NIRMA UNIVERSITY
INSTITUTE OF TECHNOLOGY
NAAC ACCREDITED 'A+' GRADE

Civil Engineering Department, School of Engineering

CENTRE FOR RESEARCH IN GEOTECHNICAL TEXTILES

Centre for Research in Geotechnical Textiles (CRGTex) will be dedicated to advanced knowledge, research, and innovation in the field of Geotextiles. Geotextiles are natural or synthetic textiles materials used in civil engineering for various applications, including soil stabilization, erosion control, drainage systems, and geotechnical engineering. The centre will serve as a hub of expertise, bringing together researchers, engineers, and professionals to explore the latest developments, best practices, and cutting-edge technologies related to Geotextiles. The centre would play a crucial role in enhancing the understanding of geotextiles' capabilities, promoting sustainable construction and infrastructure development, and ensuring the effective use of these materials in diverse engineering projects. Through research, education, and collaboration, the centre would contribute significantly to the advancement of geotextiles, ultimately benefiting the construction industry in particular and the broader field of civil engineering.

VISION

To be known as an internationally acclaimed centre for research in Geotechnical Textile leading innovation through cutting-edge research, industry collaboration, and transformative education.

MISSION

The centre is envisaged to

- Conduct research in geotechnical textiles and its interaction with other construction materials, aiming to address current and future challenges in infrastructure development.
- Promote sustainability by exploring environmentally friendly materials and techniques in geotechnical textiles.
- Provide a platform for academicians, researchers, post-graduate, and undergraduate students, as well as civil engineering professionals, to enhance their knowledge and skills in geotechnical applications and ground improvement through geotextiles.
- Develop a skilled workforce and provide specialized training to professionals in the geotechnical textile industry.
- Advance experimental methods to facilitate the analysis and design of complex civil engineering infrastructures having geotechnical textiles.
- Enhance the durability and service life of infrastructures through innovative geotechnical textile solutions.
- Innovate cost-effective approaches for health monitoring, repair and rehabilitation of infrastructure using geotechnical textiles.

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Nirma University

Nirma University was established by the initiative of the Nirma Education and Research Foundation (NERF). The University was established in the year 2003 as a statutory university under a special act passed by the Gujarat State Legislative Assembly. It is recognized by the University Grants Commission (UGC) under Section 2(f) of the UGC Act. The University is duly accredited by National Assessment and Accreditation Council (NAAC) with "A+" Grade. The University is a member of Association of Indian Universities (AIU) and the Association of Commonwealth Universities (ACU). Functioning under the aegis of NERF, the University consists of Faculty of Technology and Engineering, Faculty of Management, Faculty of Pharmacy, Faculty of Law, Faculty of Science, Faculty of Architecture, Faculty of Commerce and Faculty of Doctoral Studies and Research. The University is identified with cutting edge research, robust academic programmes, quality teaching learning process and over-all personality development interventions of its students. The 110 acres sprawling state of art campus provides refreshing environment and stimulates intellectual growth and creativity.

Institute of Technology

Institute of Technology (IT-NU) is a leading institute offering multidisciplinary undergraduate, postgraduate, MCA and PhD programmes in engineering. Institute is located in peaceful and sylvan surroundings, about 15 km from Ahmedabad Railway Station on Sarkhej-Gandhinagar highway. The academic ambience of the Institute provides full scope for development. The presence of the institute can also be felt by its alumni spread in national and multinational organizations as well as leading universities of the world. The institute provides an inspiring environment to students to expand their intellectual dimension and recognize their hidden talents in life skill in addition to technical field. School of Engineering (SoE) comprises of Department of- Civil Engineering, Mechanical Engineering, Electrical Engineering and Chemical Engineering. SoE thrives for imparting a quality education to the students and helps in shaping the career. SoE also focuses on cutting edge research and innovation in the field of engineering. It believes in organising different academic programmes for Scholars, Academicians and Professionals to upgrade their skill & knowledge.

Civil Engineering Department

Civil Engineering Department offers a B. Tech. Programme in Civil Engineering since 1996, M. Tech. in Computer Aided Structural Analysis and Design (CASAD) and Construction Technology & Management (CTM). The department also offers Ph.D. Programmes in various fields of Civil Engineering including Geotechnical Engineering, Structural Engineering, Geomatics, Construction Project Management, Transportation Engineering and Environmental Engineering. B.Tech. programme of the department is NBA Accredited in the year 2023 for three years. The Department is actively involved in Testing and Consultancy activities and is currently undertaking consultancy in diversified areas of Civil Engineering like Analysis and Design of Structures, Geotechnical, Environment, Concrete Technology, Earthquake Engineering, Remote Sensing and GIS. Department has successfully undertaken externally funded research projects. Department has well-developed laboratory facilities. The Department is actively involved in various research activities in areas such as Structural engineering, Foundation engineering, Environment engineering, Water Resources engineering, RS&GIS and Transportation engineering. MOU's have been signed with several research & professional organizations in order to enhance research contributions and to conduct continuing education programmes.

ACTIVITIES OF CENTRE

The centre would focus on following activities for better establishment and further growth of the proposed research centre:

- To plan, execute and conduct cutting-edge research in the areas of Geotechnical Textiles.
- To send applications for inviting research funding from various organizations like Ministry of Textiles (GoI), DST, GUJCOST and similar other Indian and international funding agencies.
- To offer testing and consultancy services in the areas of geotextile material quality, durability properties of geotextile, soil-geotextile interaction & behaviour, and structural health monitoring.
- To offer training in specialized fields to industry personnel, make them industry ready and create more employment opportunity. Academicians and students will also be offered special training in relevant areas.
- To propose collaborative/ individual research projects in the areas of geotechnical textiles by having MOUs with leading Indian & Foreign universities and CSIR laboratories.
- To propose industry sponsored research projects in the areas of geotechnical textiles.
- To disseminate the information to the peers and society about the research activities being conducted at the centre through a variety of publications.
- To pursue efforts for publishing journal papers and patents.

THRUST AREAS OF RESEARCH

Following thrust areas of research have been identified:

- Soil Stabilization: Enhancing soil strength and stability for construction and infrastructure projects.
- Drainage Systems: Efficient water management in geotechnical applications.
- Pavement material and execution methodology for different types of roads based on vital physical and environmental parameters.
- Use of waste materials/Indigenous materials.
- Landslide prevention: slope protection using geo-textiles including jute/coir/natural fibre
- Railway sub-ballast/ sub- structure strengthening using geo-textiles
- Water infrastructure – Erosion Control: Preventing soil erosion due to natural forces
- Water Conservation – seepage prevention.
- Reinforcement: Strengthening soil and structures.
- Filtration: Filtering and separating materials in drainage and erosion control.
- Environmental Protection: Applications in landfill liners and waste containment.
- Coastal Engineering: Coastal protection and marine infrastructure.
- Sustainability: Eco-friendly and recyclable geotextile materials.
- Monitoring and Sensors: Real-time data collection for geotechnical projects.
- Seismic Mitigation: Earthquake-resistant construction techniques.
- Innovative Applications: Exploring new uses for geotechnical textiles.
- Standards and Guidelines: Ensuring industry best practices and quality control.

FUTURE RESEARCH

Focus on application-based research activities in the proposed centre and conduct the research on the following areas in future:

- Characterize materials for various properties and perform experimental analysis of geotextile reinforced soil.

- Assess the influence of different hydraulic characteristics of soil and geotextiles on the effectiveness of drainage through prefabricated vertical drains, wicking geotextiles and other advanced technical textile solutions.
- Examine the suitability of applications of different technical textiles for the purpose of reinforcement, drainage, and separation within the long linear transportation infrastructures such as roadways and railways embankments.
- Erosion control applications of geotextiles will be assessed through variable soil slope properties under different controlled hydraulic conditions.
- Research will be carried out on the durability and endurance behaviour of various geotextile materials under extreme environmental conditions.

SPECIAL TRAINING PROGRAMS

- For future civil engineers, workshops/symposia/competition/expert lectures, etc. will be conducted on allied topics such as geotextile materials, ground improvement, innovations in geotextile, etc.
- The centre will offer short duration professional development courses to cater the specific needs of construction industry and allied material technology.
- Centre plans to upgrade the skills of Professional Engineer, Industry Professional, Academicians and Scholars by arranging short term training programs in areas of ground improvement and especially geotextiles.

Testing & Consultancy Services

Centre will be offering specialized testing & consultancy services to ensure quality, durability and suitability of geotextiles for specific engineering applications.

- Mass per Unit Area Test
- Thickness Test
- Stiffness Test
- Grab Strength Test
- Trapezoid Tear Test
- Puncture Resistance Test
- CBR Puncture Test
- Bursting Strength test
- Cone drop test
- Interface Shear Strength Test
- Pull-out Strength Test
- Permittivity Test
- Transmissivity Test
- UV Degradation Test
- Creep Test
- Gradient Ratio Test
- Long Term Flow Test
- Analysis and Design of Reinforced Geotechnical Structures

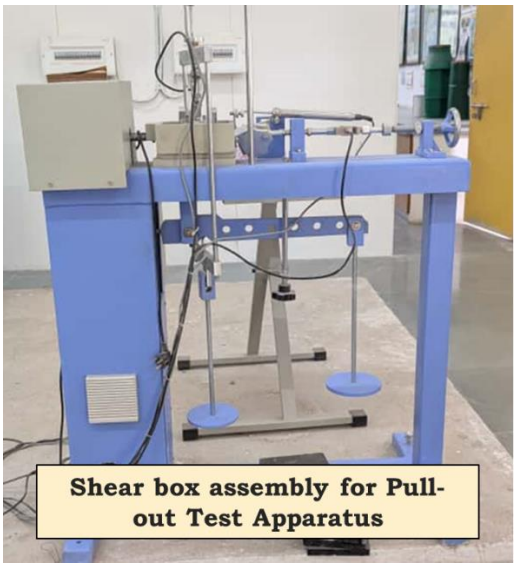
Large Pull-Out Test Apparatus for Geosynthetics (Capacity 100 kN)

Pull out Test Apparatus for Geosynthetics at variable angles and speeds (Capacity 50 kN)

Gradient Ratio Test Apparatus

Long term Flow Test Apparatus

Humidity Chamber

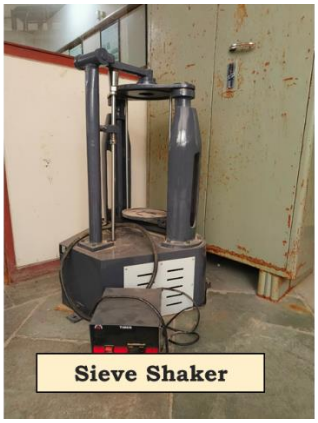


Shear box assembly for Pull-out Test Apparatus

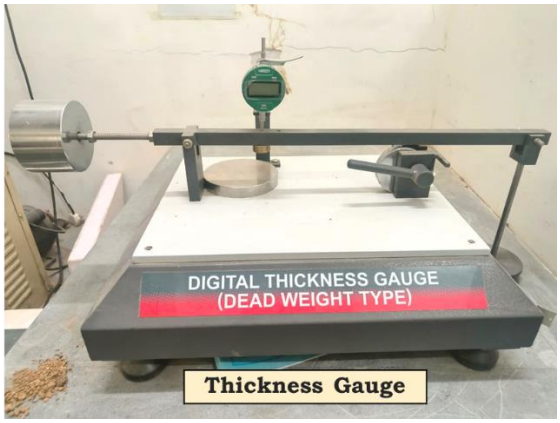
Ultraviolet Light Accelerated Weathering Tester

Cross Permeability Test Apparatus

Bench Xenon Tester Chambers



Sieve Shaker



Thickness Gauge