nimbalkar is a Senior Lecturer in the School of Civil and Environmental Engineering at the University of Technology Sydney (UTS). His research has strongly focused on seismic analyses of retaining structures, railway embankment stability analysis, ground improvement techniques, tailing dam, constitutive and numerical

Modelling. He has more than decade experience in academics, research, training and consultancy. He is Chartered Professional Engineer: CPEng (Engineers Australia) and member of Australian Earthquake Engineering Society. He has published a number of research papers in peer reviewed journals and conference proceedings. His scholarly articles are internationally recognised and among highly cited. His doctoral research work on pseudo-dynamic method of analyses for earth retaining structures is considered one of most significant contributions to the field of geotechnical earthquake engineering. He is recipient of Thomas Telford Premium' award from Institution of Civil Engineer (ICE), UK (2014) and 'Professor Joseph M Sussman Best Paper Prize' from Frontiers in Built Environment, Switzerland (2020).



Prof. Deepankar Choudhury is Institute Chair Professor of Civil Engineering department at Indian Institute of Technology (IIT) Bombay, Mumbai, India and Adjunct Professor of Academy of Scientific and Innovative Research (AcSIR) of CSIR laboratories (connected to CSIR-CBRI Roorkee) of India. Prof. Choudhury also worked as a faculty at IIT Kanpur, new IITs at Gandhinagar and Dharwad (both on

deputation from IIT-B) and as a Visiting Fellow/Faculty at NUS Singapore, UoW Australia, UC Berkeley USA, Kagoshima Univ. Japan, TU Darmstadt Germany and Incheon National Univ. South Korea. Prof. Choudhury is the only Geotechnical Engineer of India who is an elected Fellow (FNASc) of the oldest Science Academy of India, viz. The National Academy of Sciences, India. Internationally he is Alexander von Humboldt Fellow of Germany, JSPS Fellow of Japan, and TWAS-VS Fellow of The World Academy of Sciences, Italy, in addition to National Fellow of Institution of Engineers India (FIE), Indian Geotechnical Society (FIGS), Indian Society of Earthquake Technology (FISET). Prof. Choudhury's Video lectures in YouTube through NPTEL, Govt. of India on topics 'Soil Dynamics' and 'Geotechnical Earthquake Engineering' are highly popular all over the world.

Host Faculty

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Dr. Santanu Misra is an Associate Professor in the Department of Earth Sciences of Indian Institute of Technology, Kanpur (IITK). He is also a DST Swarnajayanti Fellow, and INSA Young Scientist. He led the Experimental Rock Deformation Laboratory in IIT Kanpur. Along with his students, he try to understand the

mechanical response of composite rock systems at various deformation conditions.

He received his PhD degree from Jadavpur University, India, in 2007. Between 2007 and 2009, he did his post-doctoral research at ETH Zurich in Switzerland. The research was focused on achieving a better understanding on the micro-process of rock mechanics by high pressure and temperature experimental rock deformation. In 2009, he was offered a lecturer position in the same department in ETH Zurich and worked as a full-time lecturer and researcher for the next four years until 2012. After-which, he spent about two and half years in New Zealand as a Senior Scientist at GNS Science, Wellington, New Zealand.

He believes that modern understandings of Structural Geology and Rock Deformation are no more restricted in describing the geometry and disposition of rock-architecture but closely integrated to other subjects like Rheology, Solid Earth Geophysics, Metamorphic Petrology and advanced mechanics. Most of his courses are designed integrating all such parameters.

Support Team

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