BUNIYAAD

a technical magazine by

Department Of Civil Engineering

Ambalika Institute of Management & Technology, Lucknow

JULY-2023

The Institute was established in 2008 as a private engineering and management college in (Mohanlalganj) Lucknow, Uttar Pradesh India and is affiliated to AKTU and BTE and Approved by AICTE. The Lucknow campus is spread over vast 200 acres and is located near NH-56B, surrounded by lush green field and enhanced by a beautiful lake. The institute is 24 kilometers from Lucknow Railway Station and 20 kilometers from CCS Airport, Lucknow. It is very well connected to the district headquarters.

Ambalika center of excellence has become the most dominating center delivering high-end technical skills to our engineers to make them highly employable. AIMT, Lucknow is imparting training and joint certification programs of innovative technologies in collaboration with the Industry giants such as Microsoft, KUKA Robotics, Siemens, Ace Micromatics, MTab, and Master CAM etc.

Departmental vision

To create high quality civil engineers with knowledge par excellence who may contribute in nation building with highest moral and ethical values as true citizens of a civilized society.

Departmental mission

To adapt teaching and learning process that gives student power to think and to analyze

To impart practical knowledge by means of lab exposure and industrial interaction

To conduct co-curricular activities for updation of technological advancement

To impart moral and ethical values by means of various programs

Head of the Department

SURYAKANT SHUKLA

M.Tech (Civil Engineering)
B.Tech (Civil Engineering)

I am very pleased that we have successfully published the "JULY-2023" edition of our departmental magazine "BUNIYAAD". The technical magazine is a combined effort the students, faculty members and the magazine team. It gives a overview of the major projects taken up in the department. The Magazine article gives an insight of various aspects of Civil Engineering. This Magazine has served as a platform to students and member of the faculties to present their unique ideas. The Magazine is a sincere effort to bridge the gap between theoretical knowledge and practical application of Civil Engineering.

I would like to congratulate the editorial team and the members of faculty for working together as a team in publishing this Magazine. I hope the Magazine re-energizes the perspective of Civil Engineering and the Magazine is a Success.

CONTENTS

STUDENT'S SPACE

Waste Plastic Bricks

Plastic is a non bio-degradable substance which takes thousands of years to decompose that creates land as well as water pollution also to the environment. The quantity of plastic waste is expanding very rapidly. It is estimated that the rate of usage is double for every 10 years. The plastic usage is large in consumption and one of the largest plastic wastes is polyethylene (PE). The utilization of earth based clay material resulted in resource depletion and environmental degradation.

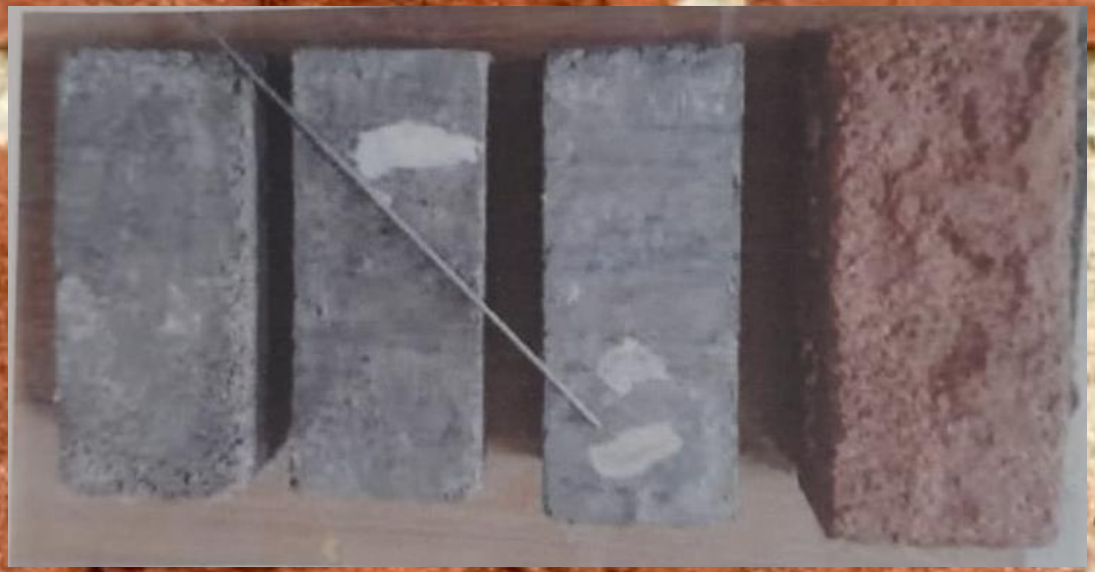
One such effort is the efficient use of waste plastic and laterite quarry waste with a small quantity of bitumen, to develop an alternative building material such as bricks with negligible water absorption and satisfactory strength in comparison with laterite stone to satisfy the increasing demand of conventional building materials.

Utilizing waste plastic as construction materials especially in the manufacturing of bricks is one of the promising steps towards a sustainable resources and waste management. Plastic waste can substitute either partially or completely one or more of the materials in the brick production.

The proposed project presented above intends to resolve in reducing the plastic waste disposal problem as it utilizes the waste even in its finest form and converts that useless material into a useful construction material. Crusher machine or Shredder plays a prominent role in the conversion of waste plastic into its grinded or powdered form. Also, shredder machine does not possess any threats to the environment and hence can be used without any restriction.

- It also helps in reducing the usage of natural resources which are utilized during the manufacturing of plastic bricks; also it reduces the pollution which is generated from kiln during brick manufacturing.
- The final end product can be used as brick, which is having a higher strength than conventional brick. Also, the water absorption capacity is higher in comparison to conventional brick with a lower weight.
- Its uses are not restricted as only brick; it can even be utilized as a building block by increasing the dimension of the mould.
- Also, it reduces the use of wire used for fencing. Floor tiles, sleepers, etc. can also be produced from it.

- This brick also turns out to be economical than conventional brick, by reducing the cost of incinerators for burning purpose and landfills.
- The waste plastic can also be recycled and reused; so that, less pollution could be done and the environment can become friendly.
- The waste plastic can also help in the making or the construction of roads other than the bricks.
- The overall cost of the plastic brick will get reduced. Plastic sand bricks give an alternative option of the bricks to the customers at the affordable rates.



Waste plastic bricks with traditional brick

Arpit Sharma
B.Tech CE-4th Year

SELF HEALING CONCRETE

What is self-healing concrete?

It is a bacterial concrete which fills up cracks by producing calcium carbonate crystals with the help of bacterial reaction in the concrete. Bacteria which are embedded in the concrete while mixing precipitates calcite when comes in a contact with water. The process of self-healing cracks by the help of bacterial reaction in the concrete after hardening is known as Self-Healing Concrete.

Mechanism of self-healing concrete

Self-healing concrete is a result of biological reaction of limestone and calcium based nutrients with the help of bacteria. While preparation of concrete, bacteria are added in wet concrete when mixing is done. When water seeps through cracks in concrete, the pores of the bacteria germinate and start feeding on the calcium consuming oxygen. This soluble calcium lactate is converted to insoluble limestone, which starts to harden thus filling the crack automatically without external aide.

Why bacillus bacteria?

Bacillus bacteria have a positive effect on compressive strength of concrete. Water and cement mixture has high pH value around 13 in which most of micro-organisms die but these bacillus bacteria are alkaline resistant. They withstand the harsh environmental conditions. They are harmless to human life.

Bacillus Bacteria

Prashant Shukla
B.Tech CE 4th Year

WASTE PLASTIC ROADS

Plastics are user friendly but not eco-friendly as they are non biodegradable. Generally it is disposed by way of land filling or incineration of materials which is extremely risky. This waste plastic can be partially mixed with material use for road construction. In conventional road making process bitumen is used as binder. Such bitumen can be modified with waste plastic pieces. This waste plastic modified bitumen mix shows better binding property, stability, density and more resistant to water.

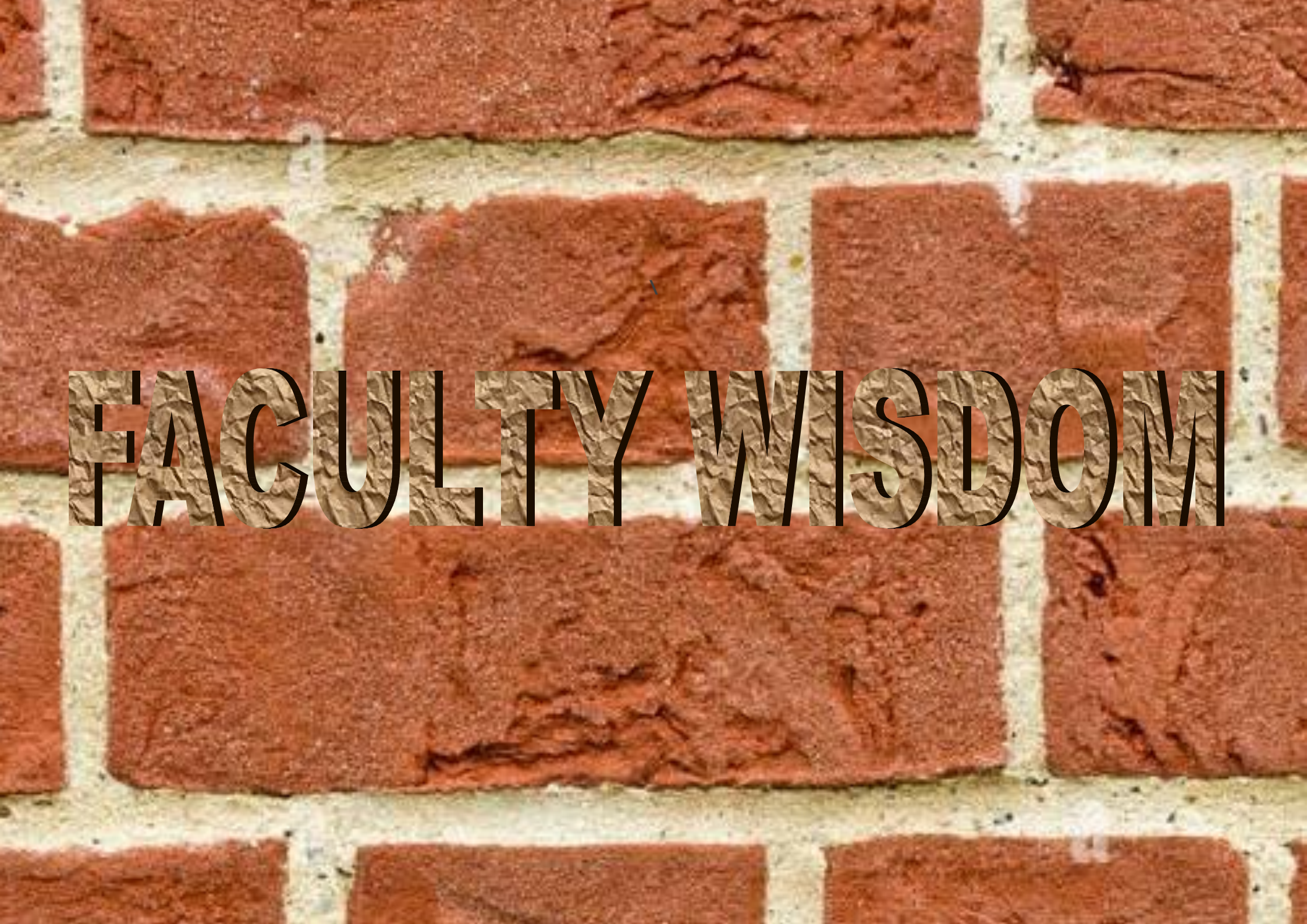
Worldwide use of waste material in road construction is being increasingly encouraged so as to reduce environmental impact. The use of this innovative technology will strengthen the road construction and increase the road life as well as will help to utilization of waste plastic material. Plastic roads would be a blessing for hot and extremely humid climate, where temperatures normally cross 50°C and abundant rains create damage, leaving most of the roads with big potholes.

The main aim of this study is to focus on using the available waste/recycled plastic materials and waste rubber tires present in abundant that can be used economically and conveniently.

Using this technique for road construction proves eco-friendly, economical and use of plastic will also give strength in the sub-base course of the pavement.

A MODEL OF WASTE PLASTIC ROAD

Laiba Aziz Khan
Prachi Verma
B.Tech CE-4th Year


FACULTY WISDOM

Satellite Rainfall Estimation

Prashant Mishra
M.TECH (Remote Sensing)
B.Tech (CIVIL ENGINEERING)

Being an important component of the hydrological cycle, there is a great need for accurate estimation of the rainfall. Although the rain gauge networks can estimate the rainfall with a good accuracy but they are non-uniformly and are sparsely distributed. Therefore it was required to estimate the rainfall on a spatially uniform and closer network, without leaving even the inaccessible points (Mishra et al., 2010). This was possible only by the satellite rainfall estimation. Using advanced remote sensing tools and techniques as satellite rainfall estimation would provide reliable and timely data to supplement the gauge stations and fill in the data gaps to forecast floods with greater accuracy.

Satellite rainfall estimations are primarily done with the help of two types of meteorological satellites, geostationary satellites and polar orbiting satellites. The orbits of geostationary satellites are such that they rotate at the same speed as the earth and hence appear to be stationary relative to any point on the Earth. Geostationary satellites provide continuous observation of the earth's surface and provide data on a half hourly basis. Imagery obtained from these satellites is mainly visible (VIS) and infrared (IR) at resolution of about 4 km, with information on clouds collected once every half an hour (Kidd et al., 2009). Though a continuous coverage is provided by these satellites they are said to be limited by their range and resolution

of the imagery. There are several operational geostationary meteorological satellites in orbit such as the MTSAT, GOES, Mateosat, FY series, and INSAT.

The second types of satellites are the polar orbiting satellites. Polar-orbiting satellites travel in a circular orbit from pole to pole orbiting at an altitude of about 800 km and use MW (Microwave) channels. The orbits of these satellites are such that they pass the equator at the same local time on every orbit, providing about two overpasses each day. These satellites carry a range of instruments such as MW sounders and imagers that are capable of more direct measurement of precipitation.

The polar orbiting satellites include the NOAA-17 and 18, DMSP-F13, 16, 17, FY-1D, and METOP-A operated by various operational agencies.

The satellite rainfall estimation techniques can be divided in three wide groups:

- **Visible/Thermal Infrared Estimation**

This is usually done by the sensors, which are mounted on geostationary satellites. The visible (VIS) and infrared (IR) sensors uses cloud top temperatures which are indirect measurements but provides rapid temporal update cycle with a continuous temporal coverage every half an hour needed to capture the growth and decay of precipitating clouds.

- **MW Estimation**

MW estimation is considered better because MW can penetrate through the clouds and give us the information about the vertical profile of the clouds. The drawback associated with MW estimation technique is that MW sensor can-not be mounted on geostationary satellite owing to lower energy in MW band. Therefore it's mounted on low orbiting satellites and its temporal frequency is lesser as compared to VIS and IR sensors mounted on geostationary satellites. However MW estimation very accurate.

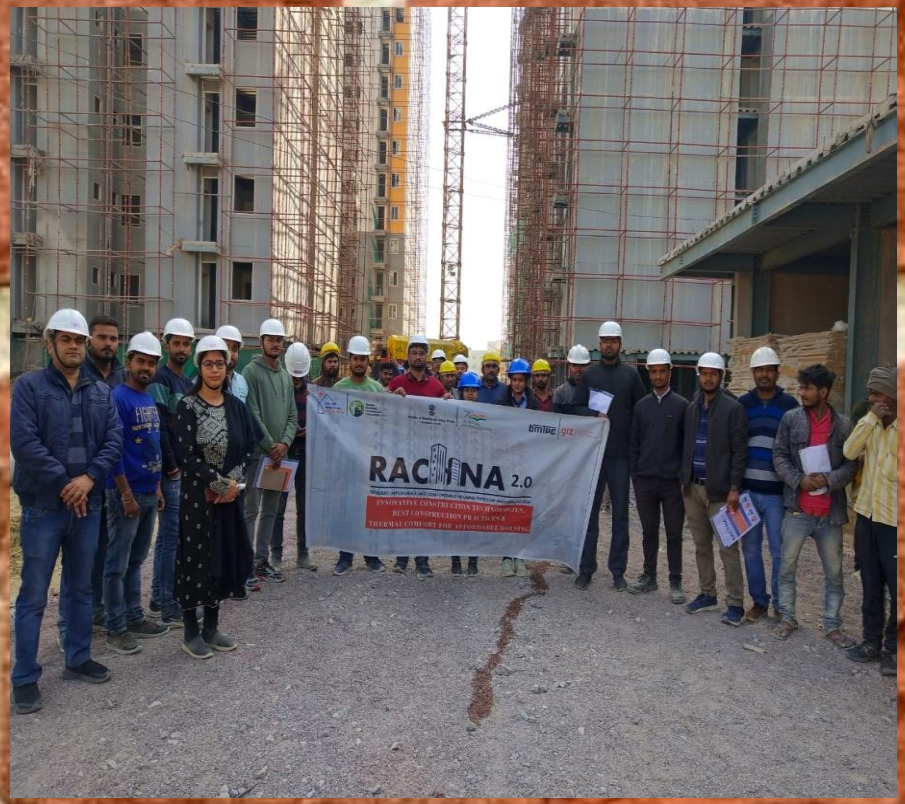
- **Multispectral Rainfall estimations**

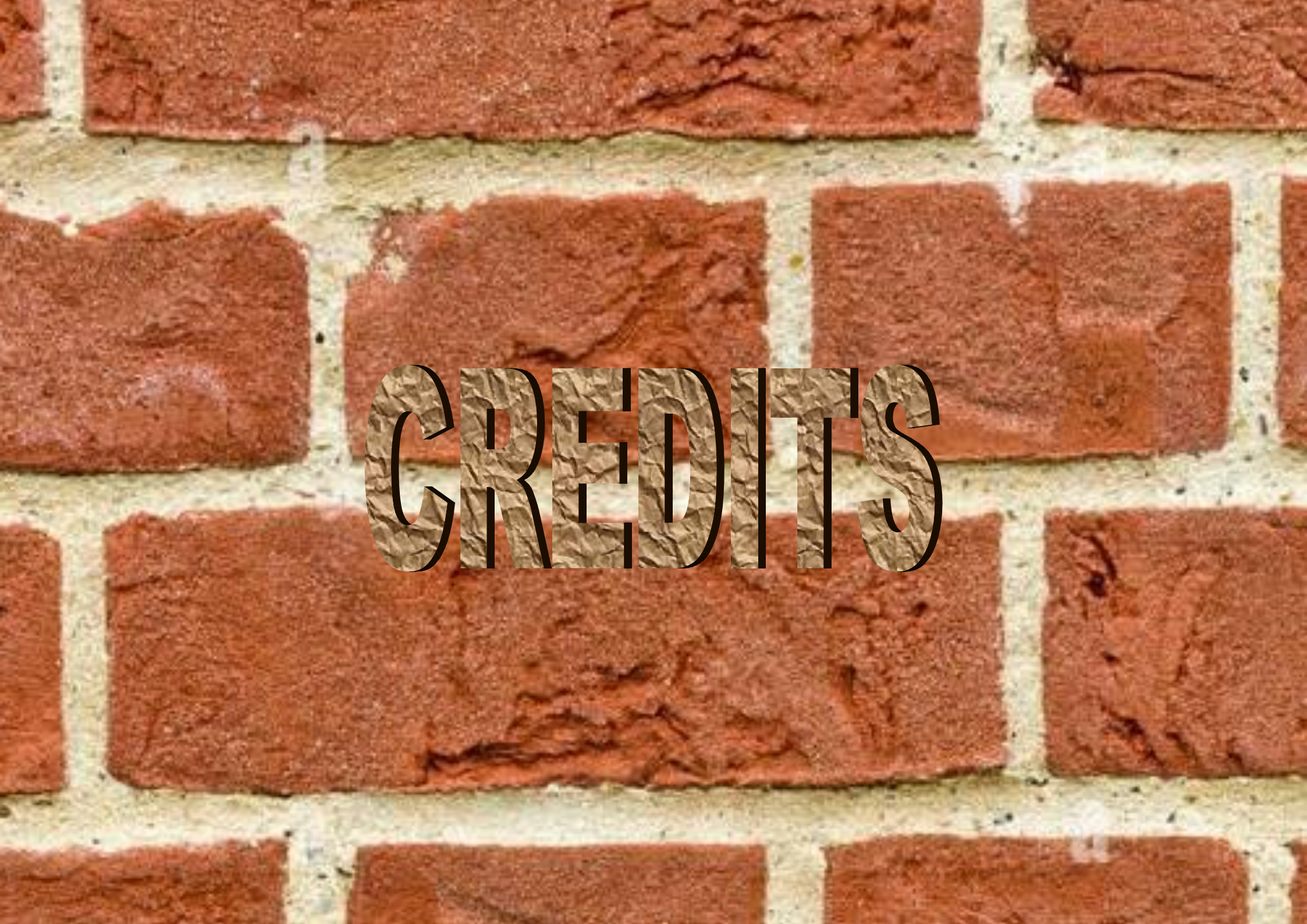
The TIR sensors do not have the ability to detect signal from the variable vertical cloud profile. The MW sensors have the ability to detect the variable vertical profile as they can penetrate through the clouds. On the other hand MW sensors do not have good temporal resolutions as they are mounted on low orbiting satellites, because of low energy in the MW band. Thus both of MW as well as TIR sensors have their shortcomings and strengths .The complementary strengths of MW and TIR are combined to produce rainfall estimation data products. Techniques to generate merged products of high resolution precipitation estimates are relatively new and evolved rapidly in recent years (Xie et al., 2007). As each of the techniques based on IR and MW sensors described above have their strengths and limitations, techniques in combining these satellite data have been developed to improve accuracy, coverage and resolution for better rainfall estimates (Huffman et al., 2007).

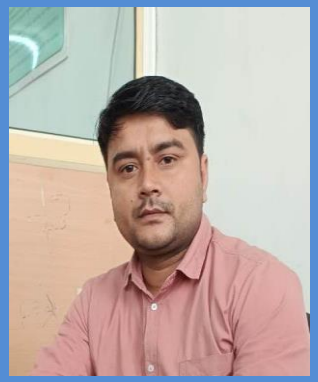
Prashant Mishra
Assistant Prof.
Department of CE


INDUSTRIAL VISIT

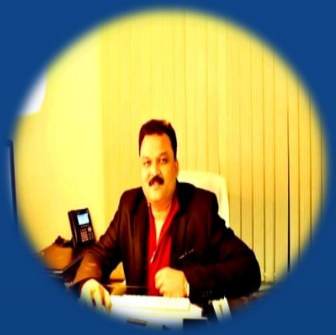
Industrial Visit for making the students familiar with the practical aspect of Civil Engineering was organized on February 3rd, 2023 under the RACHNA 2.0 scheme of the Government of India. Students of third year and final year of civil engineering were taken to the site where the construction of a G+21 multistory building was underway. The site is located in the Vrindavan colony, Near NH56. Few snippets of the visit are presented below.




CREDITS

Suryakant Shukla Asst. Prof. Dept. of CE		Prashant Mishra Asst. Prof. Dept. of CE	
Prashant Shukla B.Tech CE-4th Year		Arpit sharma B.Tech CE-4th Year	
Laiba Aziz Khan B.Tech CE-4th Year		Prachi Verma B.Tech CE-4th Year	

OUR PATRONS



Mr. Ambika. Mishra

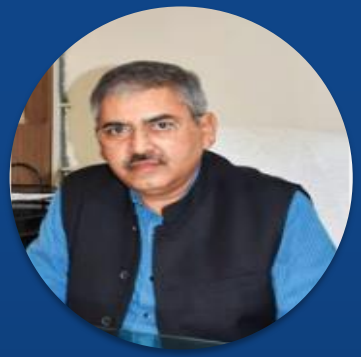
Executive Director

AIMT, LUCKNOW

Dr S.Q.Abbas

Director General

AIMT, LUCKNOW



Dr. Ashutosh Dwivedi

Director

AIMT, LUCKNOW

Dr. Shweta Mishra

Addl. Director

AIMT, LUCKNOW