

A CIVIL ENGINEERING MAGAZINE

INGENIUM

2022



DEPARTMENT OF CIVIL ENGINEERING
VELAMMAL COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Viraganoor, Madurai - 625009





INSTITUTE VISION

- **To emerge and sustain as a centre of excellence for technical and managerial education upholding social values**

INSTITUTE MISSION

- **Imparted with comprehensive, innovative and value based education**
- **Exposed to technical, managerial and soft skilled resources with emphasis on research and professionalism**
- **Inculcated with the need for a disciplined, happy, married and peaceful life**

DEPARTMENT VISION

- **To inspire and mould civil engineering aspirants as competent and dynamic infrastructure developers**

DEPARTMENT MISSION

Our mission is to

1. **Integrate high Quality civil engineering education and research**
2. **keep the students abreast with the state of art, theory and practice**
3. **Create a supportive environment to meet professional challenges**

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VELEMAL COLLEGE OF
ENGINEERING AND
TECHNOLOGY-
MADURAI

DR. P. ALLI

PRINCIPAL-VCET

Engineering Education is now an integral and indispensable component of contemporary society. A nation's level of development is proportional to the availability of quality engineering education. The Vellore Institute of Technology is a pioneering engineering institution that ranks among the best in the nation. Among the numerous engineering institutions in the southern districts of Tamil Nadu, VCET stands tall. Students can anticipate the finest infrastructure, highly qualified and experienced faculty, and pedagogical ideals of the highest order.

While I am proud to be affiliated with the institution and its administration, I assure all stakeholders that they will receive an engineering education of the highest quality.



DEPARTMENT OF
CIVIL ENGINEERING

VELEMAL COLLEGE OF
ENGINEERING AND
TECHNOLOGY-
MADURAI

DR.L. ANDAL

HEAD OF THE DEPARTMENT - VCET

Velammal College of Engineering and Technology's Department of Civil and Environmental Engineering extends a cordial greeting. Our work as practising and aspiring engineers is crucial for a world that is constantly evolving. The infrastructure of our modern society, such as roads, bridges, buildings, and water distribution systems, is designed by civil engineers. Environmental engineers develop solutions for the responsible utilisation of resources and energy in order to protect our air and water supplies. Together, civil and environmental engineers are creating the Built Environment, a world that is stronger, safer, and more sustainable.

Our department provides academic programmes of the highest calibre, supported by facilities of the highest calibre. Our faculty are committed to teaching excellence while fostering an inclusive learning environment where all students can flourish. We offer coursework and research opportunities in five engineering disciplines: Environmental Engineering, Geotechnical Engineering, Structural Engineering, Transportation Engineering, and Water Engineering.

Our alums have exciting careers and leadership positions around the world, addressing the complex engineering challenges of the present. If you envision yourself in a dynamic and rewarding career, a degree in civil and environmental engineering may be the right choice for you. Explore our academic programmes or get in touch with us to meet with a recruiter. We anticipate seeing you at VCET

MESSAGE FROM EDITORIAL TEAM

Dear Readers, Greetings to you !!! As the editor of **INGENIUM** , A Civil department biannual Magazine, I would like to start by conveying my regard to all the team members of editorial board and faculties who supported me for making this happen We are pleased to bring you this special edition of our Departmental Magazine “**INGENIUM**”.

This special edition is reflection of Departmental activities, the achievements, the spirit of all the students and teachers, fantasies and goals, experiences and everything that is a part of the B.E Civil Engineering course, be it curricular, co-curricular or extra– curricular during this semester.

In order to keep the readers widely interested and updated we will off course continue the tradition of communicating the significant events and activities of civil department. I would like to thank **Dr. L. ANDAL** (HOD, Civil) and faculty Advisor **Dr.M.PANDIESWARI** (Assistant professor-III) for the continuous motivation, input and time to time feedback for the final draft of Special Edition of “**INGENIUM**”.







**“ ENGINEERING IS ALL ABOUT
USING THE POWER OF SCIENCE
TO MAKE LIFE BETTER FOR
PEOPLE TO IMPROVE COMFORT,
IMPROVE PRODUCTIVITY , TO
EMPOWER PEOPLE”**

TECHNICAL

- THE NEW PARLIAMENT BUILDING IN INDIA
- KALINGAR MEMORIAL LIBRARY
- NATHAM BRIDGE MADURAI
- REVOLUTIONING CIVIL ENGINEERING WITH IOT
- CARBON NANOTUBES
- VERTICAL FARMING
- DOWEL BARS

An aerial, high-angle photograph of a dense urban skyline, likely New York City. The image shows a variety of skyscrapers with different architectural styles, including some with prominent spires and others with flat roofs. The buildings are packed closely together, and the streets below are visible as a grid of dark lines. The lighting is somewhat dim, suggesting dusk or dawn, with some lights visible on the buildings and streets. The overall tone is a mix of blue and grey, with some warmer tones from the buildings' facades.

**THE ENGINEER'S
MIND,
THAT RESTLESS
INNOVATOR,
RESENTS ALL
EFFORTS TO
ENCLOSE IT IN
A RIGID
FRAMEWORK.**

THE NEW PARLIAMENT BUILDING IN INDIA

India's new Parliament building stands as a magnificent testament to the fusion of architectural grandeur and cutting-edge civil engineering. This iconic structure, designed to accommodate the nation's democratic aspirations, not only showcases India's prowess in construction but also sets new standards in terms of engineering innovation and sustainability.

ARCHITECTURAL MARVEL:

The first striking aspect of the new Parliament building is its architectural brilliance. The circular design, inspired by India's rich heritage, presented unique engineering challenges. The structure had to be both aesthetically pleasing and structurally sound, requiring innovative engineering solutions.



STRUCTURAL ENGINEERING FEAT:

The circular shape of the building posed a structural challenge. To achieve this, engineers employed cutting-edge technology, including advanced 3D modelling and simulation techniques. The use of reinforced concrete and steel played a crucial role in creating a strong and durable structure that could withstand both natural and man-made forces.

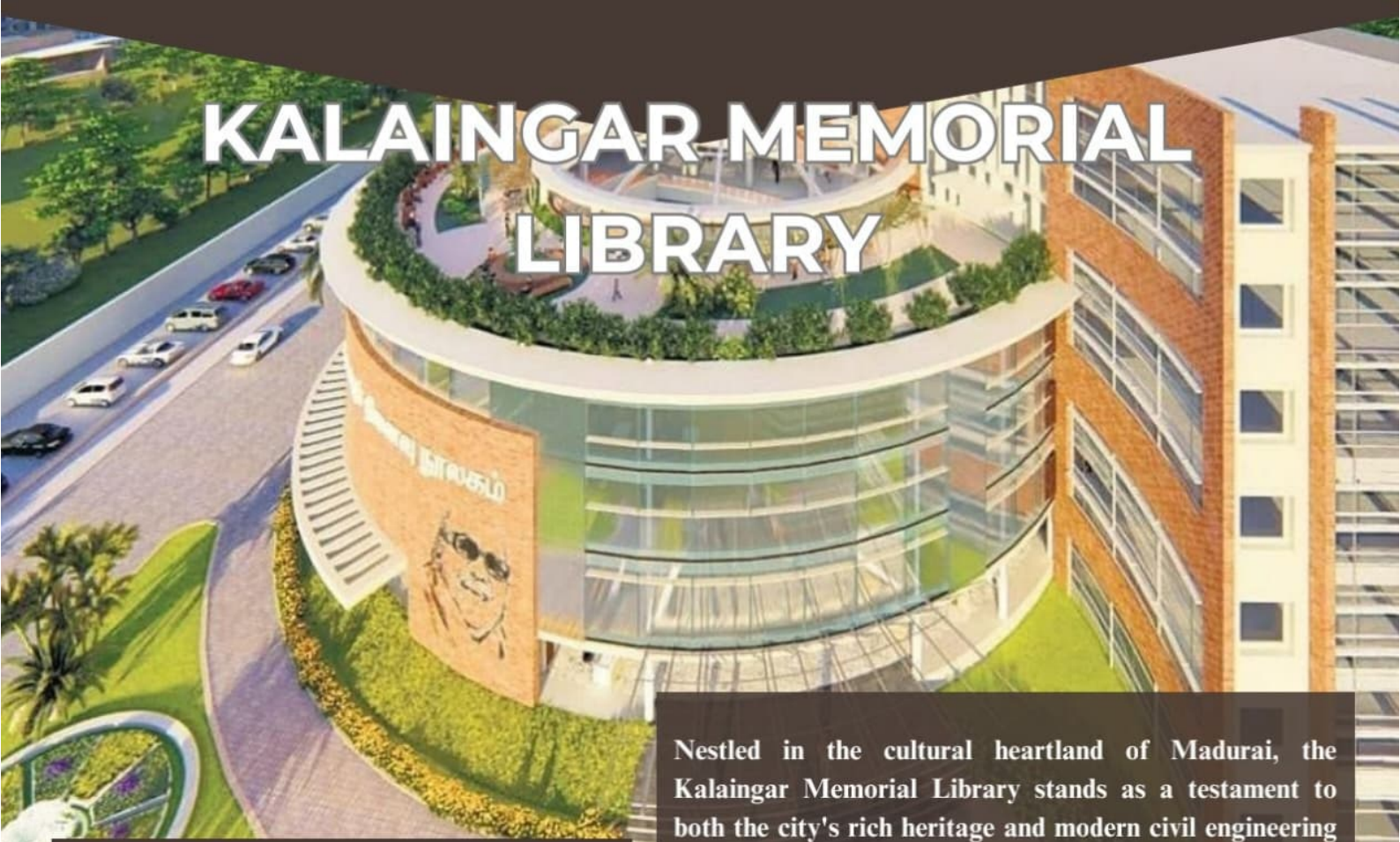
SUSTAINABILITY AND ENVIRONMENTAL CONSIDERATIONS:

In line with global environmental concerns, the new Parliament building incorporates sustainable design principles. Advanced HVAC systems, energy-efficient lighting, and rainwater harvesting mechanisms were integrated to reduce the building's carbon footprint. Moreover, the use of locally-sourced materials and recycled construction materials demonstrated a commitment to sustainable practices.



G LALLIT KISHORE
II YEAR - CIVIL

KALAINGAR MEMORIAL LIBRARY



Sustainable construction practices have become a cornerstone of modern civil engineering. The Kalaingar Memorial Library incorporates several eco-friendly features. The building's lighting, heating, and cooling systems are energy-efficient, reducing its environmental impact. Additionally, solar panels installed on the rooftop harness solar energy to supplement the library's power needs. Madurai falls within a region that experiences seismic activity, necessitating robust seismic resilience measures. The library incorporates cutting-edge seismic dampers and base isolators. These components absorb and dissipate seismic energy, safeguarding the structure and its occupants during earthquakes. This iconic library serves as an inspiration for future construction projects, emphasizing the importance of innovation and sustainability in the field of civil engineering.

Nestled in the cultural heartland of Madurai, the Kalaingar Memorial Library stands as a testament to both the city's rich heritage and modern civil engineering ingenuity. This architectural marvel not only houses a wealth of knowledge but also embodies advanced civil engineering concepts.

In this article, we explore the Civil Engineering aspects that make the Kalaingar Memorial Library an exceptional feat of construction.



V. SOWMYA VARSHA
II YEAR - CIVIL



NATHAM BRIDGE- MADURAI

NATHAM BRIDGE IN MADURAI

A Triumph in Civil Engineering
The Natham Bridge in Madurai, Tamil Nadu, is a stunning example of civil engineering prowess and innovation. This vital infrastructure project not only serves as a critical transportation link but also showcases advanced engineering techniques that have been employed to address the region's unique geographical and logistical challenges.

Materials and Construction:

The choice of materials for the Natham Bridge was a crucial aspect of its construction. High-strength concrete and durable steel cables were used to ensure the bridge's longevity and structural integrity. Advanced construction techniques were employed to minimize disruptions to traffic during the construction phase

INNOVATIVE BRIDGE DESIGN:

The Natham Bridge stands out for its innovative design. Spanning the Vaigai River, this bridge is a cable-stayed bridge, a design chosen for its ability to provide both stability and elegance. The cables radiate from several points on the bridge's towering pylons, distributing the load efficiently and reducing the need for excessive support structures in the river.



S SRINIDHI
II YEAR - CIVIL

REVOLUTIONIZING CIVIL ENGINEERING WITH IOT

INTRODUCTION

The Internet of Things (IoT) has emerged as a transformative force in various industries, and civil engineering is no exception. IoT technology is revolutionizing the way construction projects are planned, executed, and maintained. By integrating sensors, data analytics, and connectivity, civil engineers are harnessing the power of IoT to optimize resource management, improve safety, and enhance overall project efficiency.

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SMART CONSTRUCTION SITES

IoT in civil engineering starts at the construction site. Sensors embedded in equipment, materials, and even workers' gear provide real-time data on various parameters. For instance, GPS-enabled equipment can track their location and usage, helping project managers monitor progress and allocate resources more effectively. Sensors on construction materials like concrete can indicate the curing process, ensuring quality control.

BUILDING MANAGEMENT

Beyond construction, IoT plays a crucial role in building management. Smart building systems use sensors to monitor and control various aspects such as lighting, heating, and security. This not only enhances comfort for occupants but also contributes to energy efficiency and cost savings.

TRAFFIC MANAGEMENT

IoT is also being employed in civil engineering to improve transportation systems. Smart traffic lights, sensors on roads, and connected vehicles can work together to reduce traffic congestion and enhance road safety. This leads to more efficient transportation networks and a reduction in emissions.

CONCLUSION

IoT technology is transforming civil engineering into a smarter, more efficient, and sustainable industry. From smart construction sites and predictive maintenance to enhanced safety and environmental sustainability, IoT offers a plethora of opportunities for innovation and improvement. As the world continues to urbanize and infrastructure demands grow, the integration of IoT into civil engineering practices will become increasingly crucial for meeting these challenges head-on. Embracing IoT is not just a choice; it's a necessity for a more connected and sustainable future in civil engineering.



CARBON NANOTUBES

INTRODUCTION

In the ever-evolving field of civil engineering, innovation plays a pivotal role in enhancing construction materials and methodologies. One such ground breaking innovation is the application of carbon nanotubes (CNTs). These nanoscale structures, composed of carbon atoms arranged in a cylindrical pattern, have gained significant attention for their remarkable properties and their potential to transform various aspects of civil engineering. This article explores the diverse applications of carbon nanotubes in civil engineering and their impact on the industry.

REINFORCEMENT OF STRUCTURAL MATERIALS

One of the most promising applications of CNTs in civil engineering is the reinforcement of structural materials such as concrete and steel. CNTs possess exceptional strength and stiffness, making them ideal candidates for enhancing the mechanical properties of these materials. When added to concrete or steel, CNTs can significantly increase their tensile strength, thereby improving the overall structural integrity and durability of buildings and infrastructure.

LIGHTWEIGHT AND HIGH-STRENGTH COMPOSITES

Carbon nanotubes can be incorporated into composite materials used in civil engineering, resulting in lightweight yet high-strength alternatives to traditional construction materials. These composites find applications in bridges, aircraft, and other structures where weight reduction is critical. CNT-reinforced composites offer the advantage of reduced material consumption and increased load-bearing capacity.

SMART MATERIALS FOR SENSING AND MONITORING

Carbon nanotubes have the unique ability to conduct electricity and respond to changes in their environment. This property is harnessed in the development of smart materials for structural health monitoring. By embedding CNT-based sensors into structures, engineers can continuously monitor stress, strain, temperature, and other parameters in real-time. This proactive approach helps identify potential issues before they escalate, ensuring the safety and longevity of civil infrastructure.

WATER AND AIR PURIFICATION

Beyond structural applications, CNTs are employed in water and air purification systems used in civil engineering projects. Their high surface area and adsorption capacity make them effective at removing contaminants and pollutants from water and air. This technology is especially valuable in regions with water scarcity or high levels of pollution, contributing to improved environmental sustainability.

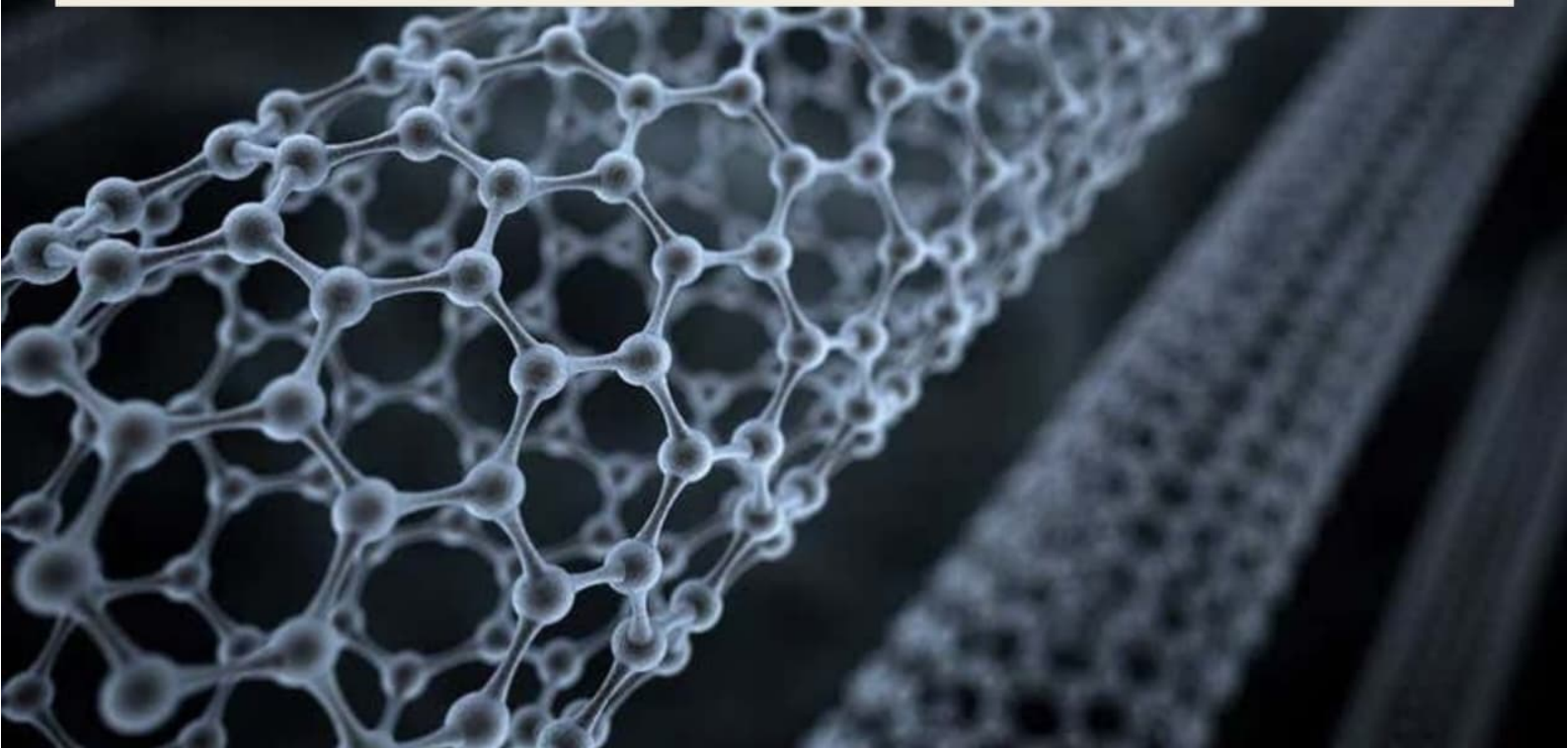
ENERGY-EFFICIENT CONSTRUCTION

In the pursuit of energy efficiency and sustainability, carbon nanotubes play a role in enhancing building materials. CNT-based coatings and films can improve thermal insulation and contribute to better energy performance in buildings. Additionally, CNTs can be integrated into transparent materials for energy-efficient windows that control heat and light transmission.

CONCLUSION

Carbon nanotubes hold immense promise in revolutionizing civil engineering by enhancing structural materials, enabling smart monitoring systems, and contributing to sustainable construction practices. As research and development in this field continue to progress, CNTs are poised to play an increasingly significant role in shaping the future of civil engineering, leading to safer, more efficient, and environmentally friendly infrastructure.

D. CLARA
II YEAR
CIVIL



VERTICAL FARMING

Our world's food supply has been supported for ages by traditional farming practises. However, it's becoming more crucial to investigate novel and sustainable methods for food production as the world's population continues to grow and climate change threatens agricultural stability. With its many benefits and potential to transform the future of agriculture, vertical farming is emerging as a possible response to these issues.

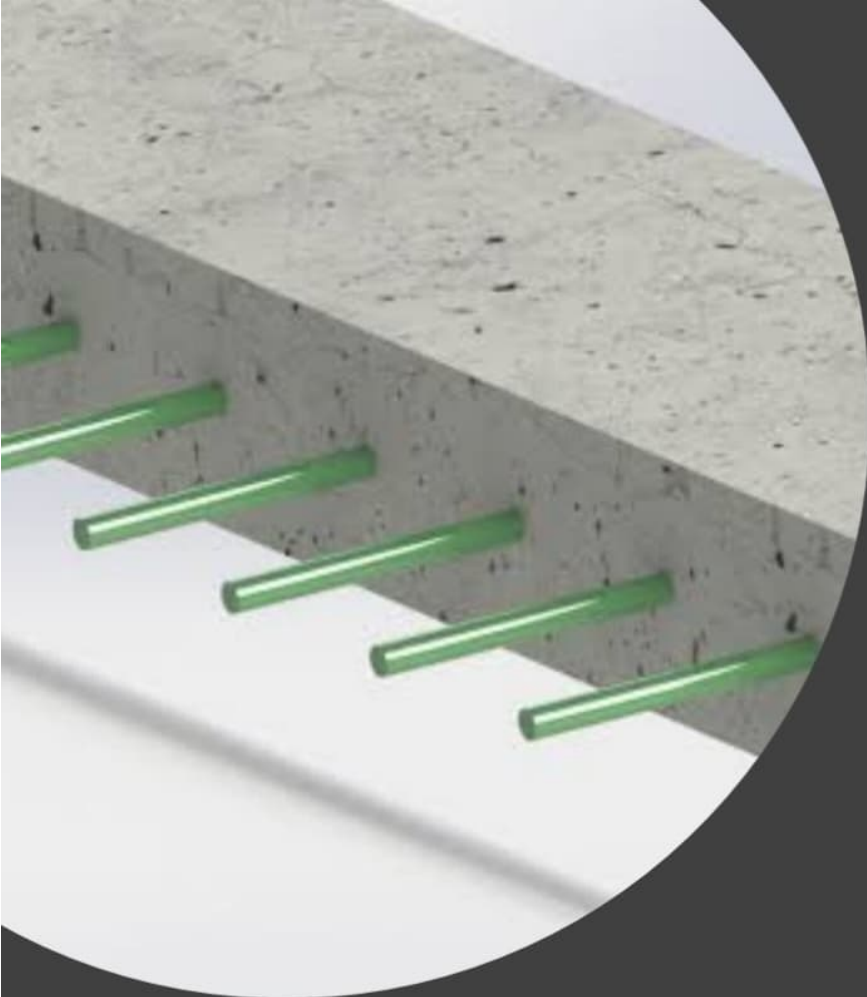
VERTICAL FARMING

Growing crops in stacked layers or on surfaces that are inclined vertically, usually inside of climate-controlled interior spaces, is known as vertical farming. With the aid of cutting-edge technology like hydroponics, aeroponics, and LED lighting, these farms are able to provide crops precisely the right quantity of water, nutrients, and light while also managing the humidity and temperature. By enabling year-round food production in cities, this technique lessens the need for vast tracts of arable land and reduces the environmental effect of conventional farming. A remarkable development in agriculture, vertical farming has the ability to solve several problems that traditional agricultural techniques now face.



P.B.S SRUTHE SRI
II YEAR- CIVIL

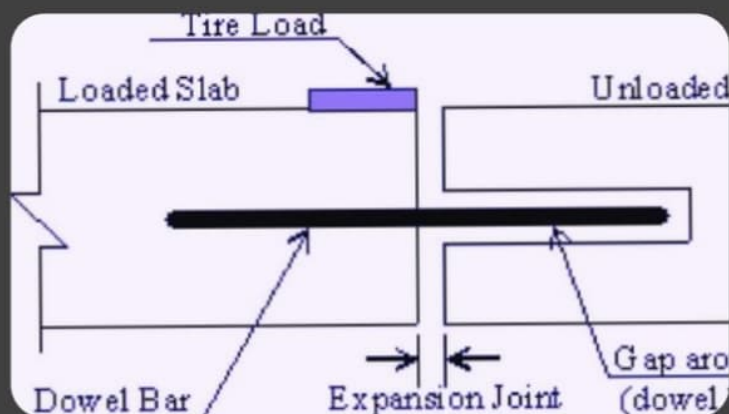




DOWEL BARS

Dowel bars are typically provided in transverse joints between concrete slabs. Transverse joints are the joints that run perpendicular to the direction of traffic, and they are the most common type of joint in concrete pavement. Dowel bars are placed in the joints at regular intervals, typically every 2 to 4 feet. The exact spacing of the dowel bars will depend on the size and type of concrete slabs, as well as the traffic loads they are subjected to.

In civil engineering, dowel bars are a common component of concrete pavement construction. They are used to transfer loads between concrete slabs, allowing the slabs to move independently of each other without cracking or breaking. Dowel bars are typically made of steel or other durable materials, and they are placed in transverse joints between concrete slabs.



SRI NARAYANAN M
I YEAR - CIVIL



**“ IN THE WORLD OF CIVIL
ENGINEERING, EVERY STRUCTURE
IS A WORK OF ART, COMBINING
BEAUTY & FUNCTION ”**

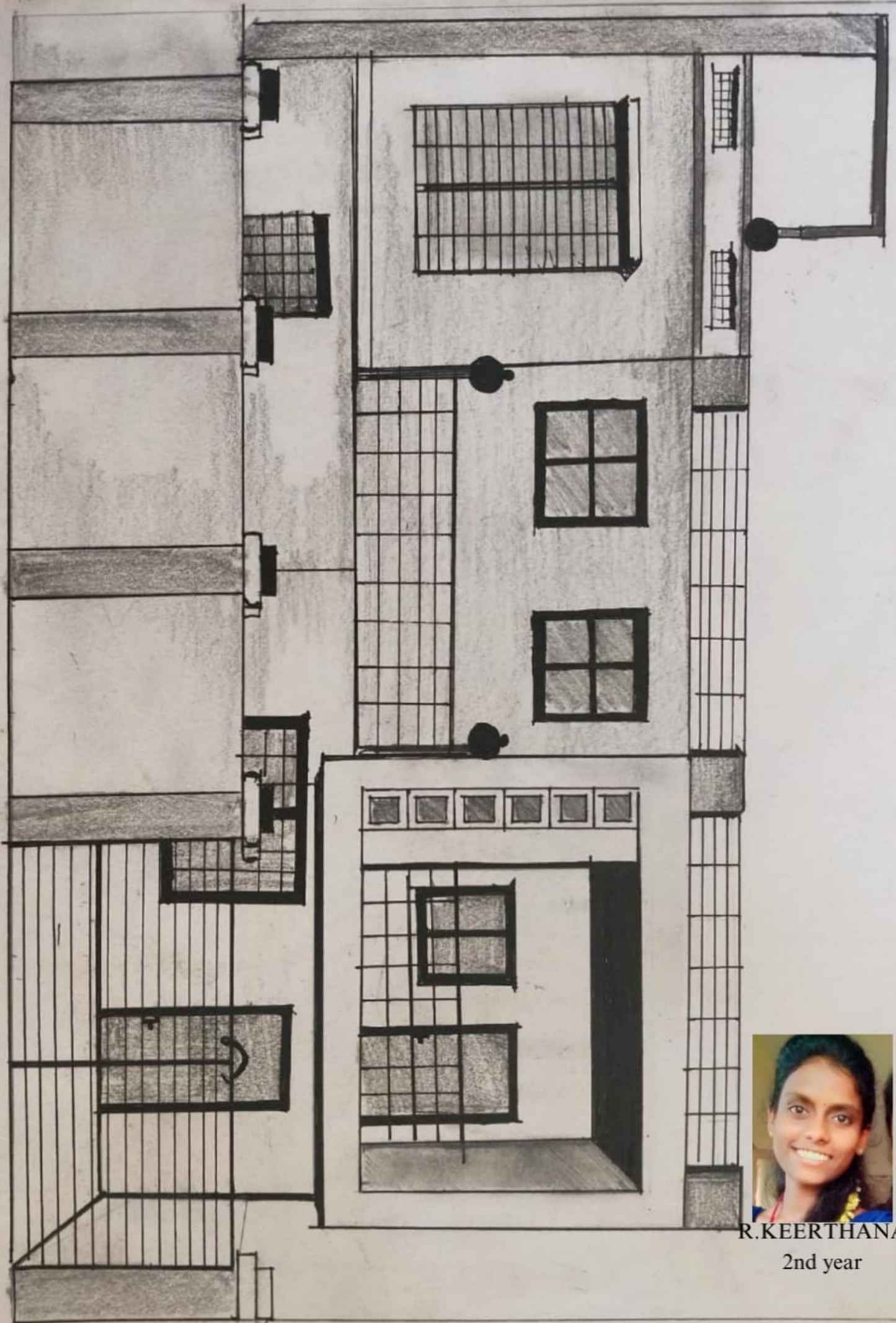


NON TECHNICAL

- **DRAWINGS**
- **PAINTINGS**



R.KEERTHANA
2nd year



R.KEERTHANA

2nd year



R.KEERTHANA
2nd year

THE BEST WAY TO PREDICT THE FUTURE IS TO DESIGN IT

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