MAGAZINE

DEPARTMENT OF CIVIL ENGINEERING

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CESA 2k24

KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

PREFACE

This magazine represents the students of civil engineering and stars of the future. Writing is an art; everyone can't deliver the knowledge into words beautifully. The main motto of the magazine is to deliver precious information that are beneficial for civil engineering scholars and it makes the readers to understand the importance and greatness of civil engineering field. It is the complete effort of the students and teachers of the department of civil engineering.

We are grateful to all the article contributors and hope that your support to the "KNCET" will be never ending. This publications is just a beginning volume and would carry forward so on with developed versions and materialized quality with complete verified and analyzed contents of civil engineering departments.

- Team CESA 2k24

COLLEGE:

VISION:

"To become an Internationally Renowned Institution Education, Research and Development by Transforming the Students into Competent Professionals with Leadership Skills and Ethical Values".

MISSION

- Providing the Best Resource and Infrastructure.
- Creating Learner-Centric Environment and continuous Learning.
- Providing Effective Links with Intellectuals and Industries.
- Enriching Employability and Entrepreneurial Skills.
- Adapting to Changes for Sustainable Development.

DEPARTMENT

VISION:

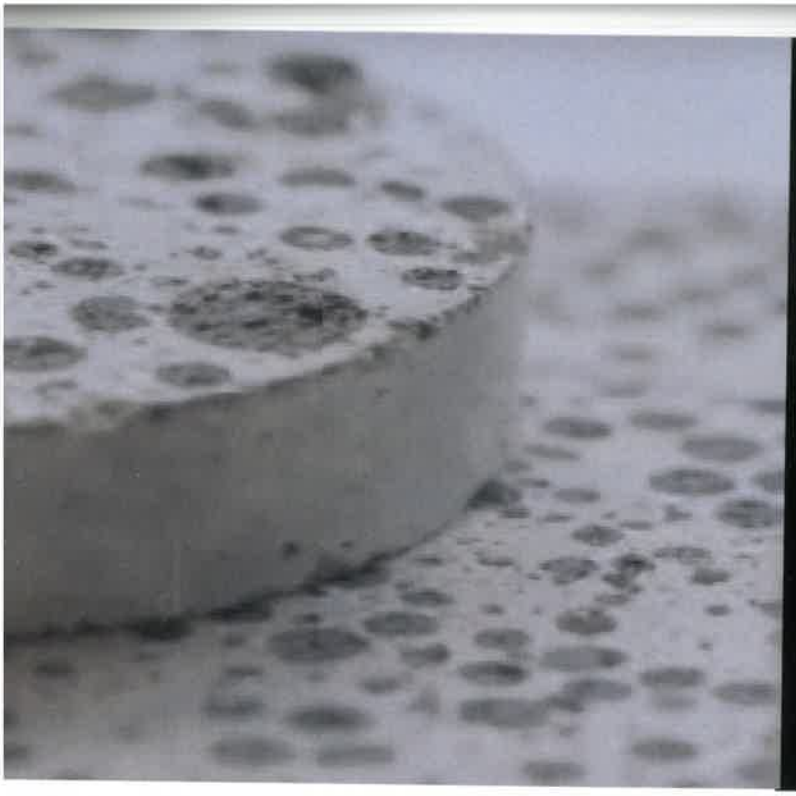
To strive to graduate, quality civil engineers with ethical values, contributing to society and community

MISSION:

M1: Providing quality civil engineering education through best teaching-learning process with modern laboratory, equipment and tools.

M2: Endeavour the students to become an entrepreneur and employable through industrial interaction.

M3: Inculcating moral and ethical values to serve the society and focus on students' overall development.



EXPERIMENTAL STUDY ON BACTERIAL CONCRETE

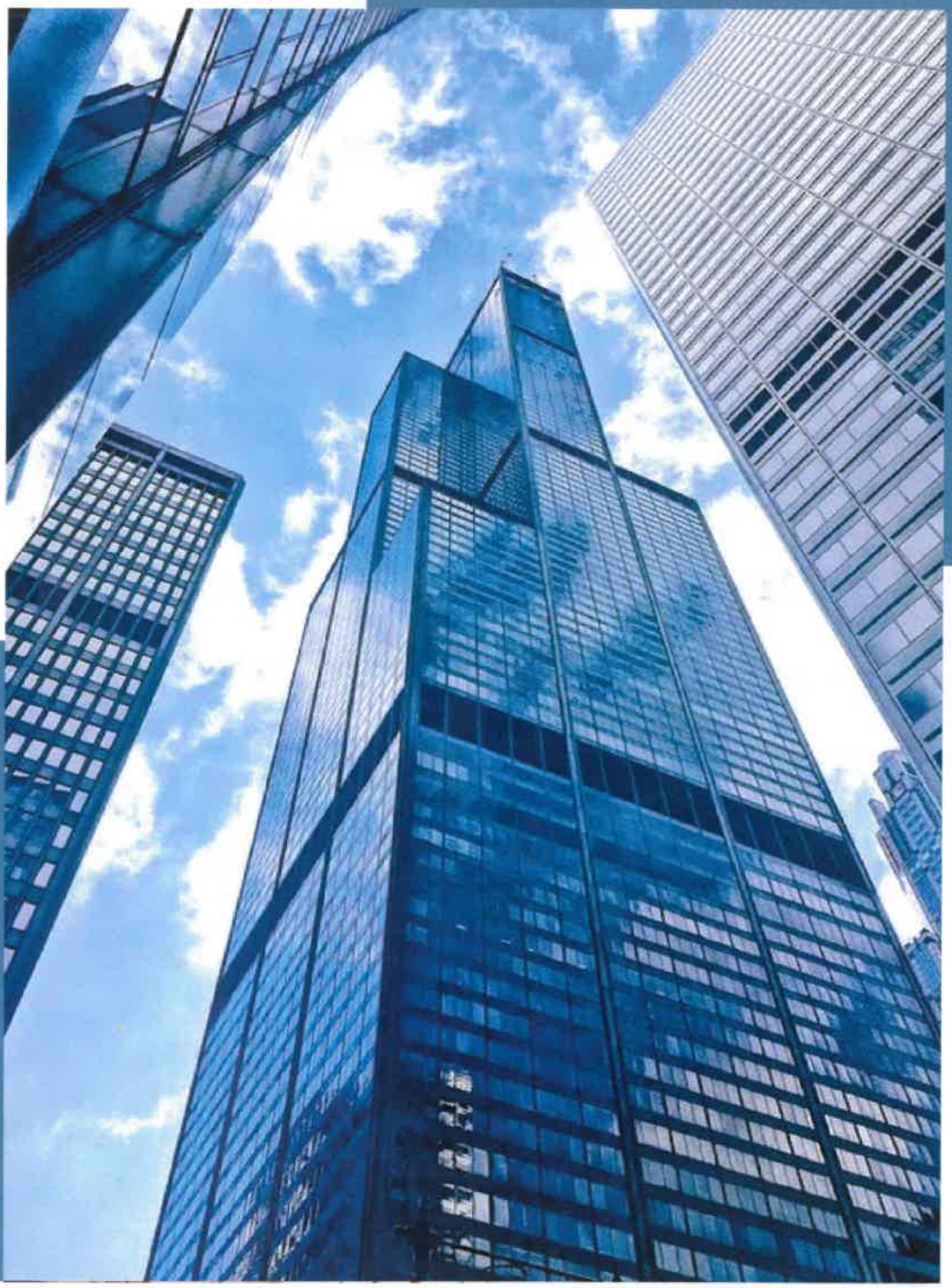
Bacterial concrete is a material, which can successfully remediate cracks in concrete. This technique is highly desirable because the mineral precipitation induced as a result of microbial activities is pollution free and natural.

The inclusion of microorganisms in concrete can be a long-term option for crack healing or filling. It also influences the compressive and split tensile strength and maintain strength after crack formation to certain amount.After three years of experimenting, he found the perfect healing agent - bacillus. To do this, specially selected types of bacteria genus Bacillus, a calcium-based nutrient (calcium lactate), nitrogen, and phosphorus are added to the pellets in the ratio 1:19 of bacteria to calcium source.

Bacterial concrete is a self repair cracks upto 0.5 mm width. An investigation is conducted to study changes in the compressive strength, flexural strength of concrete by the addition of bacteria. The bacteria used in bacterial concrete are typically of the Bacillus genus, which are known for their ability to produce calcium carbonate. These bacteria are the production process and lie dormant until they come into contact with water.

mixed into the concrete during

M.K.HARINI
B.E CIVIL (IV YEAR)
(621320103012)



2024

"THE ROAD TO SUCCESS IS ALWAYS UNDER CONSTRUCTION"

Shrimp Farm Wastewater Treatment using Hybrid Reed Bed Filter

Through the process of water flow through the constructed wetland, plant roots and the substrate remove the larger particles present in the wastewater. Pollutants and nutrients present in the wastewater are then naturally broken down and taken up by the bacteria and plants, thereby removing them from the water. A constructed wetland is an artificial wetland to treat sewage, greywater, stormwater runoff or industrial wastewater. It may also be designed for land reclamation after mining, or as a mitigation step for natural areas lost to land development. Wetlands purify our water by removing sediments and other pollutants including chemicals. Wetlands also filter and process excess nutrients that may runoff from agricultural and development sites. Wetlands have been called "the kidneys of our watersheds."

Wetland processes remove suspended and dissolved solids and nutrients from surface and ground water and convert them into other forms, such as plant or animal biomass or gases. Debris and suspended solids (fine sediment or organic matter) may be removed by physical processes, such as filtering and sedimentation.

Constructed wetlands are grouped into three categories based on their wastewater flow regime: vertical flow constructed wetlands (VFCW), horizontal flow constructed wetlands (HFCW), and surface/subsurface flow constructed wetlands.

The largest wetland in India is the Sunderbans. Sunderban Wetland is also a part of the largest mangrove forest in the world. It consists of hundreds of islands, a maze of rivers, creeks nestled in the delta of the Ganga river and Brahmaputra on the Bay of Bengal in India and Bangladesh. Wetland soils differ from terrestrial soils in that they are anaerobic. The absence of oxygen produces characteristics, especially differences in soil color and texture that are uniquely different from aerobic, terrestrial soils.

S.SANJAY DHARSAN B.E
CIVIL (IV YEAR)
(621320103034)

"JUTE IS GOOD IN OPTIMUM MOISTURE CONTENT, MAXIMUM DRY DENSITY"

Stabilization of Black Soil using Lime and Jute Fibre

As per the results, 1% of soil mixed with jute is good in optimum moisture content, maximum dry density, and CBR. The research has undertaken tests such as the California Bearing Proportion (CBR) test and Proctor density changes in the soil's building qualities. Stabilization of soil is carried out by adding lime, coconut coir, fly ash, plastic fiber etc. with the soil. This project aims to conduct a study to carry out the above- mentioned process using polypropylene fiber which is basically a textile consisting of a network of natural or artificial fibers. Binders such as cement and lime enhance stabilization in soils, developing their engineering properties and generating an improved construction material. Soil stabilization with cement and lime is a popular method of soil stabilization. This soil stabilization method involves mixing lime or cement into the soil to increase its strength and resistance. The strengthening of black cotton soil with the addition of lime as an additive provides stability to the civil engineering structures like sub-base/subgrade for roads and other engineering projects.

Jute is also known as golden fibre mainly because of its colour. It is a cash crop and can be very profitable for the economy as its export can bring in a lot of money into the economy. It is the second most important natural fibre after cotton and at present its demand has risen in India and also all around the world.It was found that the engineering properties of black cotton soil substantially improved by addition of lime.

The aim is to improve the engineering properties of the black cotton soil such that the structure built on this soil can be efficiently withstanding applied loads.

B. YOGESHVARAN
B.E CIVIL (IV YEAR)
(621320103040)

Digital Twins and Building Information Modeling (BIM)

Building Information Modeling (BIM): BIM is a process involving the generation and management of digital representations of physical and functional characteristics of places. It's used to design, construct, and operate buildings and infrastructure. BIM allows stakeholders to visualize the entire project lifecycle, from initial planning and design to construction and maintenance, in a collaborative and coordinated manner. Key benefits of BIM include improved communication and coordination among project teams, enhanced visualization and analysis capabilities, reduced errors and conflicts during construction, and better facility management through the integration of asset information. Digital Twins: A digital twin is a virtual representation of a physical object, system, or process. In the context of civil engineering and construction, a digital twin can be created for a building, infrastructure asset, or even an entire city. Digital twins are created by collecting real-time data from sensors, IoT devices, and other sources, which is then used to simulate and analyze the behavior and performance of the physical counterpart. Digital twins enable engineers and stakeholders to monitor and optimize the performance of assets, predict maintenance needs, and simulate various scenarios to improve decision-making.

D.PRAKASH
B.E CIVIL (III YEAR)
(621321103019)

"3 Ways Virtual Reality in Construction is Shaping the Industry"

"3D CONSTRUCTIONS"

1.Row and Scale More Quickly and Efficiently

Construction has never been an easily scaled industry. VR changes that by making it easy to share data and models across teams and get new teams quickly up to date on relevant is-sues. Creating a 3D model of a construction site used to be a complex physical process that required physical space, time, and materials. These miniature models were helpful in ori-enting the project, but by necessity contained inaccuracies and lacked detail.

2.Experience Better Collaboration

Because VR gives teams the ability to "see" a project site without traveling to it, it is easy for teams to collaborate in real-time, within a shared environment, where they can literally point out details and issues, ask questions, and immediately make decisions about changes. This improves timelines by facilitating quicker feedback. It also reduces rework, by improv-ing accuracy and the detail level of communi-cations.

3.Improve the Overall Customer Experience and Handover

Lack of transparency has been a common frustration for building owners and other stakeholders during the construction process. It used to be that they simply had to trust that the construction company was doing their job right, and hope that an occasional site visit would clear up any problems.

G.SHANMUGAVEL MURUGAN
B.E CIVIL (III YEAR)
(621321103025)

3D CONCRETE PRINTING TECHNOLOGY

3D concrete printing technology is revolutionizing the construction industry by offering faster, more cost-effective, and sustainable methods for building structures. Unlike traditional construction techniques that involve assembling pre-made components on-site, 3D concrete printing allows for the direct deposition of concrete layer by layer, based on digital models. This process enables the creation of complex architectural designs with precision and efficiency. Moreover, it reduces material waste and labor requirements, making construction projects more environmentally friendly.

Advanced 3D concrete printing technology represents a cutting-edge approach to construction, leveraging digital design and robotics to push the boundaries of what's possible in building infrastructure. One key aspect of advancement lies in the development of specialized concrete mixes optimized for printing, which offer enhanced strength, durability, workability.

K.SANTHOSH
B.E CIVIL (III YEAR)
(621321103501)

Energy Harvesting Tiles

In 2017, a UK-based technology company Pavegen has redesigned Bird Street. in London's West End and turned it into an energy harvesting walkway. Instead of needing to absorb sunlight, people just walk on it to generate power. This is done by generators moving around under the pavement from each human step to create kinetic energy. Every footstep generates around five watts which is roughly 107 square feet. This will power on lights in the area and creates bird sounds, making the space both safer and more pleasant. The most unique thing about this is the push for human interactivity.

Building Cleaning out Air Pollution

The multi-talented substance titanium dioxide is now being used as an active building ingredient in paint and materials that can remove pollutants from the air. Special grades of titanium dioxide can remove harmful nitrogen oxides through the air 'photocatalysis'.

Photocatalysis results in the conversion of nitrogen oxides into harmless soluble nitrate salts which are removed from a building's surface by rainfall.

The titanium dioxide isn't consumed or degraded. This means that the titanium dioxide based coatings continuously remove the pollutants from the air, making it a cost effective and low-maintenance solution.

In Mexico City, which was named the most polluted city on the planet in 1992, one of the city's main hospitals, Torre de Especialidades, is fighting smog through the use of Titanium dioxide tiles that cover the entirety of the external facade. It is estimated that the Titanium dioxide coating on the hospital alone can neutralize the pollution of 8,750 cars every day.

M.SUSIRAJAMUGAN
B.E CIVIL (III YEAR)
(621321103027)

T.KAMALESH
B.E CIVIL (II YEAR)
(621322103022)

EIFFEL TOWER

Eiffel Tower, wrought-iron structure in Paris that is among the most famous landmarks in the world. It is also a technological masterpiece in building-construction history. It was designed and built (1887–89) by Gustave Eiffel and named in his honor.

When the French government was organizing the International Exposition of 1889 to celebrate the centenary of the French Revolution, a competition was held for designs for a suitable monument. More than 100 plans were submitted, and the Centennial Committee accepted that of the noted bridge engineer Gustave Eiffel. Eiffel's concept of a 300-meter (984-foot) tower built almost entirely of open-lattice wrought iron aroused amazement, skepticism, and no little opposition on aesthetic grounds. When completed, the tower served as the entrance gateway to the exposition.

Nothing remotely like the Eiffel Tower had ever been built; it was twice as high as the dome of St. Peterâ€™s in Rome or the Great Pyramid of Giza. In contrast to such older monuments, the tower was erected in only about two years (1887â€“89), with a small labor force, at slight cost. Making use of his advanced knowledge of the behavior of metal arch and metal truss forms under loading, Eiffel designed a light, airy, but strong structure that presaged a revolution in civil engineering and architectural design.

The Eiffel Tower stands on four lattice-girder piers that taper inward and join to form a single large vertical tower. As they curve inward, the piers are connected to each other by networks of girders at two levels that afford viewing platforms for tourists.

After the 1889 fair closed, Eiffel realized that the only way to save his monument would be to find new and profitable uses for it.

SOIL INCUBATION

Soil incubation is a fundamental technique used in soil science and agricultural research to investigate the biological, chemical, and physical processes that occur within soil ecosystems. During soil incubation, soil samples are carefully collected from specific sites and placed under controlled laboratory conditions to observe and measure changes over time. These conditions often include controlled temperature, moisture levels, and sometimes altered levels of oxygen to simulate various environmental scenarios. By studying the decomposition of organic matter, nutrient cycling, microbial activity, and greenhouse gas emissions during soil incubation, researchers can gain insights into soil fertility, carbon sequestration, and the impacts of land management practices on soil health.

Soil incubation is a vital process in environmental science and agriculture, involving the controlled incubation or incubation of soil samples under specific conditions to study various soil properties, microbial activity, and nutrient cycling. Typically conducted in laboratory settings, soil incubation experiments aim to simulate and understand soil processes that occur in natural ecosystems. During incubation, soil samples are often subjected to controlled temperature, moisture, and aeration conditions to mimic specific environmental conditions, such as those found in different climates or soil management practices. This allows researchers to investigate how factors like temperature, moisture, and organic inputs influence soil microbial communities, nutrient availability, greenhouse gas emissions, and overall soil health. Soil incubation studies play a crucial role in advancing our understanding of soil dynamics and informing agricultural practices, land management strategies, and climate change mitigation efforts. By providing insights into the complex interactions between soil, microorganisms, and environmental factors, soil incubation experiments contribute to the development of more sustainable and resilient agricultural systems and ecosystem management practices.

S.AJITH KUMAR
B.E CIVIL (III YEAR)
(621321103002)

OLDEST BUILDING "ANATOLIAN PLATEAU"

Two hills form the 37 ha site on the Southern Anatolian Plateau. The taller eastern mound contains eighteen levels of Neolithic occupation between 7400 bc and 6200 bc, including wall paintings, reliefs, sculptures and other symbolic and artistic features. Together they testify to the evolution of social organization and cultural practices as humans adapted to a sedentary life. The western mound shows the evolution of cultural practices in the Chalcolithic period, from 6200 bc to 5200 bc. Çatalhöyük provides important evidence of the transition from settled villages to urban agglomeration, which was maintained in the same location for over 2,000 years. It features a unique streetless settlement of houses clustered back to back with roof access into the buildings. The vast archaeological site of Çatalhöyük comprises two tells rising up to 20 meters above the Konya plain on the Southern Anatolian Plateau. Excavations of the Eastern tell have revealed 18 levels of Neolithic occupation dating from 7,400-6,200 BC that have provided unique evidence of the evolution of prehistoric social organisation and cultural practices, illuminating the early adaptation of humans to sedentary life and agriculture. The Western tell excavations primarily revealed Chalcolithic occupation levels from 6,200-5,200 BC, which reflect the continuation of the cultural practices evident in the earlier Eastern mound. Çatalhöyük is a very rare example of a well-preserved Neolithic settlement and has been considered one of the key sites for understanding human Prehistory for some decades. The site is exceptional for its substantial size and great longevity of the settlement, its distinctive layout of back-to-back houses with roof access, the presence of a large assemblage of features including wall paintings and reliefs representing the symbolic world of the inhabitants.

SEISMIC RETROFIT

The word â€œRetrofitâ€ , in general, refers to the incorporation of new features, facilities or technology to
existing systems for better performance. Seismic Retrofit, to be specific, is the addition of certain features to existing structures so that they are more seismic resistant i.e. resistant to ground motion, soli failure due to earthquakes and so on. The importance of seismic retrofitting cannot be ignored, given our recent experiences with large earthquakes near urban areas. Before the introduction of modern seismic codes in the late 1960s for developed countries (US, Japan etc) and late 1970s for many other parts of the world (Turkey, China etc), engineers were never really concerned about designing structures with adequate detailing and reinforcement for seismic protection.

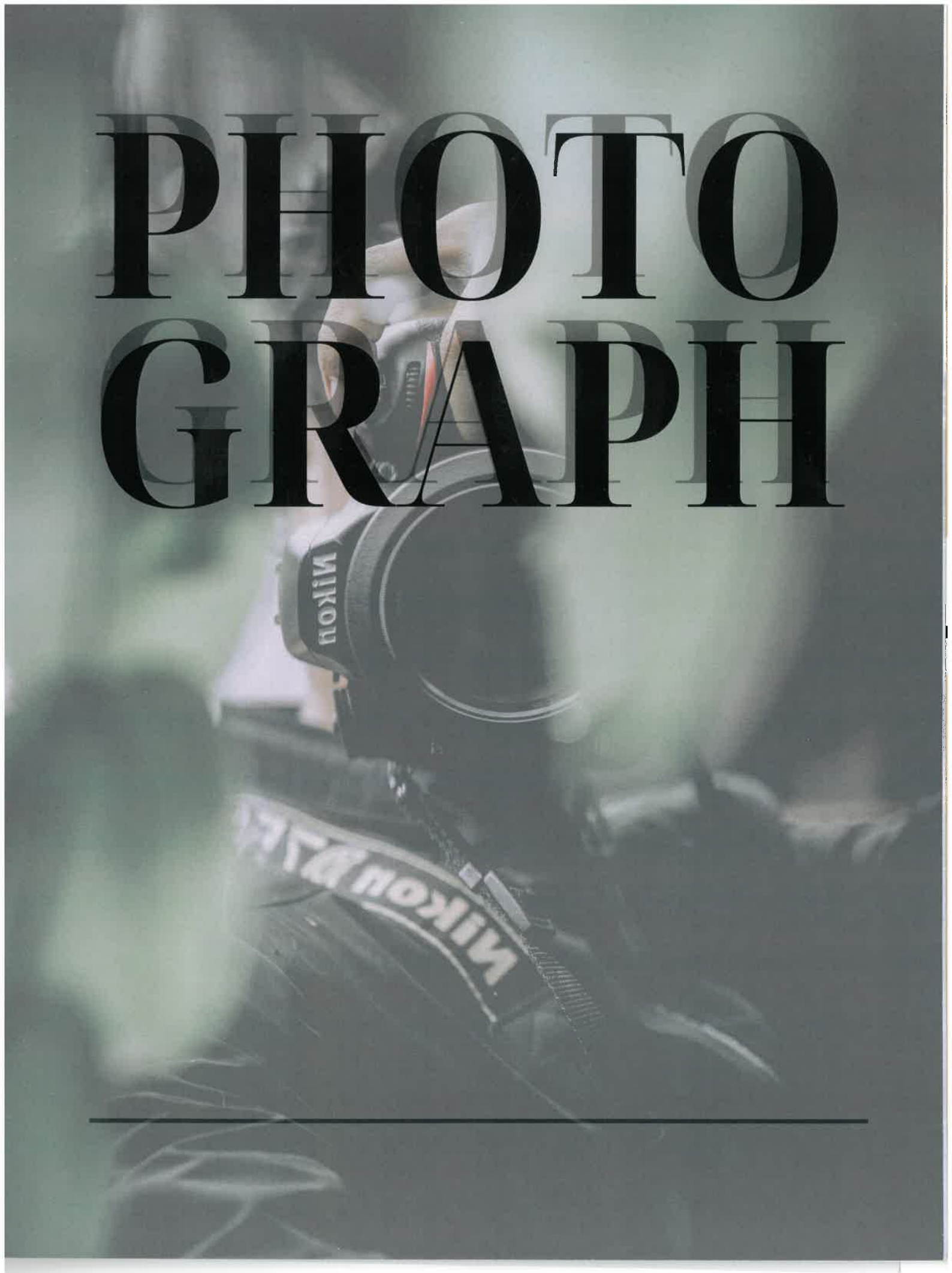
P.ANANTH
B.E CIVIL (II YEAR)
(621322103005)

Public Safety- Protect human resource. Structure SurvivabilityThis is the lowest level of retrofit, and the structure requires extensive repair before it can be put to use (Applied to BRIDGES). Structure Functionality- The structure is undamaged primarily, i.e. it requires only final touch repairing. It is the minimum level of retrofit acceptable for HOSPITALS and is considered high level retrofit. Structure Unaffected- Preferred for structures of Historical and Cultural significance. Selective Upgradation of local capacity (Strength, Stiffness etc) of each structural component.

Seismic evaluation may be understood like the diagnosis of a person with or without ailment on which the direction and nature of treatment depends. Seismic evaluation implies determining the capacity of the structures to resist earthquakes. The aim of seismic evaluation is to judge the seismic capacity and vulnerability of buildings during earthquake so that the amount of retrofitting may be determined. There are many deficient buildings, not meeting the current seismic requirements that may suffer extensive damage or even collapse if shaken by an earthquake. This may cause injury to occupants or people living in the vicinity. So, it is necessary to identify weak buildings and to evaluate their capacity for future earthquakes. If required, the buildings must be retrofitted.

Numerous methods of seismic evaluation of a building are available depending upon the objective of evaluation and the skill of the evaluator ranging from the visual examination to detailed structural analysis. Each has its own advantage, disadvantage and limitations. Rapid Visual Screening Procedure (RVSP) - This method is used for short term evaluation of buildings especially at a time when the frightened occupants refuse to re-enter their houses after an earthquake unless they have been assured.

PHOTO GRAPH



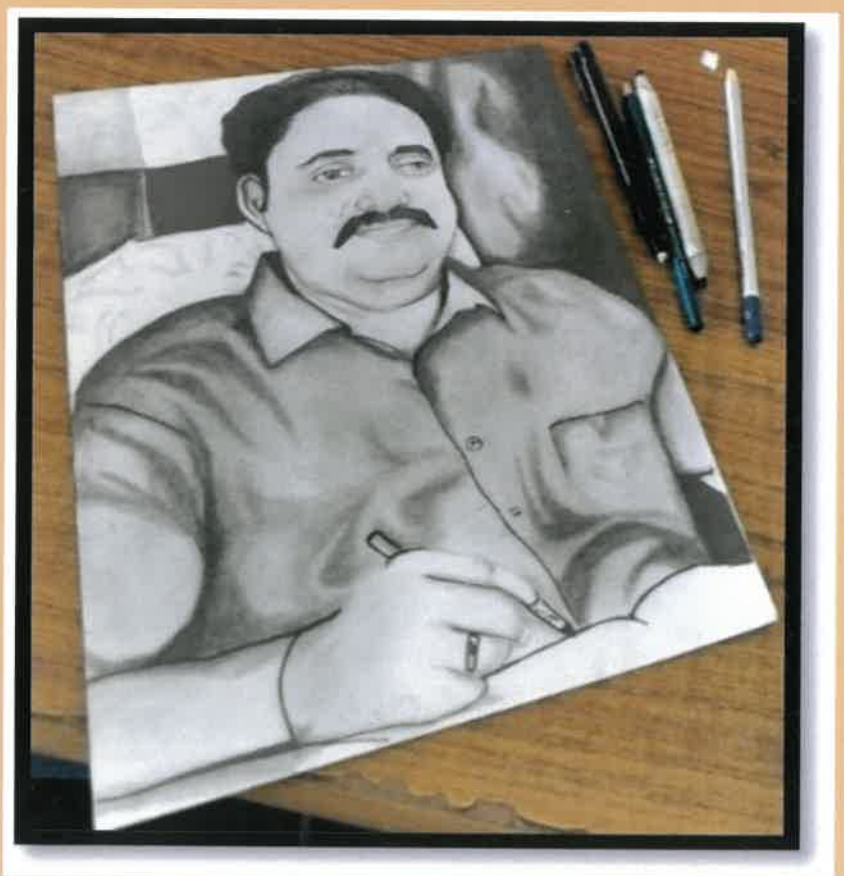
Adhoc addition of structural support/ einforcement- It is the most common form of seismic retrofit, i.e. addition of exterior reinforcement, exterior columns (for historical structures) etc. come under this category. The strengthening may be carries out by connecting existing elements or addition of walls, frames etc. Simplified Evaluation Procedure – ATC–14 (A Handbook for Seismic Evaluation of Existing Buildings and Supporting Documentations) is a document in which a simplified method of seismic evaluation of different types of buildings is recommended. However it has been modified by a number of Indian conditions and requirements and is available in different ways. The purpose of evaluation is to identify the buildings or building components that are risky to human lives. Visual Inspection Method – It is generally used in earthquake damaged buildings. Based on the visual observation and modes of failure of building components, one estimates that the particular building may be used in future or not.

N. NITHISH
B.E CIVIL (II YEAR)
621322103029

Sunsets are the most beautiful part of a day. Just take a breath and you can smell the colors chang-ing in the sky. And that is how we witness a miracle. A miracle that changes our fears and stress to a silent bliss. Peace creeping in like silent visitors as we see the clouds slowly moving in the pink sky with a tinge of tanger-ine to it. T he sky teaches us to re-main calm and to let the clouds of life take us through the jour-ney of beautiful uncertainties.

Incandescence

VD PHOTOGRAPHY



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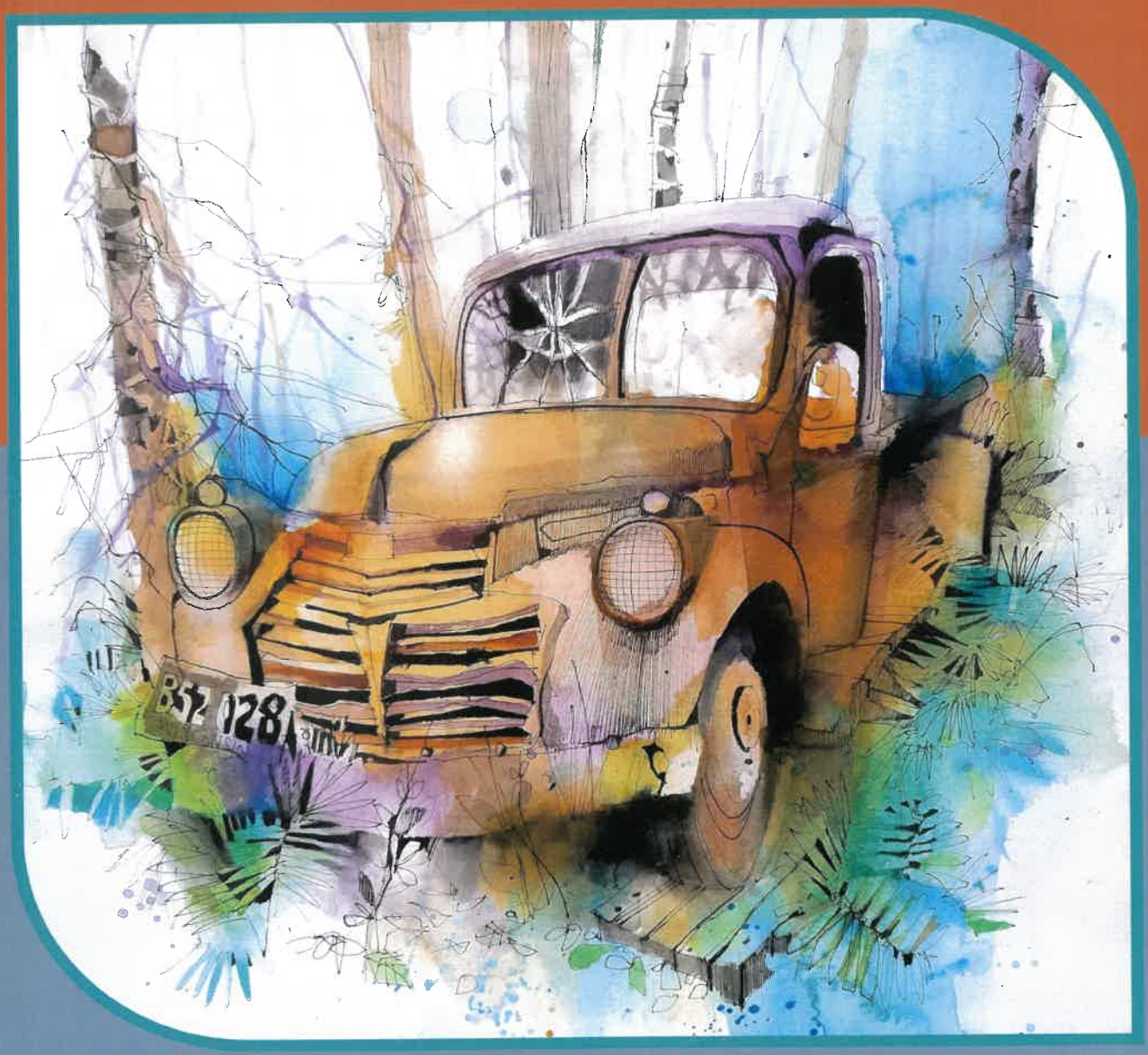

we are the masters of
our imagination

R.BARAT
B.E CIVIL (IV YEAR)
621320103003

M.SARAN
B.E CIVIL (II YEAR)
621322103042

COLLEGE VISION

"To become an internationally renowned educational research and development by transforming the students into competent professionals with leadership skills and ethical values".

MISSION

- Providing the best Resource and Infrastructure
- Creating Learner - Centric Environment and continuous Learning
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- Enriching Employability and Entrepreneurial skills
- Adapting to changesfor sustainableDevelopment

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DEPARTMENT VISION

To be recognized globally pre - eminence in Civil Engineering education,research and Social service.

MISSION

- To produce well reformed graduates with engineering skills for professional practice, advanced study and research through state of art infrastructure facilities and adopting innovative teaching methods
- To inculcate professional and ethical responsibilities related to industry, society and environment.
- To interact with industries and address issues related to infrastructure, public health and environmental protection for sustainable development..