THIAGARAJAR COLLEGE OF ENGINEERING
(A Govt. Aided Autonomous Institution Affiliated to Anna University)
-where quality and ethics matter
Since 1957

# ALTITUDE

## Department of Civil Engineering

FIRST EDITION

**FEATURED**

*Exquisite technical articles, department highlights, staff achievements and more...*



JAN 2026

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# ACKNOWLEDGEMENT

**FROM US,**

In an age where information moves fast and attention spans grow shorter, this magazine is our attempt to pause, reflect and celebrate meaningful work. With great pride, we present the First Edition of Altitude, the official magazine of the Department of Civil Engineering, a platform created to capture ideas, efforts and experiences that define our academic year.

This first edition brings together the many facets of our department's journey. From student achievements and industrial visits to technical articles, research highlights, faculty contributions and departmental milestones, every section reflects a shared commitment to learning, innovation and professional growth. It stands as a collective record of what we have built together over the year.

Through this magazine, we aim not only to document events, but to showcase curiosity, creativity and collaboration — values that lie at the heart of civil engineering. Altitude is envisioned as a space where technical thought meets expression and where students and faculty come together to share knowledge, experience and inspiration.

A heartfelt thanks to the Civil Engineering Association, our Staff Editor Dr. D. Brindha, our Head Of the Department Dr. S. Arul Mary, our Principal Dr. L. Ashok Kumar and all the faculty, students and alumni whose unwavering support, contributions and encouragement made this endeavor possible once again.

As this first edition takes flight, we hope Altitude becomes a lasting reflection of our department's spirit — grounded in knowledge, driven by purpose and always reaching higher.

**TEAM MAGAZINE.**

# OUR COLLEGE

Thiagarajar College of Engineering (TCE), Madurai, an Institution affiliated to Anna University is one among the several educational and philanthropic institutions founded by Philanthropist and Industrialist Late. Shri. Karumuttu Thiagarajan Chettiar. It was established in the year 1957. TCE is funded by the Central & State Governments and Management. The courses offered in TCE are approved by the All-India Council for Technical Education, New Delhi. It was granted Autonomy in the year 1987. TCE has been accredited by the National Board of Accreditation. TCE offers Nine Undergraduate Programmes, Ten Postgraduate Programmes and Doctoral Programmes in Engineering, Science and Architecture. The major objective of this institution is to plan and implement a programme of education in Engineering and allied Sciences, to promote research, to disseminate knowledge and to foster co-operation and exchange of ideas between academic community and industrial organisations and to develop entrepreneurship skills among the students. It strives to achieve academic excellence along with harmonious development of personality of the students.

## WE AT TCE SHALL STRIVE CONTINUOUSLY,

- Academic excellence in Science, Engineering and Technology through dedication to duty, commitment to research, innovation in learning and faith in human values.
- Enable the students to develop into outstanding professionals with high ethical standards capable of creating, developing and managing global engineering enterprises.
- Fulfill expectations of the society and industry by equipping students with state-of-the-art technology resources for developing sustainable solutions.
- Achieve these through team efforts making Thiagarajar College of Engineering a socially diligent trend setter in technical education.

## PRIME MOVER

Kalaithanthai Thiru Karumuttu Thiagarajan Chettiar, son of Thiru Muthukaruppan Chettiar and Thirumathi Sivakami Achi was born on 16th June, 1893 at A. Thekkur in Sivagangai district of Tamil Nadu. He was educated at St. Thomas College, Sri Lanka. He edited a newspaper championing the cause of the plantation workers. After his return to India he started Meenakshi Mills, Madurai in 1925. He actively participated in the struggle for the Indian Independence. He founded 14 textile mills, 19 educational institutions, Bank of Madura, and Madurai Insurance company. He also published a daily called "Tamil Nadu' for a number of years. He was an ardent lover of architecture, music and literature. This great philanthropist used a large part of his wealth for the development of higher education. Leaving behind a rich legacy, Karumuttu Thiagarajan Chettiar passed away on 29th July, 1974.

# DEPARTMENT OF CIVIL ENGINEERING

## VISION

To establish process of learning to meet the global standards for sustainable built environment.

## MISSION

We are committed to,

• Provide quality education through innovation in teaching and learning practices meeting the global standards.

• Encourage faculty and students to carry out socially relevant and forward-looking research.

• Offer consultancy services using state of the art facilities fulfilling the needs of the industry and society.

• Enable our students, faculty and staff to play leadership roles for betterment of the society in a sustainable manner.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Graduates of the programme will contribute to the development of sustainable infrastructure for the betterment of society.

PEO2: Graduates of the programme, as an employee of an organization or as an employer, will continuously update their domain knowledge for continuous professional development with focus on research and development and industry interaction.

PEO3: Graduates of the programme will accept and create innovations in providing solution for sustainable built environment.

PEO4: Graduates of the programme will discharge their duties as professional civil engineers with quality and ethics.

# MESSAGE

## PRINCIPAL

Dr. L. ASHOK KUMAR

It is a moment of pride for Thiagarajar College of Engineering to unveil ALTITUDE, the magazine of the Department of Civil Engineering. This publication serves as a dynamic showcase of the department's varied initiatives, highlighting the ingenuity, originality, and passion of its members. A magazine like ALTITUDE is not just a chronicle of events but also a platform to inspire and engage. I congratulate the editorial team for their vision and commitment in bringing this effort to fruition.

## HEAD OF THE DEPARTMENT

Dr. S. ARUL MARY

I am truly elated to bring forth the publication of ALTITUDE, the magazine of Department of Civil Engineering that celebrates the spirit of the Department of Civil Engineering. This publication serves as a stage for our students to showcase their technical prowess, and creative pursuits. The magazine is more than a collection of stories, it represents the heart and soul of our department. With every issue, I believe it will set new benchmarks and inspire our students to aim higher.

## STAFF EDITOR

Dr. D. BRINDHA

It is my privilege to acknowledge the hard work and creativity of the editorial team of the Department of Civil Engineering, Thiagarajar College of Engineering. This magazine is a testament to the idea that learning extends beyond the classroom. It is a space where ideas converge, talents flourish, and achievements are celebrated. I hope ALTITUDE continues to inspire both its creators and readers in the journey of discovery and excellence.

# CONTENTS

1A

# BUILDING TOMORROW: HOW AI WILL TRANSFORM CIVIL ENGINEERING IN INDIA

**The Dawn of Intelligent Infrastructure**

Picture this: construction sites where robots work alongside human crews with precision that would make a master craftsman proud, traffic systems that adapt in real-time to prevent jams before they happen, and buildings that can diagnose their own structural health and request maintenance. This isn't science fiction—this is the rapidly approaching reality of civil engineering powered by Artificial Intelligence.

For civil engineering students, understanding AI isn't just about staying current with technology trends; it's about preparing to lead a fundamental transformation in how we design, build, and manage the infrastructure that shapes our nation's future. As India embarks on ambitious infrastructure projects from Smart Cities to the expansion of our railway networks, AI offers unprecedented opportunities to build faster, safer, and more sustainably than ever before.

But what exactly is this "AI" that promises to revolutionize our field? At its core, Artificial Intelligence refers to computer systems that can perform tasks typically requiring human intelligence—recognizing patterns, making decisions, understanding language, and learning from experience. Think of it as giving machines the ability to think and learn, much like how we trained ourselves to recognize the difference between good concrete and poor concrete through years of observation and experience.

Within AI, we encounter several important concepts that every future civil engineer should understand. Machine Learning (ML) is perhaps the most immediately relevant—it's like teaching a computer to learn from examples rather than programming it with explicit rules. Imagine showing a computer thousands of images of cracked and uncracked concrete; eventually, it learns to identify structural damage on its own. This capability is already being used to inspect bridges, monitor construction quality, and predict when infrastructure components might fail.

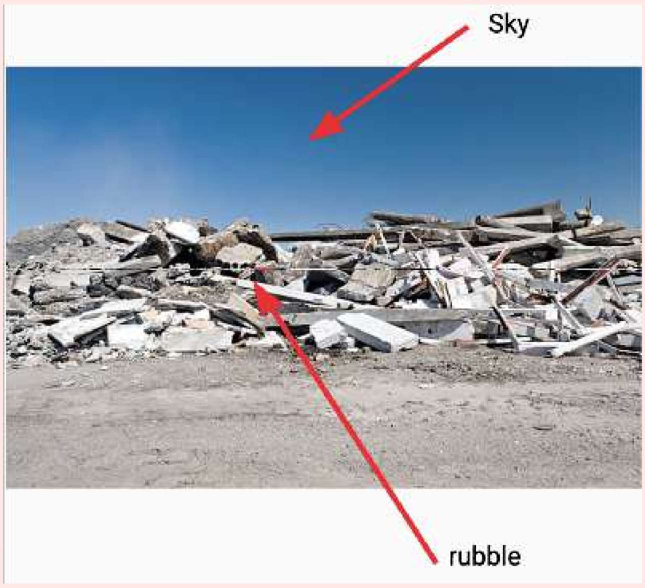
Deep Learning takes this concept further, using neural networks inspired by the human brain to recognize complex patterns in vast amounts of data. These systems excel at tasks like analyzing drone footage of construction sites, interpreting satellite imagery for urban planning, or processing sensor data from bridges to detect subtle changes that might indicate structural problems.

**Why Civil Engineers Must Lead the AI Revolution**

A common misconception is that computer scientists can simply develop AI solutions and civil engineers can adopt them. This couldn't be further from the truth. Civil engineering presents unique challenges that require deep domain expertise combined with AI knowledge. Consider a practical example: Meta's Segment Anything Model (SAM) can identify objects in images with remarkable accuracy on a powerful computer. However, deploying this for real-time structural inspection requires engineers wearing head-mounted displays like HoloLens on construction sites or during disaster response.

The reality? These devices have severely limited computational power and bandwidth compared to laboratory conditions. A civil engineer with AI knowledge understands that we need to develop lightweight models specifically designed for field conditions—models that can run on constrained hardware while maintaining the accuracy needed for safety-critical decisions. A computer scientist, no matter how skilled, lacks the domain knowledge to understand what trade-offs acceptable and what accuracy thresholds are essential for structural safety.

This expertise becomes even more critical when we consider explainability. AI systems, particularly deep learning models, often operate as "black boxes"—they make decisions through processes that are difficult for humans to understand. Imagine an AI system analyzing images of earthquake-damaged buildings to assess structural integrity. When the system classifies a building as "severely damaged," we need to know why. Did it focus on the cracked walls and collapsed roof, or did it mistakenly base its decision on the predominant blue sky in the background image? Without explainability, we can't trust these systems for life-or-death decisions.




Predicted Class: General Collapse
Transfer Learning Prediction: Ants

*Detectron2 misclassifies a landfill as a general collapse after an earthquake*

Only civil engineers with AI literacy can develop the explainable AI techniques needed for our field. We understand which features matter for structural assessment, what environmental factors might confuse an AI system, and how to interpret results in the context of safety and engineering judgment. This combination of civil engineering knowledge and AI expertise simply cannot be replicated by computer scientists working in isolation.

**Transforming Construction and Transportation**

The construction industry stands on the brink of an AI-driven revolution. AI-powered robots are already being developed for tasks like bricklaying and welding, 3D printing houses, performing these jobs with consistency and precision that human workers struggle to match over long periods. Consider the potential impact on India's massive infrastructure projects—AI systems can analyze real-time data from construction sites, monitoring progress against schedules, identifying potential safety hazards before accidents occur, and optimizing resource allocation to prevent costly delays.

The safety implications alone are transformative. Construction remains one of India's most dangerous industries, but AI can significantly reduce human exposure to hazardous environments. Robots can work in conditions unsafe for humans—extreme heights, unstable structures, or areas with toxic materials. AI-powered monitoring systems can analyze worker behavior patterns to identify when fatigue or unsafe practices might lead to accidents.

India's transportation challenges are equally suited for AI solutions. Intelligent traffic management systems can analyze real-time traffic data from cameras and sensors throughout a city, dynamically adjusting traffic signals to optimize flow and reduce congestion. Unlike simple timer-based systems, AI can respond to unexpected events—a broken-down vehicle, a cricket match letting out, or monsoon flooding—by rerouting traffic across the entire network.

Public transportation optimization presents even greater opportunities. AI can analyze ridership patterns, predict demand fluctuations, and optimize bus routes and schedules accordingly. For a country where millions depend on public transportation daily, such optimizations can significantly improve quality of life and economic productivity.

**The Data Challenge: Why Western AI Fails in Indian Contexts**

One of the most critical challenges facing AI adoption in Indian civil engineering is the "data divide." Most current AI models are trained on data from Western countries, where infrastructure follows different patterns, materials have different properties, and environmental conditions vary significantly from those in India.

An AI system trained to identify road defects using images from well-maintained European highways will struggle when deployed on Indian roads with their unique mix of materials, varying maintenance standards, and different failure patterns. The potholes that form during Indian monsoons look different from frost-heave damage in colder climates. The infrastructure challenges faced by informal settlements in Indian cities are simply not represented in training datasets developed in Western contexts.

This bias extends beyond simple recognition tasks. AI tools built around the neat grids and formal zoning of Western cities often misinterpret the winding, incremental development of Indian urban landscapes. For example, a model trained on American suburbs may entirely miss the dense, multilayered settlements of Mumbai's informal neighborhoods.

The solution requires India to develop its own AI training datasets that reflect our specific conditions, materials, and challenges. This represents both an opportunity and a responsibility for the next generation of Indian civil engineers—we must create AI systems that understand and can work effectively within the Indian context.



*The bias of AI object detection in two different neighborhoods. The top image matches the training data; the bottom image lacks suitable training data.* ***Image credits:*** *Sean McLean, Paul Navrátil, and Krishna Kumar*

**The Future Landscape: LLMs and Autonomous Systems**

The rapid advancement of Large Language Models (LLMs) like ChatGPT represents a new frontier in AI applications for civil engineering. These systems can understand and generate human language with remarkable sophistication, opening up possibilities for AI assistants that can help with everything from writing technical reports to generating preliminary design specifications based on project requirements described in natural language.

The concept of AI "agents" extends this capability further. These are AI systems that can understand complex goals and execute multi-step tasks autonomously. An AI agent might take a project brief and autonomously generate preliminary design reports, compile material lists, and create initial simulation models, while human oversight and final approval remain essential.

Beyond individual tasks, the future points toward autonomous infrastructure systems. We're moving toward self-healing infrastructure where AI-powered sensors and robotic systems can detect damage and initiate repairs automatically. Buildings will become intelligent entities that can optimize their own energy usage, monitor their structural health, and predict maintenance needs.

**Reimagining Engineering Education for the AI Era**

The transformation of civil engineering through AI demands a corresponding evolution in how we educate future engineers. Traditional engineering education must expand to include data science, AI literacy, and systems thinking. Future civil engineers will need to understand not just how to design a bridge, but how to design a bridge that can monitor its own health and communicate with traffic management systems.

Engineering curricula must integrate AI and machine learning concepts into core subjects rather than treating them as optional add-ons. Students need to understand how to collect, manage, and analyze the vast amounts of data that modern infrastructure generates. They must learn to work with AI systems as partners, understanding both their capabilities and limitations.

Equally important is developing strong ethical foundations. Future engineers must understand the social implications of AI-driven infrastructure decisions and be prepared to ensure that technological advancement serves all communities equitably. The education system must also embrace lifelong learning as a core principle, as AI capabilities advance rapidly throughout engineers' careers.

**A Vision for India's AI-Powered Infrastructure Future**

The future of civil engineering in India, enhanced by AI, presents extraordinary opportunities to address our nation's infrastructure challenges while creating new possibilities for sustainable development. We can envision smart cities that truly deserve the name—urban environments that adapt to their residents' needs, optimize resource usage automatically, and provide high-quality infrastructure services efficiently and equitably.

Consider the possibilities for disaster resilience, particularly relevant for a country that faces diverse natural hazards. AI systems can analyze vast amounts of environmental data to provide early warning systems with unprecedented accuracy. During disasters, AI can optimize relief efforts and help communities recover more quickly.

However, realizing this vision requires more than just adopting new technologies. It demands developing AI solutions specifically tailored to Indian conditions rather than simply importing Western technologies. Most importantly, it requires ensuring that AI-driven infrastructure serves all Indians equitably.

For the engineering students reading this, the future belongs to those who can bridge the world of traditional civil engineering with the emerging possibilities of artificial intelligence. Your generation has the opportunity—and the responsibility—to build not just better infrastructure, but smarter, more responsive, and more equitable infrastructure that serves all Indians effectively.

The foundation of tomorrow's India will be laid by engineers who understand both concrete and code, who can design for both structural integrity and algorithmic intelligence, and who never lose sight of the human communities that infrastructure exists to serve. The future of civil engineering in India is not just about building with AI—it's about building intelligently, ethically, and inclusively for generations to come.

- Dr. Krishna Kumar,
Associate Professor,
The University of Texas at Austin

# ABOUT OUR EXCLUSIVE CONTRIBUTOR

The Department of Civil Engineering features an exquisite article by **Dr. Krishna Kumar**, Associate Professor in the Department of Civil, Architectural and Environmental Engineering at **The University of Texas at Austin**, where he holds the J. Neils Thomson Centennial Teaching Fellowship.

**Dr. Krishna Kumar**

Dr. Krishna Kumar specializes in computational mechanics, data-driven modeling, machine learning applications in civil engineering, and high-performance computing. He is a core faculty member at the Oden Institute for Computational Engineering and Sciences.

His research develops advanced numerical and AI-based techniques to address complex challenges related to infrastructure systems, natural hazards, and sustainable built environments.

He earned his Ph.D. from the University of Cambridge, an M.S. from the Indian Institute of Technology Madras, and a B.E. from Thiagarajar College of Engineering. His academic background combines a foundation in Indian engineering education with internationally recognized research.

At UT Austin, Dr. Kumar directs the $7M NSF SCIPE "Chishiki.ai" initiative, building an AI ecosystem for civil engineering research and education. He develops AI tools on the NSF DesignSafe-CI cyberinfrastructure platform and received an NSF CAREER Award for his work on high-performance computing and machine learning in geomechanics. He received his tenure in 2025. He has received several teaching awards, including the Dean's Award for Outstanding Teaching in Engineering.

The Department of Civil Engineering thanks Dr. Krishna Kumar for contributing this article and sharing his expertise with our department. The article presents a discussion on intelligent infrastructure and the role of civil engineers in adopting artificial intelligence. It explores AI's impact on construction and transportation, addresses challenges related to data and contextual relevance in Indian infrastructure systems, and reflects on future directions for AI-driven engineering practice and education. Dr. Kumar's perspective on AI-powered infrastructure offers useful insight to students and professionals. We appreciate his contribution to this edition of the department magazine.

1B


# WHEN CONCRETE MET CODE – THE NEW MIND OF CIVIL ENGINEERING

At 2:47 a.m., a bridge in Hyderabad sent out a silent cry. A vibration sensor buried deep within its pier recorded an unusual spike too small for a human eye to notice but not for the neural network trained on years of structural behaviour. Before dawn, a predictive maintenance alert landed in an engineer's inbox. The site team inspected, found a loosened joint and fixed it. A failure that could have made headlines, simply became another line in a report. That night, it wasn't experience that saved the bridge but it was data.

**The Shift Beneath the Dust**

For centuries, civil engineers have built with muscle and intuition from sketching arches to calculating load paths on paper. We learned from failures, redesigned and built again. But intuition can't always see what sensors can. The world we design today be it tunnels, metros, megacities produce terabytes of data every day. Hidden inside that noise are patterns, warnings and insights that human eyes miss. This is where Artificial Intelligence , Machine Learning and Deep Learning are quietly reshaping our field not replacing engineers but amplifying their instincts.

**When Structures Start to Learn**

A decade ago, a crack on concrete was only noticed when it was visible. Today, ML models can predict crack initiation by analyzing micro-strain data long before any damage surfaces. Researchers at IIT Madras, for instance, trained convolutional neural networks to classify crack patterns in concrete beams from simple photographs achieving accuracy levels once thought impossible outside a lab.

Imagine a structure that not only holds its shape but *understands* its stress. Imagine smart buildings in which sensor networks feed real-time data into predictive algorithms that learn how each beam behaves under temperature or load fluctuations. Deep learning turns these patterns into forecasts, letting engineers schedule maintenance before fatigue turns to failure.

**The Site That Thinks Ahead**

It's not just structures construction management itself is being rewired. A planning engineer no longer depends solely on Gantt charts; instead, AI systems forecast project delays by recognizing combinations of weather, workforce and equipment data. Every spreadsheet becomes a dataset; every site log becomes training data. We're not collecting data anymore but we're learning from it.

**Brains Behind the Bricks**

Models like Linear Regression and Support Vector Machines (SVMs) are helping predict concrete compressive strength with impressive accuracy by analyzing mix proportions and curing conditions. Decision Trees and Random Forests are being employed to forecast project delays, material wastage and equipment failure, improving both time and cost efficiency. Artificial Neural Networks (ANNs) have shown remarkable success in modeling complex nonlinear relationships, such as predicting settlement in foundations and analyzing structural deformation patterns.

Meanwhile, Convolutional Neural Networks (CNNs) are finding use in detecting cracks, corrosion and surface distress in bridges and pavements through image recognition. Reinforcement Learning (RL) is being explored for optimizing construction scheduling and resource allocation, where the model continuously learns from on-site performance feedback. K-Means Clustering aids in categorizing soil types and optimizing land-use mapping for sustainable urban planning.

More advanced deep learning frameworks like Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks are being tested to forecast water demand, traffic flow and rainfall intensity crucial for stormwater design in fast-urbanizing regions. Even Generative Adversarial Networks (GANs) are stepping into the field, generating synthetic yet realistic simulation data for rare events like earthquakes or floods helping researchers design safer structures without needing decades of real data.

Civil engineering, once called a "slow" discipline, is now running predictive models faster than any physical test could be done.

**The Fear Before the Future**

Yet, the transformation faces one resistance that is "Us". Many civil engineers still say, "We build. We don't code." But the truth is coding today is not software engineering; it's scientific storytelling. Python or MATLAB are just new pencils for old equations.

AI, ML and DL are not here to take away design judgment they're here to extend it. Just as CAD replaced hand drafting, intelligent algorithms will soon replace repetitive guesswork.

A civil engineer who can train a model to predict compressive strength, optimize a beam or simulate traffic is not a coder they're a creator of smarter decisions.

**The New Civil Intuition**

In the next decade, our greatest structures won't just stand tall instead they'll think. Our bridges will sense fatigue, our pavements will learn stress cycles, our cities will self-regulate water and our materials will evolve with every pour.

And the civil engineer? They'll no longer just draw blueprints but they'll design algorithms that predict the future. Because the next revolution in construction won't begin with a bulldozer. It will begin with a dataset.

- Sivaranjani S
IV Year

1C

# RESILIENT WATER INFRASTRUCTURE FOR A CHANGING CLIMATE

**Introduction**

For centuries, water infrastructure has been designed around predictability. Engineers relied on historical rainfall records, steady hydrological cycles and conventional safety margins to design dams, drainage systems and treatment plants. But the climate no longer follows the past. According to the World Meteorological Organization (WMO, 2025), nearly two-thirds of global river basins experienced abnormal conditions last year, either extreme drought or flooding. Rising global temperatures are intensifying rainfall in some regions while drying out others and sea levels are threatening coastal infrastructure. These changes expose the limits of infrastructure built for a stable climate. Civil engineers today face a new imperative: to make water systems resilient to anticipate, withstand and recover from climate-driven disruptions.

**Climate Impacts on Water Infrastructure**

The climate crisis is directly reshaping the design and performance of water systems. Intense rainfall events are overwhelming urban drainage networks. Studies show that under severe emission scenarios (RCP 8.5), cities could see a 60% rise in flooded drainage nodes during storms if mitigation measures are not implemented. Meanwhile, prolonged droughts are depleting reservoirs and aquifers, forcing cities like Cape Town and Los Angeles to adopt aggressive conservation and reuse programs.

In the United States, the 2025 Black & Veatch Water Report revealed that only 34% of utilities feel "very confident" in their water supply resilience down from 45% the previous year. Across Europe, the European Investment Bank recently committed €15 billion to strengthen water resource protection, citing the growing frequency of extreme hydrological events. In India, erratic monsoons are exposing gaps in urban drainage and rural water storage systems, prompting the government to expand adaptive infrastructure through the Jal Jeevan Mission and AMRUT 2.0 programs.

At the same time, the world faces a mounting funding gap. A McKinsey (2024) analysis estimated that U.S. utilities alone face a $110 billion shortfall to upgrade existing networks to withstand future climate extremes.

Globally, the OECD warns that failing to invest in resilient infrastructure could cost nations 1 to 3% of GDP annually by mid-century due to flood damage, water shortages, and economic disruption.

**Engineering the Resilience Blueprint**

Resilient water infrastructure is not just an aspiration, it's an evolving design philosophy. It blends technical robustness, nature-based solutions and digital intelligence. Engineers are now integrating redundancy into systems, ensuring multiple pathways for supply and drainage. For instance, Singapore's water security strategy combines imported water, desalination, stormwater capture and wastewater reuse, creating a "Four National Taps" model that insulates the nation from drought risk.

Green infrastructure is another cornerstone of resilience. Rather than channeling stormwater through concrete drains, cities are turning to bioswales, rain gardens, permeable pavements and wetlands to absorb and filter runoff. Research shows green roofs can retain 50 to 60% of annual rainfall, reducing both flood risk and heat stress. In Rotterdam, the Netherlands, adaptive parks and floating pavilions serve as flood buffers during heavy rains, demonstrating how urban design can double as climate protection.

The digital revolution is also reshaping water resilience. Through IoT sensors, GIS mapping and digital twins, utilities can monitor leaks, predict failures and simulate real time storm scenarios. A 2025 global survey found that 78% of utilities have adopted some form of digital monitoring and 70% report improved crisis response. By combining physical and digital resilience, engineers can anticipate problems before they escalate, turning reactive management into proactive adaptation.

**Challenges and Opportunities for Civil Engineers**

Despite the momentum, implementing resilient water systems remains a formidable challenge. Financial constraints often deter investment in projects whose benefits unfold over decades. In developing regions, limited technical capacity and insufficient climate data hinder effective planning. Furthermore, engineering codes and standards in many countries still rely on outdated hydrological assumptions, ignoring non-stationary climate patterns.

Civil engineers must therefore lead the transformation. They need to advocate for updated design guidelines that incorporate climate projections, higher safety margins and probabilistic risk analysis. Embracing life-cycle management, treating infrastructure as a living system that evolves over time is essential. Interdisciplinary collaboration is equally important; water engineers must now work alongside ecologists, climate scientists, economists and urban planners.

There's also a growing need for inclusive resilience ensuring that adaptation benefits all communities, especially those most vulnerable to floods or droughts. Projects like Mumbai's flood mitigation initiative and Bangladesh's coastal embankment upgrades are examples where engineering innovation meets social protection. Moreover, investments in resilience are not just defensive they yield strong economic returns. The World Bank estimates that every $1 invested in resilient infrastructure saves $4 in post-disaster recovery costs.

**Conclusion: Building Tomorrow's Water Systems Today**

Resilient water infrastructure represents the next frontier in civil engineering a future where adaptability, sustainability and technology converge. As climate uncertainty grows, the profession must pivot from building systems that resist change to ones that adapt to it. That means designing floodplains that store excess water rather than fight it, pipelines that self monitor for leaks and treatment plants powered by renewable energy and data analytics.

The evidence is clear: the world cannot afford to delay. The WMO warns that water related disasters have increased fivefold in the past 50 years and the costs of inaction will only escalate. By embracing resilience, engineers are not just solving technical challenges they're safeguarding livelihoods, ecosystems and economies.

In the end, resilience is not a single project or technology—it's a mindset.

- Asimithaa K
IV Year

## DID YOU KNOW?

- Nearly two-thirds of the world's river basins experienced either extreme flooding or severe drought in a single year, highlighting how rapidly climate change is overwhelming traditional water infrastructure designs.
- Water infrastructure designed using historical rainfall data may underestimate future flood risks by over 50%, as climate change is intensifying rainfall beyond past records.
- Under high-emission climate scenarios, urban drainage systems could face up to a 60% increase in flooding failures, unless redesigned for climate resilience.


(Source: Freepik

1D

# THE TILTED TALE: SOIL PROBLEMS AND GEOTECHNICAL SOLUTIONS

Soil is the most fundamental element in civil engineering practice, yet it is also one of the most unpredictable ones. Construction begins not with concrete, but with the earth beneath it, and the performance of any structure is ultimately determined by how well the ground receives it. The story of the ‘ Leaning Tower of Pisa ’ is often told as an architectural marvel, but beneath its tilted elegance lies a cautionary geotechnical tale that remains relevant to modern engineers struggling with soft clay soils and settlement hazards.

The engineering behavior of soil is shaped by its physical, mechanical, and mineralogical features. Grain size distribution and moisture content determine how densely soil particles can pack, how easily they deform under load and how they respond to climatic variations. For fine-grained soils, especially clay, the Atterberg limits capture plasticity and susceptibility to deformation, offering early indications of the soil’s behavior under varying moisture states.

From a structural point of view, properties such as shear strength, compressibility and permeability directly influence the soil’s capacity to carry load, dissipate pore water pressure, and resist volume change. High compressibility may translate into long-term settlement, while low permeability can delay consolidation, prolonging deformation over years. Clay minerals, especially montmorillonite, are notorious for their high surface activity, leading to expansion, shrinkage, and strength loss in response to moisture fluctuations. These characteristics often make clay-rich deposits the most challenging soils for construction.

Soil stabilization exists as a response to the limitations of natural ground conditions. Without stabilization weak or saturated soils can compromise structural safety, accelerate deterioration, and increase project costs through retrofitting or over-designed foundations. Stabilization enables soils to meet engineering requirements by improving strength, reducing compressibility, controlling swelling and enhancing durability. In many cases, stabilization allows for efficient construction on sites that would otherwise be deemed unsuitable or economically infeasible.

Beyond structural concerns, stabilization contributes to sustainability by avoiding excessive excavation, reducing cement demand, and enabling the reuse of industrial by-products. As the geotechnical field evolves, eco-friendly stabilizers such as fly ash, GGBS, geopolymers, and even microbial induced calcite precipitation are gaining attention, aligning performance with environmental responsibility.

Modern stabilization techniques generally include mechanical, chemical, and structural methods. Mechanical strategies such as compaction or blending soils of varying gradation aim to increase particle interlocking and reduce void spaces. Chemical approaches employ binders like lime, cement, or industrial waste additives to trigger reactions that harden and densify soil matrices.

Structural enhancements, including geosynthetics, stone columns, and soil reinforcement, provide engineered pathways for load transfer and strain control. More recently, biological and sustainable stabilization technologies are redefining soil improvement with lower carbon footprints and reduced long-term environmental impacts.

Before any building rises, the subsurface must be thoroughly investigated. Weak bearing capacity, high groundwater levels, heterogeneous soil layers, and expansive behavior can all threaten structural performance. Poorly characterized ground conditions lead to differential settlements, tilting and even total collapse. These problems are amplified in clay soils, where minute changes in moisture or stress can create disproportionate responses.

Inadequate site investigation due to limited technology, budget constraints or lack of geological knowledge remains as a recurring cause of foundation failure worldwide. This brings us to one of history's most iconic examples: the Leaning Tower of Pisa

**Soil Problems and Construction Issues of the Leaning Tower of Pisa**

*Source:https://en.wikipedia.org/wiki/Leaning_Tower_of_Pisa*

Construction of the Leaning Tower of Pisa began in 1173 on ground that was geotechnically unsuitable for a heavy masonry structure. The subsurface consisted of alternating layers of soft marine clay, silty sand, and alluvial deposits materials known for high compressibility and low shear strength. A shallow foundation of about three meters was placed directly over this weak soil with no measures to improve ground conditions.

Almost immediately, the weight of the stone tower induced settlement into the clay. The southern side being more compressible and less stiff experienced greater settlement than the northern side, triggering a tilt that was visible before the third storey was completed. This initial tilt initiated a chain reaction, as the structure tilted, more load shifted to the lower side, which further increased settlement. The high groundwater table at the site compounded the problem by reducing the effective stress in the clay, delaying consolidation and making the soil even more susceptible to long-term deformation. Builders attempted to compensate by altering upper levels, but these modifications inadvertently increased eccentricity and worsened the tilt.

The primary cause of the tower's inclination was differential consolidation of soft clay due to excessive foundation pressure and inadequate soil strength. Clay being low in permeability, consolidated slowly, so the settlement happened gradually but continuously over time.

Modern geotechnical understanding explains the behavior through soil-structure interaction that the load from the structure generated high pore water pressures, water movement through low-permeability clay required long time frames, uneven settlement occurred due to soil anisotropy, tilt increased load eccentricity, producing rotational moments that worsened settlement. Thus the tower exemplifies how time-dependent settlement(creep and consolidation), often dismissed in preliminary design, can trigger structural instability decades after construction.

If the tower were constructed today, a number of soil improvement strategies would likely be applied before foundation work began. Techniques such as deep soil mixing, lime or cement stabilization, or stone column installation would increase soil stiffness and bearing capacity. Preloading combined with vertical drains could accelerate consolidation, stabilizing the clay before construction commenced.

Geogrid-reinforced layers could distribute loads more uniformly, while pile foundations could transfer loads to more competent strata, effectively bypassing the compressible clay altogether. Such interventions would significantly reduce settlement, minimize tilt risks and ensure structural performance throughout its lifespan.

Modern engineers eventually intervened to prevent collapse rather than correct the tilt entirely. The most effective strategy was controlled soil extraction (under-excavation) from beneath the northern side, prompting upward rotation of the tower. This incremental approach, combined with temporary ground freezing and anchoring mechanisms, gradually reduced tilt without disrupting heritage value. Though unconventional, this method demonstrated the critical role that soil modification, not structural reinforcement alone plays in preserving unstable foundations.

The Leaning Tower of Pisa stands not only as a historic monument but also stands as a reminder of the importance of geotechnical knowledge. The failure underscores that the soil behavior cannot be assumed based on surface observations, foundation design must not precede ground understanding, differential settlement must be anticipated and controlled, long-term performance matters as much as immediate safety, early soil stabilization is more economical than reactive intervention. More importantly, the case invites engineers to view soil not as an obstacle, but as a dynamic, living system whose characteristics must be understood, respected and adapted to.

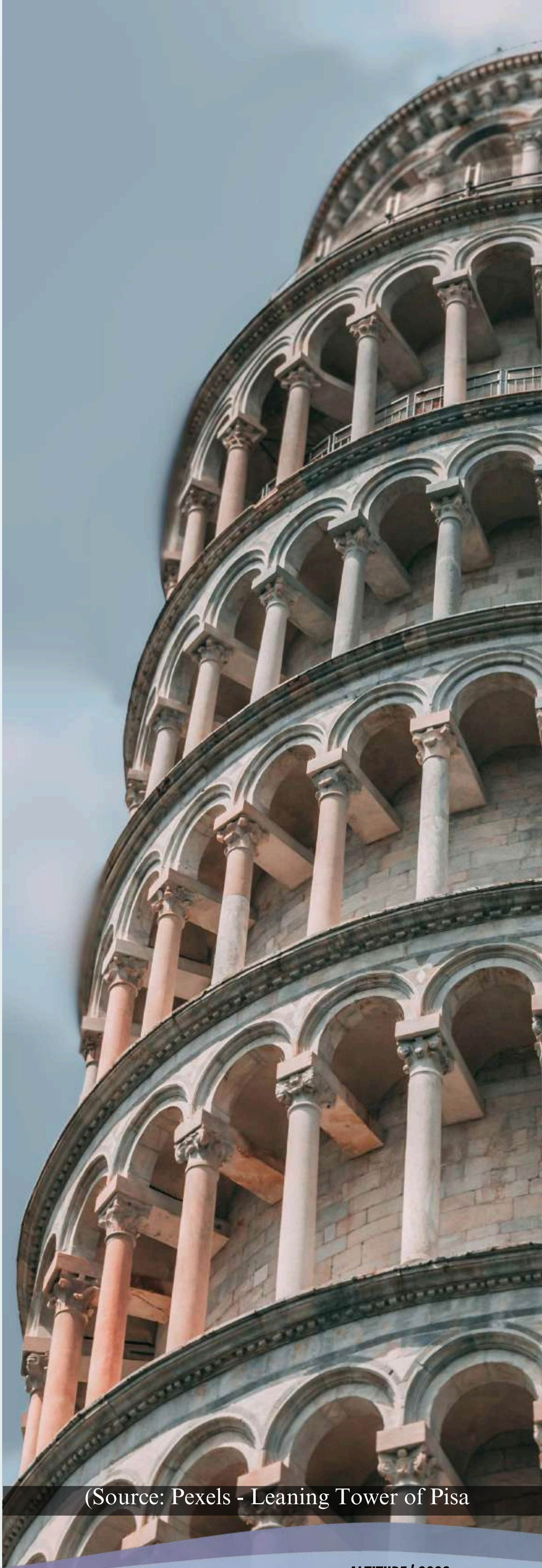
Soil stabilization remains a central pillar of modern geotechnical engineering, enabling the safe development of infrastructure on complex, variable, and often problematic soils. The story of the Leaning Tower of Pisa demonstrates how a lack of ground improvement can lead to centuries of structural instability, costly remediation, and global curiosity. Yet, it also highlights how innovative soil treatment strategies can rectify even the most entrenched geological challenges.

As urban expansion pushes construction into more difficult terrain the need for sustainable, efficient and adaptive soil stabilization methods becomes increasingly urgent. The lessons unearthed beneath Pisa's iconic tilt remind us that in civil engineering, the strength of any structure is inseparable from the strength of the ground on which it stands.

- Sakthisivakami S
III Year

## DID YOU KNOW?

- Construction of The Leaning Tower of Pisa started in 1173 and took nearly 200 years to complete due to interruptions caused by wars and engineering difficulties.
- The tower originally leaned to an unsafe angle of about 5.5° but modern stabilization techniques have reduced the tilt to about 3.97° and prevented further movement.
- Surprisingly, the same soft soil that caused the tilt also helped absorb seismic energy, protecting it during earthquakes.


(Source: Pexels - Leaning Tower of Pisa

1E

# WILL 3D PRINTERS REVOLUTIONIZE BUILDING CONSTRUCTION?

**INTRODUCTION**

The construction industry has always been slow to adopt radical technological change. For centuries, buildings have been constructed using repetitive methods involving manual masonry, concrete casting, carpentry and on-site labor coordination. Even modern innovations, such as prefabrication and high-performance materials, have only incrementally improved the way buildings are made rather than fundamentally transforming the process.

This resistance to rapid change stems from several factors, including the complexity of construction environments, stringent safety regulations, variations in local soil and climate conditions and the difficulty of automating work that traditionally requires skilled human judgment. Yet, despite this historical inertia, the global construction sector is now facing pressures that require new solutions. Rapid urbanization, chronic housing shortages, extreme climate events, rising labor costs and the global demand for more sustainable building practices have created a scenario where innovation is no longer optional but necessary.

Within this context, 3D printing has emerged not simply as a new tool but as a potentially revolutionary method of construction. Unlike conventional methods, which rely on subtractive or assembly-based processes, 3D printing constructs buildings additively, depositing material layer by layer according to a digital model. This technology transforms buildings from being manually shaped physical objects into digitally driven products that can be manufactured with automated precision.

What began as small laboratory experiments with cementitious materials has evolved into full-scale projects, with 3D-printed houses, schools, bridges, infrastructure components and even multi-storey prototypes being constructed across different countries. Each successful project strengthens the possibility that 3D printing may become a mainstream construction method within the coming decades.

The idea of printing large buildings may seem futuristic, but several factors make this approach practical. The ability to rapidly form complex geometries, reduce material waste, lower labor dependence, minimize construction errors and increase structural efficiency aligns with the urgent challenges the industry faces today. Most importantly, 3D printing allows full integration between architectural design, structural analysis and fabrication, creating streamlined workflows that are almost impossible to achieve with traditional construction. As a result, engineers and architects are beginning to reconsider long-established assumptions about how buildings should be designed and constructed.

However, to determine whether 3D printers will truly revolutionize building construction, it is essential to deeply investigate how the technology functions, what benefits it provides, what limitations it faces and how far it has already progressed globally. Only by examining these dimensions comprehensively can we understand whether this technology represents a fundamental shift comparable to the introduction of structural steel or reinforced concrete, or whether it remains a promising but limited innovation.

*Source:https://www.cnn.com/style/article/3d-printed-house-scli-intl*

## HISTORY AND EVOLUTION OF 3D PRINTING IN CONSTRUCTION

Although 3D printing became popular in the 1980s through the work of Charles Hull and the development of stereolithography, its application in construction did not begin until the early 2000s. The first significant breakthrough was the Contour Crafting method developed by Professor Behrokh Khoshnevis at the University of Southern California, who envisioned automated construction systems capable of printing entire homes quickly and affordably. His concept was based on large gantry-type printers capable of extruding a cement-based material while following programmed toolpaths. This early research laid the foundation for future developments in construction-scale additive manufacturing.


*Source:https://www.reuters.com/technology/3d-printing-reaches-new-heights-with-two-story-home-2023-01-12/*

By the 2010s, technological advancements in robotics, material science and computer modelling allowed researchers and companies worldwide to explore construction printing in more depth. In Europe, companies like COBOD and WASP developed large printers capable of handling entire building footprints. In China, firms experimented with printing modular components that could be assembled on-site. Universities such as TU Eindhoven, ETH Zurich and MIT investigated printable mixes, structural behaviour and optimized design methods. These early efforts demonstrated that 3D printing could produce structurally stable walls, complex architectural forms and even bridges.

The 2020s saw rapid acceleration in practical applications. Multiple countries built habitable 3D-printed houses that complied with national building codes. Disaster relief agencies explored the technology for emergency shelters. Military organizations examined its potential for rapid deployment of bases and infrastructure. Governments in India, the United States, the Middle East and Europe began funding research and pilot projects. This evolution illustrates a clear trajectory: 3D printing has moved from theoretical possibility to real-world construction strategy within two decades.

## HOW 3D PRINTING WORKS

Construction-scale 3D printing begins with a digital model created in advanced design software. This model is converted into layers, each representing a horizontal slice of the building to be printed. A robot or gantry system extrudes material along this path, forming the shape of the structure layer by layer without formwork. The extruded material is usually a rheologically engineered cementitious mixture that maintains shape immediately after deposition while achieving early strength quickly.

As printing progresses, engineers must maintain tight control over parameters such as nozzle travel speed, extrusion pressure, mix viscosity and ambient temperature. The printer must deposit each layer before the previous one hardens completely to maintain strong interlayer bonding. The digital nature of the process ensures accuracy, meaning the printed element closely matches the design dimensions without manual corrections. Many printers incorporate real-time sensors to monitor moisture content, temperature and geometric deviations, allowing automated adjustments during printing.

The resulting structure typically forms the load-bearing walls or shells, while roofs, floors, windows, doors, plumbing and electrical systems are added manually after printing. Although some experimental systems explore automated placement of reinforcement or printing horizontal slabs, most current projects use a hybrid approach. Even so, the speed and precision with which printers can produce full walls and architectural forms mark a radical departure from conventional techniques.

## ADVANTAGES OF 3D PRINTED CONSTRUCTION

3D printing offers wide-ranging advantages that directly address the most significant challenges of modern construction. One of its most celebrated benefits is the immense speed at which buildings can be constructed. A project that may take weeks with traditional methods can often be completed in a day or two using additive manufacturing for walls and structural shells. This rapid productivity is essential for emergency housing, low-cost mass housing developments and projects in remote or hazardous environments where long construction timelines are impractical.

Another major advantage is cost efficiency. Printed structures use less material because they do not require formwork or excessive reinforcement in many cases. Automated precision eliminates waste from over-ordering or incorrect installation. Labor demand decreases significantly, reducing project costs even further. While initial investment in a large printer can be high, these costs are offset when printing multiple units or large developments.

Environmental sustainability is one of the strongest arguments for 3D printing. The construction industry is responsible for a large portion of global carbon emissions due to cement use, material waste and energy consumption. 3D printing reduces waste to near-zero levels and allows the use of low-carbon binders, recycled aggregates and earth-based mixes. Some experimental projects even use local soil as a primary printing material, reducing transportation emissions and promoting ecological construction practices

*Source: https://cobod.com/explore-designs-and-interiors-of-3d-printed-houses/*

Design freedom is another transformative advantage. Because the printer follows a digital path, geometric complexity no longer increases cost or time. Architects can create curved walls, vaulted ceilings, variable-thickness surfaces and biomimetic forms that enhance structural behaviour or environmental performance. Such forms would be prohibitively expensive or nearly impossible with conventional formwork.

Safety on construction sites also improves because fewer workers are exposed to hazardous activities such as heavy lifting, working at heights or handling dangerous tools. The automated nature of 3D printing reduces the likelihood of accidents and improves overall site conditions. Furthermore, printed walls often exhibit good thermal performance due to internal cavities that naturally insulate the structure. Combined with advanced shape design, printed buildings can achieve higher energy efficiency with less reliance on additional insulation materials.

**LIMITATIONS AND CHALLENGES**

Despite its potential, 3D printing faces significant limitations that prevent it from replacing conventional construction entirely at this stage. One of the primary challenges is structural performance. While printed walls perform well in compression, they often have weaknesses related to interlayer bonding, tensile capacity and reinforcement integration. Many structures still require manual installation of steel reinforcement, limiting full automation. Multi-storey printed structures require careful engineering to ensure structural continuity and compliance with building codes.

Another major limitation is the restricted range of printable materials. Most construction 3D printers rely on cement-based mixtures that must satisfy strict rheological requirements. These mixes often have higher cement content, raising concerns about carbon emissions. Although geopolymers and earth-based mixes show promise, they require further testing before widespread adoption.

Regulations and building codes represent another obstacle. Most countries lack standardized guidelines for 3D-printed structures, making permitting difficult. Without approved standards for structural performance, fire safety, durability, and seismic resistance, large-scale adoption remains constrained. Printer limitations also restrict building size. Gantry printers require large, flat working surfaces, making them unsuitable for sloped or irregular terrain. Robotic-arm printers have limited reach.

Mobile printers are still in early stages of development. These restrictions limit project flexibility. Skilled labor shortages exist not only in traditional construction but also in digital fabrication. Operating a construction printer requires knowledge of robotics, material science and computer modeling. While fewer workers are needed, they must be highly trained. This shift requires new educational programs, certifications and institutional support.

Weather sensitivity is another limitation. Printing cannot occur easily during heavy rain, strong winds or extreme temperatures because they affect curing, layer adhesion and material stability. While shelters and controlled environments mitigate these issues, they increase project cost. Electrical, plumbing, mechanical and finishing works still require manual labour. The printer mainly produces the structural shell; everything else remains conventional. Full automation across all building components is still far from reality.

## GLOBAL CASE STUDIES

Countries worldwide have demonstrated real-world applications of 3D printing. In the United States, companies have successfully built code-compliant homes in several states, with some being sold as residential properties. In India, organizations such as Tvasta built 3D-printed residential units and army dwellings, proving the technology's usefulness in rapid, cost-effective construction. In Mexico, entire printed communities have been developed to address housing shortages. In the Middle East, Dubai has built one of the world's largest 3D-printed buildings and aims to integrate printed components into major infrastructure by 2030. European nations have printed bridges, offices and public buildings that comply with stringent safety regulations. These projects demonstrate structural viability, public acceptance and economic feasibility.

## FUTURE POTENTIAL AND REVOLUTIONARY IMPACT

The true revolutionary potential of 3D printing lies not just in replicating existing buildings faster but in enabling entirely new forms of architecture, structural engineering and urban planning. As material science progresses, printable mixes may achieve higher strength, lower carbon emissions and better durability. Robotics will become more advanced, allowing printers to climb, self-stabilize or operate autonomously across difficult terrain. Integration with AI will allow printers to self-correct errors, adapt to environmental changes and optimize toolpaths in real time.

In the future, building components beyond walls—such as slabs, beams, reinforcement cages and façade systems—may be automated. Multi-material printing may allow simultaneous deposition of structural concrete, insulation layers, reinforcement fibers and even wiring channels. This would drastically reduce human involvement and dramatically increase construction speed and precision
.

Urban planning will also change. Cities may adopt modular printed units that can be assembled rapidly. Disaster-prone regions may stock portable printers ready for deployment after hurricanes, earthquakes or floods. Low-income housing can be mass-produced with standardization and customization balancing cost and dignity.

The largest potential revolution lies in sustainability. If printable materials evolve to include carbon-negative mixes, recycled materials or geopolymeric binders, 3D printing may become one of the cleanest methods of construction. This could transform the environmental footprint of the global building industry.

## CONCLUSION

3D printing in construction stands at a critical intersection of technological innovation, material science evolution, digital design and global demand for sustainable, affordable housing. The technology has already proven capable of producing durable, habitable buildings faster, cheaper and with greater design freedom than many conventional methods. However, it still faces limitations related to regulation, materials, structural performance, climate sensitivity and full automation.

The question of whether 3D printers will revolutionize building construction depends on how society addresses these challenges. If advancements continue at the current pace, with improvements in materials, robotics, standards and engineering methods, 3D printing could indeed become one of the most transformative construction technologies of the twenty-first century. It may not completely replace traditional methods, but it will likely become a mainstream solution for many building types—particularly housing, community infrastructure, emergency shelters and architecturally complex forms.

In sum, 3D printing has the potential not only to change how buildings are constructed but also to redefine the philosophy of construction itself. What once relied on manual labor and rigid formwork may soon depend on digital precision, automated fabrication and material efficiency. Whether this transformation becomes a revolution depends on how effectively the global construction industry embraces, adapts and regulates this remarkable technology.

- Arjun V G
III Year


(Source: Instagram - cobodinternational

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# LEARNING BEYOND THE CLASSROOM

As part of our Civil Engineering Department's commitment to connecting classroom learning with real-world experience, we, the third year students, went on a valuable industrial visit. This journey allowed us to see engineering in action and its real-world impact.

With the guidance of our dedicated faculty, Dr. D. Brindha and Dr. K. Malavan, our team had a great opportunity to explore four diverse and technical project sites. Their expert guidance and thoughtful explanations really improved our understanding of how civil engineering concepts apply in practice.


During the trip, we stayed at Udaya Ayurvedic Resort in Palakkad. It offered a
quiet space for us to regroup and prepare for each day's visits. This stay provided
a nice balance to our busy schedule.
Our itinerary included four remarkable engineering sites:

- a modern high-rise precast commercial building,
- a top-notch cancer treatment facility that was under construction,
- a large metro precast yard where U-girders are carefully produced
- an active metro foundation site showcasing deep excavation, reinforcement work, and precise concreting.

Each site gave us new insights into specific areas of civil engineering, covering topics like structural systems, construction sequencing, safety protocols, coordination, and quality management. The visit turned textbook theories into practical experiences, deepening our appreciation for the skill, innovation, and collaboration needed in modern infrastructure development.


*Precast commercial building (Coimbatore)*


*Tower crane operations supporting hospital construction*

*Slabs of precast commercial building*


*Basement works and RCC retaining wall in progress*

*Slabs of precast commercial building*


*Construction of the G+5 cancer hospital with deep beams and slabs*

*Precast panels being lifted and placed with the tower crane*

*Precast panels being lifted and placed with the tower crane*

*Precast panels being lifted and placed with the tower crane*

Our first stop was a G+4 high-rise commercial building in Coimbatore. This structure served as a model of speed, strength, and efficiency through precast concrete construction. The site buzzed with activity tower cranes turning, workers guiding panels, and supervisors carefully coordinating each lift.

The building rested on a mat foundation, 6m × 6m in plan and 1.5m deep, reinforced with 20mm diameter rebars. M40 grade concrete provided the necessary strength and durability. Shear walls resisted lateral loads, improving seismic performance.

To ensure precise dimensions and prevent shrinkage, Sika grout was mixed with water in a 1:2 ratio. An 18-ton capacity tower crane lied precast elements with precision, speeding up construction on while prioritizing safety.

Every element at this site showcased the efficiency of modular precast systems. The clean finishes, reduced need for formwork, and quicker turnaround times showed how design, production, and assembly could work together seamlessly. Watching this process unfold made us realize that precast construction isn't just a technique, it's choreography where each movement relies on another, and timing is essential for success.

The second site had a completely different feel: the Kumaran Cancer Centre, a G+5 cancer treatment hospital in Coimbatore, complete with a double basement and a dedicated floor for linear accelerator used for radiotherapy. Here, engineering met humanity. Every cubic meter of concrete served not only structural purposes but humanitarian ones, creating a safe and healing environment.

The project featured a 5-foot-thick reinforced concrete foundation, a 1.4m deep roof slab, and 2.4m deep main beams, ensuring exceptional strength and stability. Independent footings supported the superstructure, while an RCC retaining wall surrounded the basement to resist lateral earth pressure. Spanning a total built-up area of 215,000 sq.ft, with each floor covering 26,000 sq.ft, the structure stood on hard rock strata, providing a stable and secure base.

A 60m tower crane, with a 1.5-ton main capacity and 0.5-ton free-end capacity, aided vertical and horizontal material movement. A 20m³/hour batching plant onsite produced M25 and M30 grade concrete using OPC 43-grade cement. The use of aluminium formwork gave the surfaces a smooth, plaster-free finish. Integrated systems for oxygen pipelines, lifts and ramps showcased a thoughtful blend of engineering and healthcare design.

The project was led by Er. Balamurugan, DGM, who shared insights about building radiation-proof chambers. This process required meticulous attention to material density, alignment, and thickness. It became clear that civil engineering here was not just about load-bearing capacity but a life-bearing responsibility, ensuring protection, precision and purpose under one roof.

*Casting bed for M55 grade U-girders at the precast yard*


*Casting bed for M55 grade U-girders at the precast yard*

*Pre-tensioning and post-tensioning operations in progress*

Our third stop was the Precast Yard for Metro U-Girder Construction in Kochi. This extensive facility covered over 8 hectares and focused on fabricating colossal U-girders that carry metro trains across the city. The scale was awe-inspiring, with massive moulds, towering cranes and long curing beds stretching as far as we could see.

Each U-girder, about 200 meters long, was cast using M55 grade concrete, ensuring the strength and durability necessary for high-load metro viaducts. A 75mm concrete cover protected underground components from corrosion, with a curing period of 21 days to ensure full hydration and strength gain. Transporting these girders required specialized trailers, pullers, and rail systems to manage their massive dimensions and weight safely.

We observed both pre-tensioning and post-tensioning techniques in action. In pre-tensioning, steel tendons were stressed before concrete casting, and the release of tension after curing induced compressive stresses that enhanced load capacity and minimized cracking. Post-tensioning, used for pier caps, involved tensioning tendons placed in ducts after curing and grouting them to ensure corrosion protection and efficient load transfer.

Key professionals such as Er. Surya (Environmental Engineer), Er. Maxwell (Safety Engineer), and Er. Arun (Deputy General Manager) led us through the procedures, emphasizing quality control, safety, and sustainability. Standing amid such monumental engineering, we felt a deep admiration on for the unseen complexity behind every metro line—the precision, patience and the passion it demands.

*Reinforcement cages prepared for 2m diameter piles*

*Reinforcement cages prepared for 2m diameter piles*

*Pile head cutting and pile cap preparation at the foundation site*

Our last site was an active foundation construction area for Kochi Metro Phase 2, located in Seismic Zone III. The site was alive with the deep rumble of machinery. Here, the foundation was truly the foundation of success.

2m diameter bored cast-in-situ piles extended 22 to 28 meters underground, based on load requirements. Groundwater intrusion was constant, requiring ongoing dewatering throughout the process.

All reinforcement and concreting adhered to IS code standards to maintain quality. The piles were constructed meticulously from boring and reinforcement cage placement to pile head cutting and pile cap casting.

Er. S. S. Das, Construction Manager, explained the sequence of operations and discussed topics such as rebar couplers, pile load transfer and the placement of precast girders brought from the nearby yard. His insights offered a clear understanding of the geotechnical challenges that accompany metro construction.

Watching this phase of construction was humbling. As our industrial visit concluded, it became clear that civil engineering is not limited to classrooms or drawings. It lives and breathes in the dust, sweat and determination of people who bring blueprints to life.

We saw how modern construction combines technology, sustainability and teamwork. From modular precast systems, to safe hospital designs, to metro foundations rooted deep in safety, every site taught us that knowledge becomes wisdom through experience.

This visit offered a new perspective to see not only the materials but the meaning behind them. It deepened our appreciation for precision, safety and sustainability. It demonstrated that every project, big or small, is ultimately built by hands driven by purpose and hearts filled with pride.

When we returned from the visit, we realized that what we had witnessed was too valuable to keep to ourselves. These weren't just construction sites. They were lessons in action. Watching cranes lift tons of precast elements, engineers measure alignments to the millimetre and workers ensure perfect curing reminded us that civil engineering isn't just a job. It's a commitment to creation.

What inspired us most was how each project reflected a unique aspect of our field innovation, compassion, sustainability, and precision. Observing how challenges were met with creativity made us eager to capture and share the experience not merely as a report, but as a story that speaks to what it truly means to be a civil engineer.

This visit changed how we view the future. It taught us that our field is about more than structures; it's about people, progress, and purpose. Writing this reflection allowed us to express that realization to show that every pile, every beam, every block carries a story of human effort, resilience and aspiration.

In the end, engineering doesn't start with site surveys; it starts with stories. Every structure we build becomes one.

- Padma Dharshini A R & Rama W K
III Year

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# STAFF ACHIEVEMENTS (2025-2026)

**Dr. S. Arul Mary**
Professor and Head

- Delivered guest lecture on Composite Columns and Beam Columns on 19 th Sep 2025 in the Short Term Training Programme on Design of Construction of steel concrete composite structures during 15 th Sep 2025 to 26 th Sep 2025
- Attended a GIAN course on A Gian Course on Behaviour and Design of Cold-Formed Steel Structures during 20th - 30th June 2025, organised by the Department of Civil, Indian Institute of Technology, Hyderabad.

**Dr. D. Brindha**
Professor

- Coordinated a 3 day webinar on “Revolution of Nano Materials in Construction Industry”
- Published a paper titled “Performance Evaluation of Geopolymer Paver Blocks: A Review of Recent Advances” in International Review of Applied Sciences and Engineering Journal
- Published a paper titled “Sustainable Reactive Powder Concrete incorporating Industrial Waste: Mechanical and Durability Assessment under variable curing regimes” in Global Nest Journal
- Published a paper titled “Enhancing Bond Strength and Impact Resistance in Ultra-high Performance Geopolymer Concrete using Copper Slag and Steel Fibres” in E3S Web of Conferences
- Published a book chapter titled “Influence of Binders and Alkali Activated Solutions on the Residual Properties of Geopolymer Mortars Exposed to Elevated Temperatures” in a Springer-edited volume on Sustainable Economy and Ecotechnology.

**Dr. R. Ponnudurai**
Associate Professor

- Contributed as a resource person to the National Engineering College, Kovilpatti and gave a guest lecture on "Seismic Risk Mitigation by the Capacity Building".

**Dr. S. Chandran**
Professor

- Coordinated a three-day intensive faculty development course on "Revit Fundamentals + Advanced Workflows"

**Dr. R. Indrajith Krishnan**
Assistant Professor

- Published a journal on "Electrochemical Assessment of Rebar Corrosion Resistance in Geopolymer Concrete Incorporating Ground Granulated Blast Furnace Slag and Rice Husk Ash"
- Delivered a lecture on "Beamline Brilliance: Designing Beams and slabs with Confidence Simplify complex concepts with IS code-driven techniques for efficient and safe structures" at Thiagarajar College of Engineering

**Dr. R. Sanjay Kumar**
Associate Professor

- Co-authored a research paper titled "Strength Characteristics Evaluation of Partially Replaced Waste Copper Slag in High Strength Concrete" published in the journal Advances in Mechanics.
- Designated as Associate Dean (Infrastructure)

**Dr. D. Rajkumar**
Assistant Professor

- Delivered a guest lecture titled "The Sound of Sustainability – UPV Testing for RCC Buildings" during the online FDP on "Sustainability-Driven NDT Approaches for Resilient and Sustainable Infrastructure", organized by Coimbatore Institute of Engineering and Technology.
- Delivered a guest lecture on "Precision Without Damage: Exploring NDT Methods" at SRM Madurai College for Engineering and Technology, Madurai.
- Organized a Tata Tiscon–sponsored two-day workshop titled "Optimized Reinforced Concrete Design for Tata Tiscon: Enhancing Structural Resilience", held by the Department of Civil Engineering, Thiagarajar College of Engineering

**Dr. R. K. C. Jeykumar**
Assistant Professor

- Published three papers in the journal Advances in Mechanics, Volume 13, Issue 01, titled:
  - "Micro Stabilization Study of Domestic Kitchen Waste Using Red Wrigglers and African Night Crawlers"
  - "Strength Characteristics Evaluation of Partially Replaced Waste Copper Slag in High Strength Concrete"
  - "Crab Shell Waste: Examining Characteristics for Partial Replacement in Cement and Review in Structural and Non-Structural Members"

**Ms. M. Aruna**
Assistant Professor

- Completed one one-year course on Felder and Brent "Teaching and Learning" by IUCEE
- Published a book chapter titled "Designing a Cost-Effective Net Zero Energy Building" in a Springer-edited volume on Sustainable Economy and Ecotechnology.
- Mentored two batches for the National Tech Day Hackathon held at TCE, Madurai

**Ms. J. Eunice**
Assistant Professor

- Coordinated a two-day Student Bootcamp on Autodesk Revit for Civil & Architecture students on 11–12 October 2025.

**Ms. R. Abinaya Rajakumari**
Assistant Professor

- served as a Resource Person in the Training Programme for Newly Recruited Overseers and Draughtsmen, jointly organized by Madurai City Corporation and Anna University, Chennai,

**Dr. G. Angelin Lincy**
Assistant Professor

- Coordinated a 3 day webinar on "Revolution of Nano Materials in Construction Industry"
- Coordinated a three-day intensive faculty development course on "Revit Fundamentals + Advanced Workflows"

**Dr. V. Ganga**
Assistant Professor

- Successfully completed the GIAN course on "Analysis and Design of Precast Building Systems", held at IIT Hyderabad from 15th to 23rd December.
- Received sanction for a research project titled "Performance Evaluation of Square Light Gauge Steel Concrete-Filled Tubular Columns with Hybrid Internal Confinement" under TCE Seed Money Scheme 2025–26, with a grant of Rs. 40,000/- for a 24-month duration.
- Awarded a Reviewer Certificate by Springer Nature for reviewing 6 manuscripts in 2025 for Scientific Reports.
- Successfully completed a NPTEL course on "Advanced Reinforced Concrete Design".

**Dr. K. Malavan**
Assistant Professor

- Successfully completed a 12-week NPTEL course with Elite + Silver certification
- Received sanction for a research project titled "Feasibility study on utilization of plastic waste in construction" under TCE Seed Money Scheme 2025–26, with a grant of Rs. 48,000/- for a 6-month duration.
- Designated as Associate Dean (Infrastructure)

**Dr. M. Kalpana**
Professor -Research Faculty

- Delivered a lecture on "Civil Engineering for a Carbon-Neutral Built Environment" as part of the programme "Sustainable Practices and Emerging Trends in Civil Engineering".
- Received sanction for a research project titled "Small Scale Pyrolysis of Sewage Sludge for Bio-application in Agriculture and Wastewater Treatment," under TCE Seed Money Scheme 2025–26, with a grant of Rs. 50,000/- for a 18-month duration.

**Dr. P. Manikandan**
Professor -Research Faculty

- Delivered a lecture on "Emerging Trends and Technological Innovations Shaping the Future of Civil Engineering" at Saveetha College of Engineering.
- Presented a paper titled "Seismic Analysis of Multistorey Building with Shear Walls using ETABS Software" at the 4th International Conference & Exposition on Materials, Manufacturing and Modelling Techniques, published in EDP Sciences – Web of Conferences (2025), indexed in Scopus.
- Received sanction for a research project titled "Carbon Sequestration and Sustainable Construction through Biochar Production from Invasive Biomass in a Pyrolytic Chamber" under TCE Seed Money Scheme 2025-26, with a grant of Rs. 50,000/- for a 12-month duration.
- Papers Published:
  - "Performance Evaluation of Concrete Incorporating Sustainable Ground Granulated Blast Furnace Slag and Fly Ash-based Recycled Aggregates", Emergent Materials, Springer-Verlag, 2025 (Quartile: Q2, Impact Factor: 4.10).
  - "Effect of Various Nano Materials in Enhancing the Strength, Microstructural, Mineralogical and Durability Properties of Geopolymer Binder – A Comprehensive Review", Composite Interfaces, Taylor & Francis, 2025 (Quartile: Q2, Impact Factor: 2.40).
  - "Sustainable Mortar Design: Optimizing Performance with Bamboo Fiber and Coal Bottom Ash using Taguchi and ANN", Emergent Materials, Springer-Verlag, 2025 (Quartile: Q2, Impact Factor: 4.10).
- Recognized for his outstanding contribution as a Session Chair at the 2nd International Conference on Innovative, Sustainable Materials and Technologies (ICISMT-2025), organized by the Department of Civil Engineering, Aditya University.

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# WELCOMING OUR NEW FACULTY MEMBERS

We are pleased to welcome the new members of our faculty team, whose diverse backgrounds and experiences will contribute meaningfully to the department's academic environment.

## *2024-25*

**Ms. R. Abinaya Rajakumari**
Assistant Professor

Ms. R. Abinaya Rajakumari completed her Bachelor's degree in Civil Engineering from Kalasalingam University in 2012 and her Master's degree in Geomatics from the CEG Campus, Anna University, in 2014. She has served as an Assistant Professor at SNS College of Engineering and NPR College of Engineering, gaining teaching experience in civil engineering–related domains. She brings her academic background in geomatics and prior teaching experience to her role as an Assistant Professor.

**Dr. G. Angelin Lincy**
Assistant Professor

Dr. G. Angelin Lincy completed her Bachelor's degree in Civil Engineering from Kamaraj College of Engineering and Technology, Virudhunagar, in 2013 and her Master's degree in Structural Engineering from PSNA College of Engineering and Technology, Dindigul, in 2015. She was awarded her Ph.D. in Civil Engineering from Anna University, Chennai, in 2023. She has served as an Assistant Professor at SRM Madurai College for Engineering and Technology and NPR College of Engineering and Technology, and has also been associated with research as a Research Scholar. She currently serves as an Assistant Professor, bringing experience in both teaching and research in the field of civil engineering.

## 2025-26

**Mrs. J.M. Sivapriya**
Assistant Professor

Mrs. J. M. Sivapriya completed her Bachelor's degree in Civil Engineering from Bannari Amman Institute of Technology in 2015 and her Master's degree in Soil Mechanics and Foundation Engineering from the College of Engineering, Guindy, in 2017. She joined the institution in June 2025 as an Assistant Professor and brings a strong academic background in geotechnical engineering.

**Dr. V. Ganga**
Assistant Professor

Dr. V. Ganga completed her Bachelor's degree in Civil Engineering from Annamalai University in 2002, Master's degree in Structural Engineering from Anna University in 2013 and Ph.D. in Structural Engineering from SRM Institute of Science and Technology in 2024. With over two decades of academic and research experience, she has served in various teaching and research roles across engineering institutions, including as a Research Intern at CSIR–SERC, Chennai and as a Research Scholar at SRM Institute of Science and Technology. She has also served as an Assistant Professor at SRM TRP Engineering College, JJ College of Engineering and SRM Madurai College for Engineering and Technology. She joined the institution as an Assistant Professor in June 2025.

**Dr. K. Malavan**
Assistant Professor

Dr. K. Malavan holds a Diploma in Engineering from Shanmugha Polytechnic College, Thanjavur (2012), followed by a Bachelor's degree from the Government College of Engineering, Tirunelveli (2015), and a Master's degree in Structural Engineering from Kumaraguru College of Technology, Coimbatore (2017). He was awarded his Ph.D. in Civil Engineering with specialization in Masonry Structures under static and dynamic loading, by Coimbatore Institute of Technology, Coimbatore, in January 2025. He previously served as an Assistant Professor at Sree Dattha Institute of Engineering and brings academic and research experience to his role as an Assistant Professor.

**Dr. M. Kalpana**
Professor -Research Faculty

Dr. M. Kalpana completed her Bachelor’s degree in Civil Engineering from VLB Janakiammal College of Engineering and Technology in 2002 and her Master’s degree in Quality Engineering and Management from the CEG Campus, Anna University, in 2011. She was awarded her Ph.D. in Wastewater Treatment, from Anna University in 2025. She has served in academic roles including Assistant Professor and Associate Professor at institutions such as Saveetha Engineering College and Sri Muthukumaran Institute of Technology. She joins the institution as Professor (Research Faculty), bringing extensive experience in teaching, research and academic leadership.

**Dr. P. Manikandan**
Assistant Professor-Research Faculty

Dr. P. Manikandan completed his Bachelor’s degree in Civil Engineering from the Government College of Technology, Coimbatore, in 2012 and his Master’s degree in Structural Engineering from Vellore Institute of Technology, Vellore, in 2014. He was awarded his Ph.D. in Structural Engineering from Vellore Institute of Technology, Chennai, in 2023. He has served as an Assistant Professor at institutions including Vellore Institute of Technology, Sree Vidyanikethan Engineering College and M. Kumarasamy College of Engineering and has also worked as a Project Assistant at the Tower Testing Research Station, CSIR–SERC, Chennai. He joined the institution in June 2025 as Professor (Research Faculty), bringing experience in structural engineering teaching and research.

As the department continues to evolve, the presence of our new faculty members marks an important step in advancing academic quality and professional engagement. Their diverse expertise and academic journeys add depth to the department’s teaching and research culture. Through their guidance and involvement, they will contribute to nurturing technical competence, innovation and professional values among students. Their commitment will play a meaningful role in fostering a stimulating learning environment and supporting the department’s long-term vision. We wish them a rewarding and successful association with the Department of Civil Engineering.

# STUDENT ACHIEVEMENTS

**MUTHU MAYAKANNAN K**
**(II YEAR)**

FINALIST OF SMART INDIA HACKATHON 2025

**RASIKA RANJANI P**
**(II YEAR)**

FINALIST OF SMART INDIA HACKATHON 2025


**THARUN KUMAR V K**
**(II YEAR)**

FINALIST OF SMART INDIA HACKATHON 2025

**VINISHA SRI K**
**(II YEAR)**

FINALIST OF SMART INDIA HACKATHON 2025

**DESHNAA C**
**(II YEAR)**

WON FIRST PLACE IN BADMINTON AT THE ANNA UNIVERSITY ZONE 16 TOURNAMENT

**PADMA DHARSHINI A R**
**(III YEAR)**

SECURED FIRST PLACE IN SHUTTLE BADMINTON AT THE ANNA UNIVERSITY ZONAL TOURNAMENT


**MEENU MACHARI R**
**(III YEAR)**

WON FIRST PLACE IN BADMINTON AT THE ANNA UNIVERSITY ZONE 16 TOURNAMENT

**ARI SIVA PRIYA S**
**(III YEAR)**

- FIRST PLACE – BID TO BUILD; THIRD PLACE – BUILD SMART, MOMENTS '25, NIT TRICHY;
- FIRST PLACE – BID 2 BUILD; SECOND PLACE – BRAIN BYTE, BUILD OUR BHARAT 2047, CHENNAI INSTITUTE OF TECHNOLOGY (CIT).
- THIRD PLACE – MODEL MANIA, BUILD OUR BHARAT 2047, CHENNAI INSTITUTE OF TECHNOLOGY (CIT).

**KARTHIKAA M**
**(III YEAR)**

FINALIST IN THE SMART INDIA HACKATHON 2025 AND WINNER OF FIRST PRIZE IN BUILD SMART, CONDUCTED BY NIT TRICHY

**KAROLIN R K**
**(III YEAR)**

SECURED FIRST PRIZE IN PAPER PRESENTATION AND THIRD PRIZE IN TECHNICAL PRESENTATION AT NIT TRICHY

**AKASH KUMAN A**
**(III YEAR)**

WON FIRST PRIZE IN PAPER PRESENTATION AND THIRD PRIZE IN TECHNICAL PRESENTATION AND AUTOCAD, CONDUCTED BY NIT TRICHY

**JOHN MOSES S P**
**(III YEAR)**

SECURED SECOND PLACE IN MODELMANIA AND THIRD PLACE IN CONNEXT, RESPECTIVELY, AT BUILT OUR BHARAT 2047

**VENU SRINIVASS P**
**(III YEAR)**

SECURED SECOND PLACE IN MODEL MANIA (BIM MODEL EVENT) AND THIRD PLACE IN CONNEXT (TECHNICAL QUIZ) AT THE BUILD YOUR BHARAT 2047 EVENT, HOSTED BY CHENNAI INSTITUTE OF TECHNOLOGY (CIT)

**AMIRTHU RIKAA S**
**(III YEAR)**

FINALIST IN THE SMART INDIA HACKATHON 2025 AND WINNER OF FIRST PRIZE IN BUILD SMART, CONDUCTED BY NIT TRICHY

**JISHNU DEV U K**
**(III YEAR)**

SECURED THIRD PLACE IN THE MIME EVENT AT YUKTHI’25, CONDUCTED BY THIAGARAJAR SCHOOL OF MANAGEMENT

**AGALYA S**
**(III YEAR)**

SECURED THIRD POSITION IN ANNA UNIVERSITY INTER ZONAL TOURNAMENT (KHO-KHO) HELD AT KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY, TRICHY

**HARISH KARTHICK H**
**(III YEAR)**

SECURED FIRST POSITION IN ANNA UNIVERSITY ZONAL TOURNAMENT (BASKETBALL) HELD AT SYED AMMAL ENGINEERING COLLEGE - RAMANATHAPURAM

**SHRI VARSHINI V**
**(III YEAR)**

RUNNER IN ANNA UNIVERSITY ZONE 16 BASKETBALL TOURNAMENT HELD AT ALAGAPPA CHETTIAR GOVERNMENT COLLEGE OF ENGINEERING, KARAIKUDI

**PRASANNA KUMAR M**
**(IV YEAR)**

SECURED THIRD PLACE IN THE MIME EVENT AT THIAGARAJAR SCHOOL OF MANAGEMENT AND THIRD PLACE IN THE MONO ACT EVENT AT NIT TRICHY

**SOWBARNIKA A**
**(IV YEAR)**

SECURED THIRD PRIZE IN GIRLS' DOUBLES AT THE CM TROPHY TABLE TENNIS TOURNAMENT HELD AT RACE COURSE, MADURAI

**HARSHITHA VISHAALAAKSHI**
**(IV YEAR)**

SECURED FIRST PRIZE AS PART OF A FOUR-MEMBER TEAM IN THE "BUILD THE FUTURE BIM CONTEST" ORGANIZED BY L&T EDUTECH IN COLLABORATION WITH AUTODESK, WITH A CASH PRIZE OF Rs. 25,000.

**SRI NANDHINIE M**
**(IV YEAR)**

SECURED FIRST PRIZE AS PART OF A FOUR-MEMBER TEAM IN THE "BUILD THE FUTURE BIM CONTEST" ORGANIZED BY L&T EDUTECH IN COLLABORATION WITH AUTODESK, WITH A CASH PRIZE OF Rs. 25,000.

**SREE SUNDARA RAGHAVI**
**(IV YEAR)**

SECURED FIRST PRIZE AS PART OF A FOUR-MEMBER TEAM IN THE "BUILD THE FUTURE BIM CONTEST" ORGANIZED BY L&T EDUTECH IN COLLABORATION WITH AUTODESK, WITH A CASH PRIZE OF Rs. 25,000.

**SUBARNA P**
**(IV YEAR)**

SECURED FIRST PRIZE AS PART OF A FOUR-MEMBER TEAM IN THE "BUILD THE FUTURE BIM CONTEST" ORGANIZED BY L&T EDUTECH IN COLLABORATION WITH AUTODESK, WITH A CASH PRIZE OF Rs. 25,000.

**ARAVIND BABU G S**
**(M.E. STRUCTURAL ENGINEERING- II YEAR)**

SUCCESSFULLY COMPLETED THE GIAN COURSE ON "BEHAVIOUR AND DESIGN OF COLD-FORMED STEEL STRUCTURES" ORGANIZED BY IIT HYDERABAD AND EARNED 2 CREDITS WITH TOP GRADES.

**ARUNA H**
**(M.E. STRUCTURAL ENGINEERING- II YEAR)**

SUCCESSFULLY COMPLETED THE GIAN COURSE ON "BEHAVIOUR AND DESIGN OF COLD-FORMED STEEL STRUCTURES" ORGANIZED BY IIT HYDERABAD AND EARNED 2 CREDITS WITH TOP GRADES.

**MINI PREM P**
**(M.E. STRUCTURAL ENGINEERING- II YEAR)**

SUCCESSFULLY COMPLETED THE GIAN COURSE ON "BEHAVIOUR AND DESIGN OF COLD-FORMED STEEL STRUCTURES" ORGANIZED BY IIT HYDERABAD AND EARNED 2 CREDITS WITH TOP GRADES.

**RAJA DEVA ARUL D**
**(M.E. STRUCTURAL ENGINEERING- II YEAR)**

SUCCESSFULLY COMPLETED THE GIAN COURSE ON "BEHAVIOUR AND DESIGN OF COLD-FORMED STEEL STRUCTURES" ORGANIZED BY IIT HYDERABAD AND EARNED 2 CREDITS WITH TOP GRADES.

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# STUDENT DIGNITARIES

**PRASANNA KUMAR M**
**(IV YEAR)**

GENERAL SECRETARY OF MORPHEUS - THE DRAMATICS CLUB

**SOWBARNIKA A**
**(IV YEAR)**

VICE CAPTAIN OF THE TABLE TENNIS TEAM

**DHANUSH PRAKAASH**
**(IV YEAR)**

VICE CAPTAIN OF THE CHESS TEAM

**GOMATHY**
**(IV YEAR)**

RESEARCH AND PUBLICATION ARCHITECT IN IUCEE-EWB TCE STUDENT CHAPTER

**DHARSHINI**
**(IV YEAR)**

SERVICE PROJECT CHAIR OF ROTARY CLUB

**JUSLIN RAFENA**
**(IV YEAR)**

GENERAL SECRETARY OF TCE CODERS CLUB

**SIVARANJANI S**
**(IV YEAR)**

VICE PRESIDENT OF IUCEE-EWB TCE STUDENT CHAPTER

**AMIRTHU RIKAA S**
**(III YEAR)**

BRAND AMBASSADOR OF THE DEPARTMENT IN STUDENT COUNCIL

**PADMADHARSHINI A R**
**(III YEAR)**

SPARK REPRESENTATIVE (SRC)

**HARI VARSHINI V N**
**(III YEAR)**

OVERALL JOINT TREASURER IN SHRISHTI CULTURAL ASSSOCIATION ,
CLUB COORDINATOR IN ELITZ ENGLISH SOCIETY,
JOINT TREASURER IN INNOV - CHEM

**SONAKSHI N**
**(III YEAR)**

DEPARTMENT COORDINATOR IN ALUMINI STUDENT COUNCIL

**KARTHIKAA K**
**(III YEAR)**

COMPANY QUARTER MASTER SERGEANT (SENIOR WINGS) IN NCC

**YASWANT SANKAR M**
**(III YEAR)**

COMPANY QUARTER MASTER SERGEANT ( SENIOR DIVISION) IN NCC

**MONISHA M**
**(III YEAR)**

SERGEANT IN NCC

**SHAHANA M**
**(III YEAR)**

CORPORAL IN NCC

**RENISHA MARY J S**
**(III YEAR)**

LANCE CORPORAL IN NCC

**SAKTHI G**
**(III YEAR)**

LANCE CORPORAL IN NCC

**KANI BIRUNDHA P**
**(III YEAR)**

LANCE CORPORAL IN NCC

**MUTHUGOPIHAA M**
**(III YEAR)**

LANCE CORPORAL IN NCC

**RESHMA S**
**(III YEAR)**

CADET IN NCC

**REGU A.S**
**(III YEAR)**

OFFICE BEARER (SOCIAL MEDIA TEAM) IN YOUTH RED CROSS

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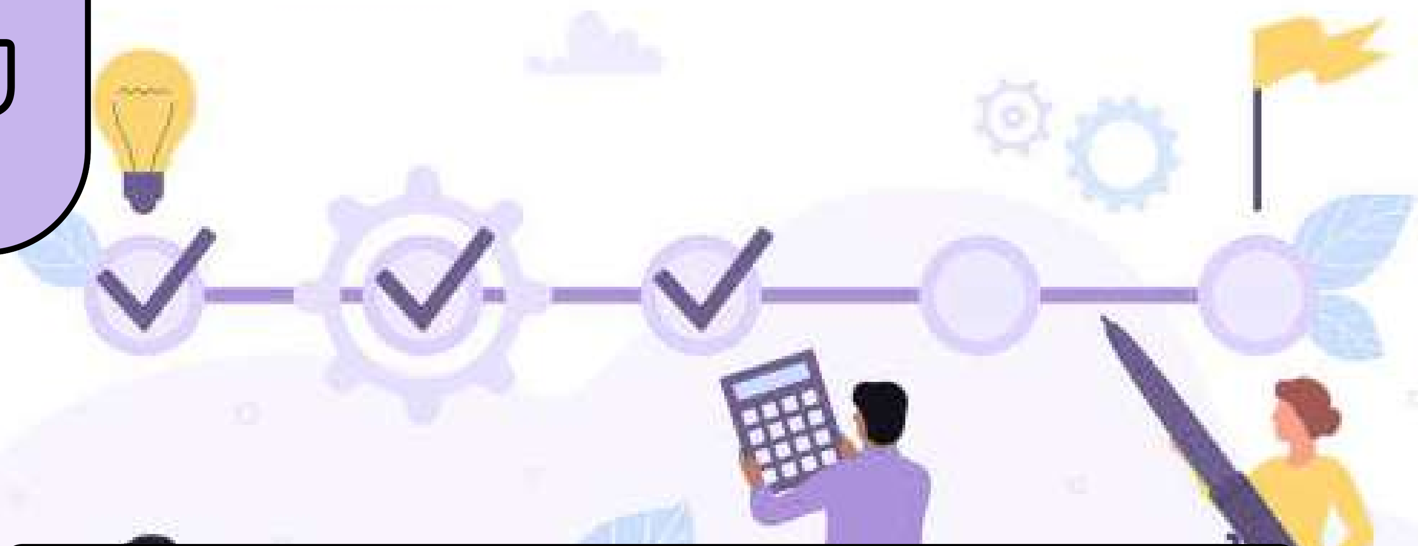


# DEPARTMENT HIGHLIGHTS & MILESTONES

**Centre of Excellence for Civil Infrastructure:**

The Department of Civil Engineering continues to make significant progress through its Centre of Excellence (CoE) for Civil Infrastructure, reaffirming its commitment to innovation, industry collaboration, and student skill development. The initiatives undertaken this semester reflect our focus on bridging academic learning with real-world engineering applications.

**Student Achievements:**

Two final-year students, A. Princy Benita and B. Shrinithi, have brought pride to the department by securing prestigious project internships at MIDAS Research and Development Centre India Pvt. Ltd., Chennai.

- Selected based on outstanding performance during a two-week virtual internship
- Internship completed during their third-year vacation
- Offered a monthly stipend of ₹15,000

Their achievement highlights the department’s emphasis on industry-oriented learning and excellence.

**Skill Development Initiatives:**

To strengthen students’ technical competence and industry readiness, the department organized the following initiatives in collaboration with MIDAS Research and Development India Pvt. Ltd.:

- A one-credit course providing hands-on training in MIDAS software, delivered by industry experts
- A two-week virtual internship, successfully conducted during the first and second weeks of December 2025

## Upcoming Programme:

- A two-credit course on "Structural Design of Bridges" will be offered to current VI semester students
- The course will be handled by our distinguished alumnus Er. Vadivel Raja, an expert in bridge design using MIDAS software

## Industrial Support Courses:

To further strengthen industry–academia integration, the department is set to introduce the following specialized courses in upcoming semesters:

- 22CE1R0 – Artificial Intelligence in Civil Engineering
- 22CE1S0 – Structural Software Applications in Bridge Design
- 22CE1T0 – Groundwater Flow and Transport Modelling

These courses aim to equip students with advanced, industry-relevant skills.

## Departmental Contributions to Community Projects:

The department takes pride in its active contribution to the Detailed Project Report (DPR) for the Climate Smart Markets Project at Mattuthavani, Madurai. The DPR preparation involved multiple interdisciplinary verticals, including:

- Building Structure & Engineering
- Air & Noise Pollution
- Water, Sanitation & Carbon Footprint
- Storm Water Management & Rainwater Harvesting (RWH)

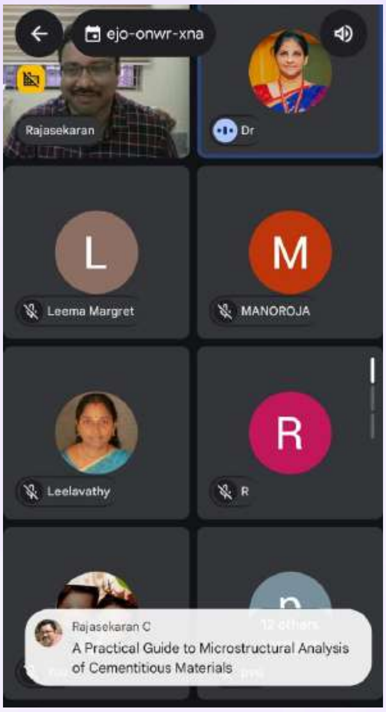
This project demonstrates the department's role in addressing real-world societal and environmental challenges.

## The TEN Summit:

The TEN Summit – TRIVENI 2025 was held on 19th and 20th December 2025. Alumni from across the globe participated in the event, showcasing their entrepreneurial competence through an Expo organized at the open auditorium. The Expo featured 90 exhibits arranged across various stalls, including a dedicated stall by the Department of Civil Engineering. Third- and final-year students actively took part in the event, gaining valuable exposure to entrepreneurship, innovation, and alumni engagement.

## Faculty Development Programs:

The Department of Civil Engineering in association with the Centre for Continuing Education, organized a three-day webinar titled "**Revolution of Nano Materials in Construction Industry**" from 08.12.2025 to 10.12.2025, held daily from 1.45 pm to 5.00 pm. The webinar focused on the transformative role of nanotechnology in modern construction. The programme featured eminent resource persons from leading institutions, including Annamalai University, NITK Surathkal, Government College of Technology Coimbatore, Coimbatore Institute of Technology and Ramco Institute of Technology. The event was coordinated by **Dr. D. Brindha and Dr. G. Angelin Lincy**, with participation from faculty members, research scholars, alumni and civil engineering professionals. E-certificates were provided to all participants.




## Faculty Development Programs:

A three-day intensive faculty development course on "**Revit Fundamentals + Advanced Workflows**" was conducted for B.Arch and B.E. Civil Engineering faculty members. The programme was coordinated by **Dr. S. Chandran and Dr. G. Angelin Lincy** and was designed to provide comprehensive training in Revit, covering both fundamental concepts and advanced workflows. The course focused on strengthening modeling fundamentals, exploring conceptual massing and parametric family creation, and integrating site tools, structural coordination, and advanced documentation practices.

## Student Bootcamp:

A two-day Student Bootcamp on **Autodesk Revit** (Civil & Architecture) was conducted on 11th and 12th October 2025, coordinated by Ms. J. Eunice, for B.E. Civil Engineering students. The programme was jointly organized by Anna University–CUIC in collaboration with Autodesk, executed by USAM CADSoft and hosted by the Department of Civil Engineering, Thiagarajar College of Engineering. The bootcamp offered hands-on training in Autodesk Revit, enabling students to enhance their design capabilities and innovation skills through practical exposure to industry-relevant tools.

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# PLACEMENT RECORD

| S.NO | REG NO | NAME OF THE STUDENT | NAME OF THE COMPANY |
|---|---|---|---|
| 1 | 22B038 | JAYAPRAKASH M | SOBHA CONSTRUCTIONS |
| 2 | 22B039 | JAYASHREELAVANYA S | SOBHA CONSTRUCTIONS |
| 3 | 22B065 | NAVEENRAJ R | SOBHA CONSTRUCTIONS |
| 4 | 22B088 | SHYAM SUNDAR S | SOBHA CONSTRUCTIONS |
| 5 | 22B109 | VAISHNAVI S | SOBHA CONSTRUCTIONS |
| 6 | 22B116 | VISHAL R | SOBHA CONSTRUCTIONS |
| 7 | 22B133 | YOGESVAR R S | SOBHA CONSTRUCTIONS |
| 8 | 22B004 | AISHWARYA R | VA TECH WABAG |

# PLACEMENT RECORD

| S.NO | REG NO | NAME OF THE STUDENT | NAME OF THE COMPANY |
|---|---|---|---|
| 9 | 22B011 | ASIMITHAA K | VA TECH WABAG |
| 10 | 22B040 | JEEVA KARUNYA V | VA TECH WABAG |
| 11 | 22B046 | KAYALVIZHI B | VA TECH WABAG |
| 12 | 22B084 | SANJAY G | VA TECH WABAG |
| 13 | 22B085 | SANJAY BALA S | VA TECH WABAG |
| 14 | 22B093 | SIVARANJANI S | VA TECH WABAG |
| 15 | 22B061 | MURALI M | PINNACLE INFOTECH |
| 16 | 22B098 | SRINIDHI R | PINNACLE INFOTECH |
| 17 | 22B111 | VANISRI E | PINNACLE INFOTECH |
| 18 | 22B041 | JUSLIN RAFENA | COMCAST |
| 19 | 22B013 | BHARATHI V | TRIMBLE |

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# CEA OFFICE BEARERS 2025-2026

| S.NO | NAME | DESIGNATION |
|---|---|---|
| 1 | NAVEENRAJ R | GENERAL SECRETARY |
| 2 | NANDHANA B | GENERAL SECRETARY |
| 3 | KAYALVIZHI B | GENERAL TREASURER |
| 4 | SIVARANJANI S | GENERAL TREASURER |
| 5 | DINESHKUMAR M | GENERAL COORDINATOR- EVENT |
| 6 | PRASANNA KUMAR M | GENERAL COORDINATOR- EVENT |
| 7 | SIVA BALAN S | GENERAL COORDINATOR- EVENT |
| 8 | ASIMITHAA K | GENERAL COORDINATOR- EVENT |
| 9 | SUBA AKSHATHA BANU V | GENERAL COORDINATOR- EVENT |
| 10 | SUGITHA A | GENERAL COORDINATOR- EVENT |

# CEA OFFICE BEARERS 2025-2026

| S.NO | NAME | DESIGNATION |
|---|---|---|
| 11 | JAYASHREELAVANYA S | GENERAL COORDINATOR- CLUB ACTIVITIES |
| 12 | SRINIDHI R | GENERAL COORDINATOR- CLUB ACTIVITIES |
| 13 | TANISH MILIND SALUNKHE | GENERAL COORDINATOR- DISCIPLINE |
| 14 | DEEPADHARSHINI G R | GENERAL COORDINATOR- DISCIPLINE |
| 15 | BHARATHI V | GENERAL COORDINATOR- MAGAZINE |
| 16 | JEEVA KARUNYA V | GENERAL COORDINATOR- MAGAZINE |
| 17 | MADHUSHRI R | GENERAL COORDINATOR- MAGAZINE |
| 18 | AJAY DEEPAK RAJ M | GENERAL COORDINATOR- MEDIA |
| 19 | MAHALAKSHMI K | GENERAL COORDINATOR- MEDIA |
| 20 | NIVASHINI K | GENERAL COORDINATOR- WOMEN DEVELOPMENT CELL |
| 21 | JOHN MOSES S P | JOINT SECRETARY |

# CEA OFFICE BEARERS 2025-2026

| S.NO | NAME | DESIGNATION |
|---|---|---|
| 22 | SHENBAGAVALLI S | JOINT SECRETARY |
| 23 | AMIRTHU RIKAA S | JOINT TREASURER |
| 24 | RESHMA S | JOINT TREASURER |
| 25 | YASWANT SANKAR M | JOINT TREASURER |
| 26 | JAI KRISHNA B | JOINT COORDINATOR- EVENT |
| 27 | JISHNU DEV U K | JOINT COORDINATOR- EVENT |
| 28 | VENU SRINIVASS P | JOINT COORDINATOR- EVENT |
| 29 | MUTHU GOPIHAA M | JOINT COORDINATOR- EVENT |
| 30 | PADMA DHARSHINI A R | JOINT COORDINATOR- EVENT |
| 31 | SHRI VARSHINI V | JOINT COORDINATOR- EVENT |
| 32 | SONAKSHI N | JOINT COORDINATOR- EVENT |

# CEA OFFICE BEARERS 2025-2026

| S.NO | NAME | DESIGNATION |
|---|---|---|
| 33 | KEERTHIKA V R | JOINT COORDINATOR- CLUB ACTIVITIES |
| 34 | PRAPTIKA S | JOINT OVERALL EVENT COORDINATOR |
| 35 | SELVA MEENA | JOINT ORGANIZER - EXTRA CURRICULAR ACTIVITIES |
| 36 | VIDYAVATHI M K | JOINT ORGANIZER - EXTRA CURRICULAR ACTIVITIES |
| 37 | YUVA MEERA GAYATHRI K | JOINT ORGANIZER - EXTRA CURRICULAR ACTIVITIES |
| 38 | KAROLIN R K | JOINT COORDINATOR- MEDIA |
| 39 | MEENU MANCHARI R | JOINT COORDINATOR- MEDIA |
| 40 | HARINI V J | JOINT COORDINATOR- MAGAZINE |
| 41 | KARTHIKKA M | JOINT COORDINATOR- MAGAZINE |
| 42 | SAKTHI G | JOINT COORDINATOR- MAGAZINE |
| 43 | SAKTHISIVAKAMI S | JOINT COORDINATOR- MAGAZINE |

# CEA OFFICE BEARERS 2025-2026

| S.NO | NAME | DESIGNATION |
|---|---|---|
| 44 | SUBHIKSHA M | JOINT COORDINATOR- MAGAZINE |
| 45 | SUJITHA S | JOINT COORDINATOR- MAGAZINE |
| 46 | AGETHA P | JOINT COORDINATOR- WOMEN DEVELOPMENT CELL |
| 47 | JENNY R | JOINT COORDINATOR- WOMEN DEVELOPMENT CELL |
| 48 | MUTHU MAYAKANNAN K | ASSISTANT COORDINATOR |
| 49 | SIVANAGADHAKSHIN M B | ASSISTANT COORDINATOR |
| 50 | DIVYA BHARATHI S | ASSISTANT COORDINATOR |
| 51 | SHEELA JENIFER P | ASSISTANT COORDINATOR |

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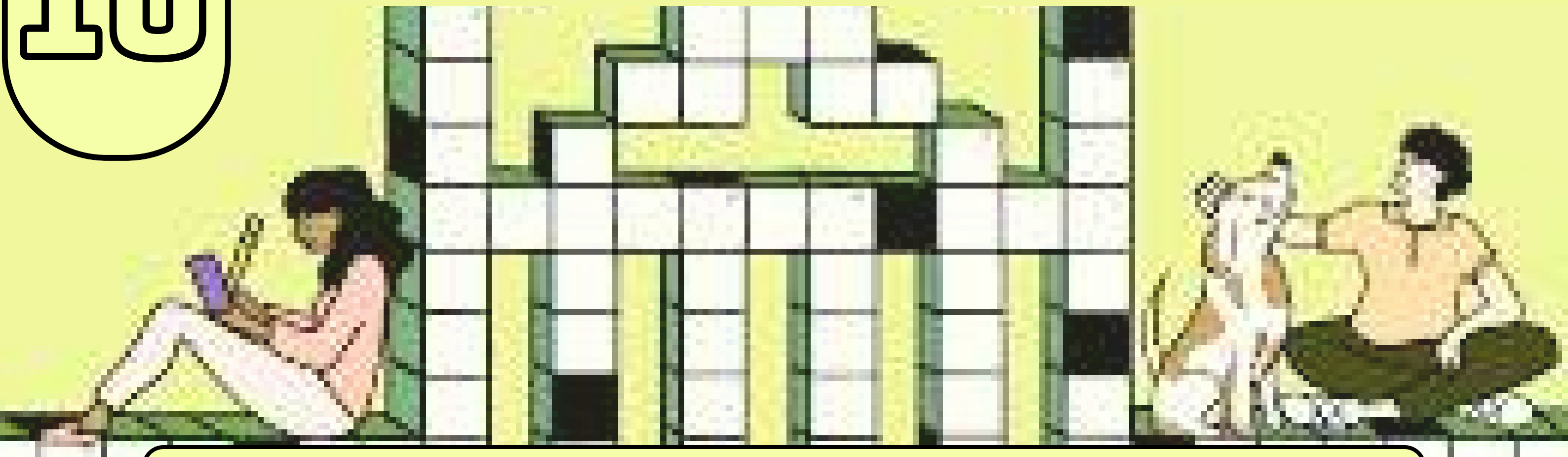
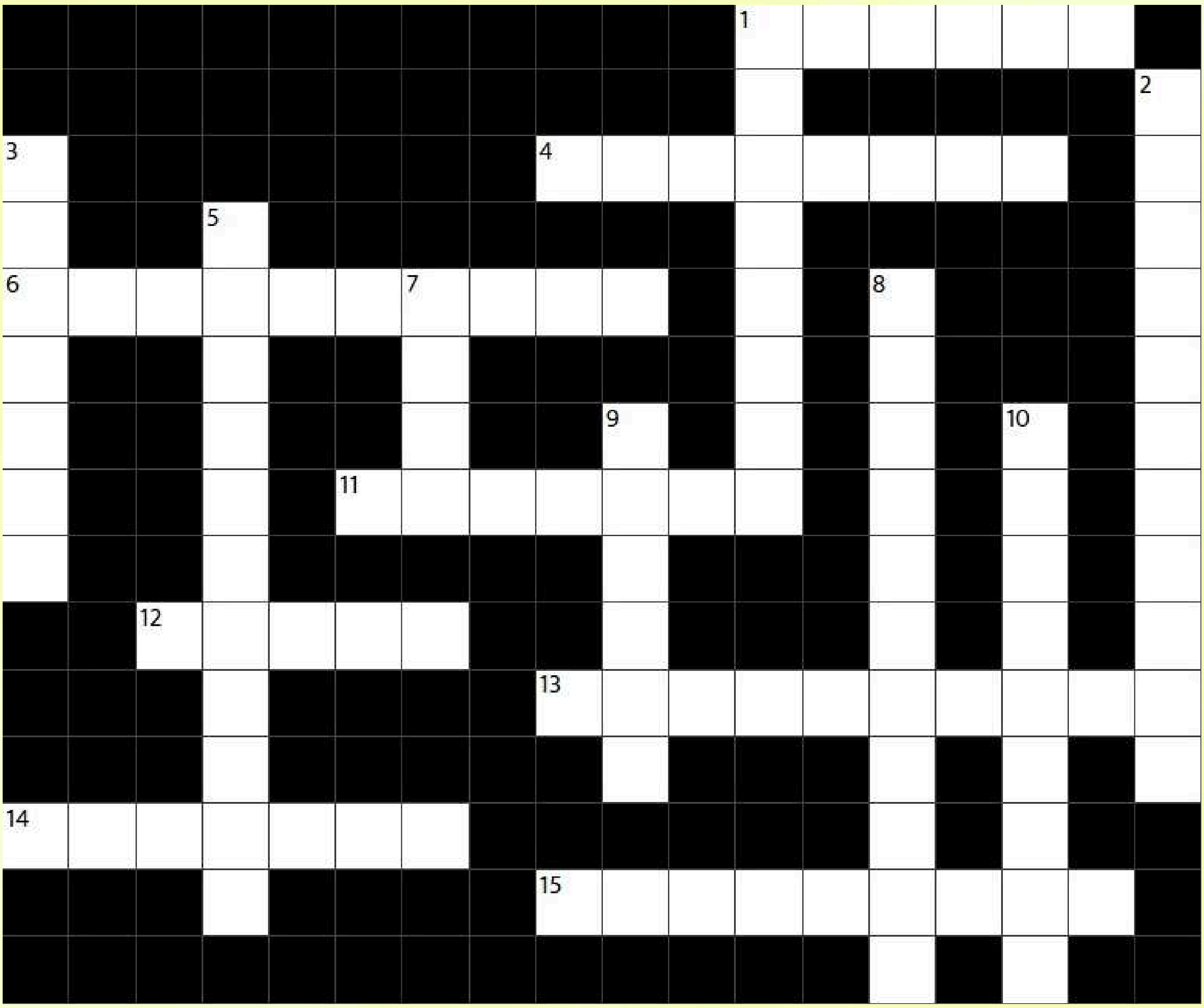


# CROSSWORD PUZZLE



# QUESTIONS

***ACROSS***

1 The process of keeping concrete moist after placing

4 The part of a dam that releases excess water

6 Instrument used to measure horizontal and vertical angles

11 Gas produced in anaerobic digestion

12 The test used to determine consistency of cement

13 The bending of a beam under load

14 A line joining points of equal elevation on a map

15 Device used to measure fluid pressure

***DOWN***

1 Disinfectant commonly used in water supply

2 A structure that is stable and has no redundant members

3 The common binder used in flexible pavement

5 The property of fresh concrete that defines its ease of placement

7 Main ingredient of Portland cement

8 The common admixture used to reduce water content

9 The slope provided to drain off rainwater from a roof

10 Tank used for sedimentation

SCAN FOR THE SOFT COPY (PDF)