

दशगौरीकौण्ड

BY DEPARTMENT OF CIVIL ENGINEERING

VOLUME:

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**DR. B.C. ROY
SOCIETY
ENGINEERING**

DR. B. C. ROY ENGINEERING COLLEGE

AFFILIATED TO MAKAUT & APPROVED BY AICTE, MINISTRY OF EDUCATION, GOVT. OF INDIA

DURGAPUR

EDITOR'S MESSAGE

Dear Readers,

It gives us immense pleasure to announce the fourth edition of our departmental E-magazine '*CIVILOHOLIC*'. We are proud and hopeful that the magazine would surely unfold the most innovative ideas of the students and the faculty members of our organization.

The magazine is to be viewed as a launch pad for the student's creative urges to blossom naturally. As the saying goes, mind like parachute works best when opened. This humble initiative is to set the bored and budding minds free allowing them to roam freely in the realm of imagination and experience. The enthusiastic work of our young writers and experienced faculty members are undoubtedly sufficient to hold the interest and admiration of the readers. We believe that success depends on the power to observe, perceive and explore. The magazine comprises contents related to technical aspects of Civil Engineering as well as poems, photography, Drawings, Stories, Non-technical writings etc. We are sure that the hard work, positive attitude, continued relentless efforts and inventive ideas exhibited by our students to bring excellence to this treasure of trove would surely stir the mind of the readers.

The herculean task of editing this magazine would not have been possible without the sincere support of Prof. Koynndrik Bhattacharjee, Prof. Anupam Biswas and the editorial team of 3rd year students Manas Saha & Joydeep Mondal. It is a fine thing to have the ability but the ability to discover ability in others is the true test. I am thankful to all my co-editors who dipped in the turbulent water of the magazine and sailed it to the shore of publication. I am thankful to our Head of the Department Dr. Sanjay Sengupta, to give me the opportunity to be the editor of this magazine. Also, I am thankful to Dr. Sanjay S. Pawar (Principal, BCREC), Dr. K. M. Hossain (Vice-Principal, BCREC) for their continuous support. I heartily wish all the readers my best wishes and hope this magazine will enjoy your critical acclaim and prove itself best.

MANAS SAHA

Chief Editor, CIVILOHOLIC

3rd Year, Department of Civil Engineering

DR. B.C. ROY ENGINEERING COLLEGE, DURGAPUR



HOD'S MESSAGE



A hearty and warm greeting from the Department of Civil Engineering at Dr. B.C Roy Engineering College, Durgapur. It is a matter of immense pleasure for me that our departmental e-Magazine Civiloholic which started its journey in the year 2021 has successfully published three issues earlier with the immense and commendable effort of the student and faculty editorial board members and support of the students and faculty members who have contributed for the magazine. Now the fourth volume of Civiloholic is being published and I am sure that this volume will provide much better and improved insight than the previous volumes. I would like to take the opportunity to sincerely thank each and every member who has contributed for successful publication of this issue. My special thanks to the editorial team members who have constantly encouraged students to participate and showcase their talents by publishing through this magazine.

At this onset, I would also like to highlight some of our departmental recent achievements. A group of thirty students participated in the Tech Fest 'Megalith' organised by the Department of Civil Engineering of IIT Kharagpur and outstandingly performed well and won all the three prizes in the model competition. The placement of final year students is reaching high with almost seventy percent students getting campus placements in core Civil Engineering Industry by March, 2024 and many more campus placement opportunities are in the pipeline. With the demanding industry need of core industry for fresher's with project management knowledge department has organized certification workshops through professional expert agencies. Department is trying its best to give the students hands on experience while learning their core subjects through site visit of different core civil engineering work. Good internship opportunities of the students are another important point to highlight. Twenty students have successfully completed NHAI paid internship. Students are getting opportunities for internship in the renowned companies e.g. Saporji and Palonji Ltd. Department is continuously trying for building up a strong alumnus connect and in recent past many career counselling sessions are organized with the help of alumni. Strong alumni connect and information sharing also shows a tremendous achievement of the students in different Govt. sector jobs. Department has two vibrant student chapters with recent addition of Student chapter of Indian Society of Earthquake Technology, Roorkee.

With the primary focus on the study department always encourages its students for demonstrating their talents in different other extra and co-curricular activities. I am sure that in the years to come the department will carry on its different activities with more zeal and enthusiasm and constantly strive towards creating a comprehensive learning platform for the budding Civil Engineers. Core Civil engineering will remain the focus and department will continuously endeavour for nation building by infrastructural development support through the students and expertise of the faculties.

DR. SANJAY SENGUPTA
HOD (CIVIL ENGINEERING)
BCREC



ADVISORY COMMITTEE



PROF. ANUPAM KR. BISWAS
DEPARTMENT OF CIVIL ENGINEERING
DR. BC. ROY ENGINEERING COLLEGE



PROF. KOYNDRIK BHATTACHARJEE
DEPARTMENT OF CIVIL ENGINEERING
DR. BC. ROY ENGINEERING COLLEGE

MEET THE EDITORIAL TEAM



MANAS SAHA

CHIEF EDITOR AND DESIGNER (CIVILOHOLIC)
3RD YEAR (DEPARTMENT OF CIVIL ENGINEERING)



JOYDEEP MONDAL

CO-EDITOR (CIVILOHOLIC)
3RD YEAR (DEPARTMENT OF CIVIL ENGINEERING)

OVERVIEW OF CIVIL ENGINEERING DEPARTMENT

VISION



To transform the department into a global center of learning through synergic application of understanding, creativity, innovation and discipline.

OVERVIEW



The department of Civil Engineering was established in the year 2010 and the first batch graduated in the year 2014. The department has highly qualified faculty members who are dedicated for quality education to students. The laboratories of the department are well equipped for undergraduate level of studies. A project lab is being established looking at the recent needs in Civil Engineering where students will be able to do hands on project. Since its inception the department has produced quality students who are presently doing well in their professional life in different areas of Core Civil Engineering, Software Engineering, Government Services and different other allied sectors. Department encourages students to pursue higher studies in different areas of Civil Engineering after qualifying GATE examination, MBA and studying abroad. Department has MoU with NHA where paid internship opportunities are available. Department has well connected established relationship with various other companies and Government organizations where internship/ industrial training opportunities are created for the students. Department organises regular site visit / industrial visit for students to provide the students with the feel of practical & industry exposure from second year onwards. There are established student chapters in the department where the students are encouraged to become member and showcase their technical and managerial skill through organising different events. Since its inception the department is trying its best to improve the quality of education such that the students get the best kind of placement opportunities.

MISSION



To provide a great platform for learning by offering a variety of subject choices covering broad frontier areas of civil engineering. To inculcate in students a commitment to ethical and sustainable engineering practices, social responsibility and foster leadership qualities. To collaborate with industry and academia for achieving excellence in research, consultancy and entrepreneurship developments. To develop and maintain quality education through active collaboration with all stakeholders, including students, teachers, industry, alumni, and renowned academic and research institutions.

LABORATORIES

- 🌀 Solid Mechanics Lab
- 🌀 Surveying and Geometrics Lab
- 🌀 Fluid Mechanics Lab
- 🌀 Engineering Geology Lab
- 🌀 Soil Mechanics Lab
- 🌀 Concrete Technology Lab
- 🌀 Computer Aided Drawing Lab
- 🌀 Water Resource Engineering Lab
- 🌀 Environmental Engineering Lab
- 🌀 Material Testing Lab
- 🌀 Highway & Transportation Engg. Lab.
- 🌀 Project Laboratory



 DR. B.C. ROY
SOCIETY
ENGINEERING

SCAN & SEE OUR
DEPARTMENTAL VIDEO



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SEMINAR ON "3D MODELLING AND ANALYSIS SOFTWARE."

In association with the CADD Centre Durgapur, Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur have organised a seminar on the topic of "3D Modelling & Analysis Software's on 19th July 2023. Along with the resource person, a team of 4 people from the CADD Centre Durgapur delivered a lecture on the different design & analytical software's which are having numerous applications in the Civil Engineering industry. Students were delighted as they got some basic ideas about the software's related to the design sector.

ALUMNI CONNECT PROGRAMME

After a long time, an alumni connect program have been organized by the Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur. Alumni are great role models for current students and are often well placed to offer practical support to students as they start their careers. Alumni are often in the position to engage the expertise of the institution in their professional lives. Three of our alumni from the department of civil engineering are coming to our Dr. B C Roy Engineering College, Durgapur for sharing their experiences and expertise with the present batches. *Subham Chakraborty*, *Somnath Rakshit* and *Shuvrapratim Bera* are the alumni of 2020 batch. The hardships they have faced, the knowledge as well as requirement of patience, challenges in the field work, etc. were explained by them. An excellent program was hosted by our respected Prof. Amit Kotal sir. The alumnus interacted with the other faculty members of our department in the end. Prof. Arijit Kumar Banerji sir felicitated the alumnus during the program. Department of Civil Engineering looking forward to organize such events on a regular basis.



SEMINAR ON "WASTE TO WEALTH"

We have successfully organized the Seminar "Waste to Wealth: Plastic Waste and Its Relevance". Dr. Biswajit Ruj, the Chief Scientist and Head, Skill & Innovation Promotion Group, CSIR-Central Mechanical Engineering Research Institute Durgapur India visited our department and delivered his talk on the said topic. This was a part of MoU between BCREC and CMERI. Students thoroughly enjoyed his lecture as the lecture was full of information, interactive. Dr. Ruj showed a video towards the end where the relevance of plastic waste was shown, which has been conducted in the laboratories of CMERI. Dr. Sanjay Sengupta, Head, Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur, Dr. Sourav Ranjan Das, Head, Department of BSH, BCREC, Prof. Sourav Bhattacharya, Assistant Professor, Department of BSH, BCREC, Dr. Tribeni Prasad Banerjee, Associate Professor, Department of ECE & Coordinator, Institute Industry Partnership Cell (IIPC), BCREC were present in the program along with the faculty members and technical assistants of Department of Civil Engineering, BCREC. The program has been successfully hosted by Prof. Md. Hamjala Alam and Prof. Amit Kotal. Dr. Ruj was very impressed with the students as they interacted and showed patience of listening to such a wonderful lecture.



SEMINAR ON GREEN TECHNOLOGY

Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur has successfully organized a one-day seminar on Green Technology Application for Steep Slope Stabilization for Infrastructure Protection. Prof. (Dr.) Sanjay S Pawar, Principal, BCREC was present during the inaugural session. Prof. Sanjay Sengupta, Head, Department of Civil Engineering, BCREC welcomed the guests. Mr. Syed Samsun Nabi and Mr. Pradip Kumar Choudhury were the expert speakers who presented their lecture in front of 80 students from our department and Dr. CK Ashok Kumar, Mr. Benito Castorina and Prof. Madaswamy Moni joined us through the virtual mode. All of them explained the different technologies applied nowadays to stabilize the soil slopes, which have their applications in the field of Highways, Bridges, Hydraulic Structures. Mr Nabi brought a few samples of a plant called as Vetiver, which helps in slope stabilization by growing through its root. These samples were planted in the Water Resources Engineering laboratory in the BCREC campus. Special thanks to Prof. Md. Hamjala Alam and Prof. Amit Kotal for organizing the program successfully.



TEACHERS DAY CELEBRATION

Civil Engineering Society celebrated Teachers Day to honour all the excellent teachers who work every day to ensure the future is bright for all of us. On the occasion of birth anniversary of Dr. Radhakrishnan, students of our department have successfully organized the program of Teachers' Day. Head of the Department, Prof. Sanjay Sengupta, along with all the faculty members were present in the program. Cutting of cake, Dance performances from our students, motivational speech from the HOD and distribution of sweets - this is how the program was decorated. All the students enjoyed this celebration as well as the light refreshment provided towards the end.

ENGINEERS DAY CELEBRATION

On the birthday of Dr. Mokshagundam Visveshwaraya, Engineer's Day Celebration at Dr B C Roy Engineering College, Durgapur took place. The program was organized by the IEI Students' Chapter of Civil Engineering in collaboration with the Institution of Engineers (India) Durgapur Local Centre. Today is the 56th Engineer's Day of India and the students organized a poster & competition on the theme of "Engineering a Resilient Future: Building Stronger, Smarter, Safer". Er. Dhruva Banerjee (FIE & Former GM (Mills) SAIL) and Er. Parasuram Shaw (FIE & Chief GM (HRD), Management Training Institute, SAIL) graced the occasion as the evaluator in the poster & model competition. Prof. (Dr.) Sanjay S Pawar, Principal, BCREC, Dr. Sanjay Sengupta, HoD, Department of Civil Engineering, Dr. Arindam Ghosh, HOD, Department of CSE and Institutional Coordinator of IEI Students' Chapter Prof. Bappaditya Das were also present in the event. Dr. Sayantan Dutta, Departmental Advisor of the IEI Students Chapter (Civil Engineering).

Also, the students of Indian Society of Earthquake Technology ISET Students' Chapter from the Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur celebrated the Engineers' Day 2023. A lecture on the Relevance of Earthquake Technology in Civil Engineering was delivered by Prof. Sanjay Sengupta, HoD, Department of Civil Engineering & IQAC Convenor, BCREC. The earthquake, its understanding, the need of earthquake resistant infrastructure, the technologies involved to minimize the devastating effects were discussed with the students. In the end, the students paid their humble tribute to Er. M. Visveshwaraya.



A SEMINAR ON IOT DEVICES AND ITS IMPORTANCE IN CIVIL INDUSTRY

Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur have recently organized a Seminar. The resource person, Dr. Animesh Paral is a professional from the industry. The uses of AI technique, IoT devices, the importance of software in the application of Civil Engineering were discussed. Around 25 students from 2nd years participated in the event.

PARTICIPATED INDIA'S LARGEST CIVIL ENGINEERING TECHNICAL FEST MEGALITH IIT KHARAGPUR

Megalith, the annual technical fest of the department of civil engineering at the Indian Institute of Technology, Kharagpur, held under the aegis of the civil engineering society, IIT Kharagpur, and patronized by the institution of civil engineers (UK), IIT Kharagpur chapter, has achieved tremendous success since its 2009 inception. It stands as India's largest Civil Engineering Technical Fest, offering diverse competitions, workshops, and guest lectures. This year in Megalith, IIT Kharagpur, a group of 30 students (2nd year & 3rd year) from the department of civil engineering, Dr. BC. Roy engineering college, Durgapur participated and won the accolade for the Institute and department. The multiple prizes of different events are achieved by 2nd and 3rd year students of BCREC Civil Engineering Department. Students of BCREC have shown consistency as the students of the 2024 batch went there and won in several events. The faculty members like Prof. Anupam kumar Biswas, Prof. Md. Hamjala Alam and others motivated the students and helped them with the concepts of these models. It's team work, and certainly, the **"MIGHTY CIVILIANS"** have done an exceptional job.



SITE VISIT ON BCREC CAMPUS (BEHIND THE CANTEEN)

On 7th march 2024 our department arranged a Site visit for the students of 3rd year at inside the BCREC Campus. It is located at behind the Canteen of BCREC. Prof. (Dr.) Sanjay Sengupta (HOD), Dr. Shovan Roy, (Assistant Professor), Dr. Sayantan Dutta, (Assistant Professor) and Mr. Ajitesh Bhattacharjee, (STA), Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur were present in this site. As the practicality of Civil Engineering is vast, the students need to understand the technology used in the construction site. On this site, the details of the foundation work the key plan that locate the position of the building and the general layout of the site works and also know the details about Bar bending Schedule was described. Students understood every detail about the site. They asked the questions to the engineers, as well as teachers present in the site and cleared their doubts. As a part of quality improvement and excellence in education, our department will look forward to arrange more visits in the coming days.



SITE VISIT ON SHANKARPUR, DURGAPUR (BIJOY DEVELOPERS)

On 13th march 2024 our department arranged another site visit for the students of 2nd and 3rd year. Prof. (Dr.) Sanjay Sengupta (HOD), Dr. Shovan Roy (Assistant Professor), Dr. Sayantan Dutta (Assistant Professor) and Mr. Ajitesh Bhattacharjee (STA), Department of Civil Engineering, Dr B C Roy Engineering College, Durgapur were present in the site, located near Shankarpur. These interesting sites offer practical insights into civil engineering and the Pile foundation work. As the practicality of Civil Engineering is vast, the students need to understand the technology used in the construction site and how the Pile Foundation are Constructed. On this site, the details of the foundation work and the project management was described. Students understood every detail about the site. Throughout the visit, safety measures were meticulously assessed to ensure compliance with industry standards. Progress on the project was explained. Students asked the questions to the engineers present in the site and cleared their doubts.



FOR MORE DETAILS ABOUT SHANKARPUR (BIJOY DEVELOPERS) PILE CONSTRUCTION SITE, KINDLY SCAN AND SEE THE VIDEO.

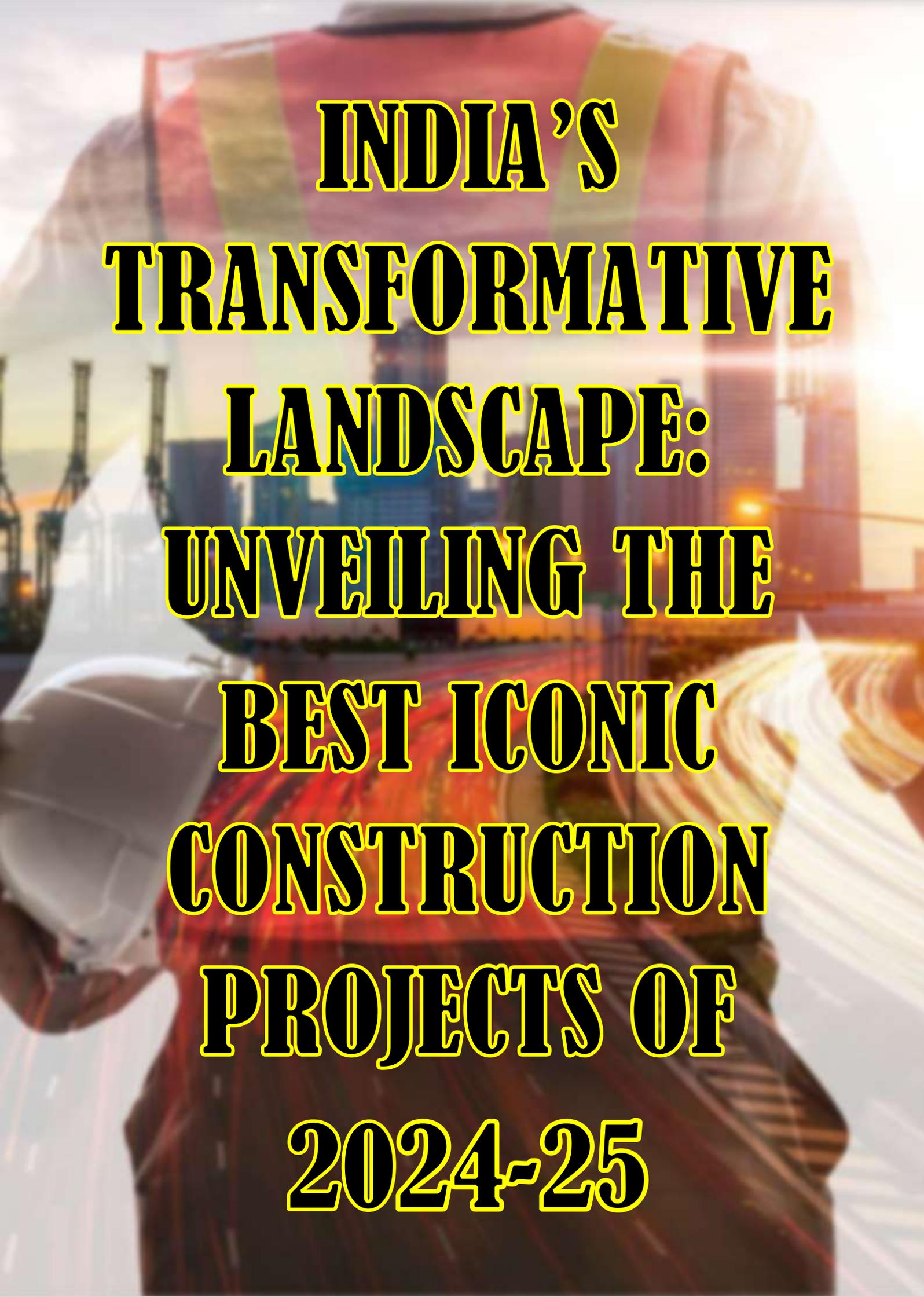
2 DAYS WORKSHOP ON REVIT AND MICROSOFT PROJECT.

In association with the Genex Engineering and Management Solutions the department of Civil Engineering, Dr B C Roy Engineering College, Durgapur have organised a 2 days' workshop on Microsoft project for 3rd year and Revit Architecture for 2nd year on 15 and 16th march 2024. Along with the resource person, a team of 3 people from the Genex Engineering and Management Solutions delivered a lecture on the project management skill through MSP and Revit Architecture which are having numerous applications in the Civil Engineering Industry. All the 2nd and 3rd year students are present in this 2 days' Workshop. Students were delighted as they got some basic ideas about the Project Management as well as Revit Software's.

MID-TERM PROJECT EVALUATION THROUGH POSTER COMPETITION FOR FINAL YEAR STUDENTS

On 12th April 2024, a Mid-Term Project Evaluation through Poster Competition was organized by Dr B C Roy Engineering College, Durgapur. Our final year students participated in the presentation. **Mr. Srikanta Mondal, Executive Engineer,** Asansol-Durgapur Development Authority (ADDA) was present as an external expert for the evaluation in the department. Dr. Dola Sinha, the Convenor of R&D Cell visited our department on the same day and Dr. K. M. Hossain, Vice-Principal, BCREC visited our civil department. The students performed well, they presented their ideas to the expert, who communicated in a friendly manner to encourage as well as to motivate them for further improvement.





**INDIA'S
TRANSFORMATIVE
LANDSCAPE:
UNVEILING THE
BEST ICONIC
CONSTRUCTION
PROJECTS OF
2024-25**

☑ **MUMBAI TRANS HARBOUR LINK- ATAL SETU, INDIA'S LONGEST SEA BRIDGE:**

Mumbai Trans Harbour Link (MTHL) or the Atal Setu is India's longest sea bridge and it is indeed a civil engineering marvel! PM Narendra Modi has inaugurated the MTHL or Atal Setu on January 12, 2024 in Mumbai. The inauguration of Atal Setu shows India's infrastructural prowess and underscores the country's trajectory towards a 'Viksit Bharat'. This project employed around 17,000 labourers and 1,500 engineers while also creating employment opportunities in the transport and construction industries. "Atal Setu project has been in the works since the 1990s and several attempts have been made to develop it. The project's foundation stone was laid by Prime Minister Narendra Modi in December 2016, and construction work started in April 2018. MTHL, India's longest sea bridge covering 21.8 km out of which 16.5 km is over the sea, the project costs a total of ₹17,843 crore. The bridge has a capacity to handle 70,000 vehicles per day with its intricate design and engineering marvels, the Coastal Road Project is not just a transportation solution but a symbol of Mumbai's commitment to sustainable urban development.



The Atal Bihari Vajpayee (Atal Setu): India's longest sea bridge

☑ **Navi Mumbai International Airport:**

The Navi Mumbai International Airport (D. B. Patil International Airport) stands as a beacon of progress, poised to become a key player in India's aviation landscape. As one of the most significant greenfield airports in the country, it promises to ease the burden on Mumbai's existing airport and boost regional connectivity. The airport's construction signifies a strategic investment in the nation's aviation infrastructure, fostering economic growth and global accessibility. Navi Mumbai International Airport (NMIA) is a greenfield international airport being built on the National Highway (NH) 4B near Panvel in the Raigad district of Maharashtra, India. It is located approximately 35km from Mumbai's existing Chhatrapati Shivaji International Airport (CSIA). The civil aviation sector is contributing to the rise of the economic power of India, Union Minister for Civil Aviation Jyotiraditya Scindia said commercial operations of the Rs 18,000-crore Navi Mumbai International Airport are expected to start by March 31, 2025.



Navi Mumbai International Airport

India's first underwater and deepest Metro Train service commences in Kolkata:

Kolkata had its name written in golden letters whenever there was talk of a rapid transit system in India. The city got the first metro in 1984, and now, in 2024, it will again be the first to have an underwater Metro.

Prime Minister Narendra Modi has inaugurated metro services in Kolkata on 6th march 2024, that included a 4.8-km underground section from Howrah Maidan to Esplanade. The underwater tunnel is part of this line connecting two century old cities. This is not just the first underwater metro but the route is also home to the country's deepest metro station — Howrah — situated 33 metres below the surface. The metro covers the 520 metres stretch under the river Hooghly in just 45 seconds. The starting of this East-West Metro will help decongest road traffic and provide seamless, easy and comfortable connectivity. The project is estimated to have cost Rs 10,442 crore, and is being executed by the Kolkata Metro Rail Corporation. The underwater stretch is 16.55 km-long, of which, 9.3 km route from Salt Lake Sector V to Sealdah is already operational.

Chenab Bridge:

Prime Minister Narendra Modi has inaugurated multiple projects in Jammu and Kashmir on 20th February 2024, including the Chenab bridge, the world's highest single-arch railway bridge yet. Taller than the Eiffel Tower in Paris, the inauguration of the bridge will mark the successful completion of what has been billed as the biggest civil-engineering challenge by any railway project in India's recent history. Approved in 2003 and contracted in 2008, after much worries over its safety and stability, the single-arch bridge over River Chenab in J&K passed all its mandatory tests and is set to mark India on the railroad history after two decades of waiting. It stands at the height of 1,178 feet above the riverbed, making it 35 metres taller than Paris' tourist icon, the Eiffel Tower. However, by itself, the Chenab bridge cost around Rs 14,000 crore. According to Indian Railways statement the Chenab bridge falls under the ambitious project of *Ek Bharat Shreshtha Bharat* which aims to connect Kashmir to the other states in the country. The bridges are expected to have a shelf life of around 120 years. It will also be able to withstand winds with speeds up to 260 km/per hour. This railway line shall also prove useful for the armed forces deployed in this geographically important region and also help boost tourism in India.



India's first underwater Metro Station, Kolkata



Chenab bridge (The World's Highest Railway Bridge in Jammu And Kashmir)

☑ Ayodhya's Holistic Development- Shri Ram Janmabhoomi Temple:

A new landmark of India - both structural and spiritual-rises on Ayodhya's horizon on 22nd January 2024 as a new-age architectural marvel of elegant sandstones, diligently carved by craftspeople with dedication and devotion to Lord Ram. The majestic Ram temple in Ayodhya is a sprawling structure, built by overcoming engineering challenges and with due sensitivity to nature. In an era where sustainability is paramount, the temple's construction, led by Larsen & Toubro. No iron or steel has been used in the construction of the grand structure. Stones have been sourced from Rajasthan's Bansi Paharpur area. The entire temple superstructure will eventually be three storeys G+2. The temple complex, built in the traditional Nagara style, will be 380 feet long from the east to the west, 250 feet wide and 161 feet high. Each floor of the temple will be 20 feet high and have a total 392 pillars and 44 gates. The pericota will be 14 feet wide and the periphery span 732 metres. The temple will be nestled within the pericota periphery.

During the excavation work, it was found that the ground was unsuitable for laying the foundation stone, a challenge that engineers overcame by creating an "artificial foundation" over which the superstructure sits. A major part of the temple compound will be a green area with hundreds of trees. The complex itself will be "*Atmanirbhar* (self-reliant)". The complex will have two sewage treatment plants, a water treatment plant and a dedicated electricity line from the power house. The fire brigade post will be able to source water from an underground reservoir.

The Shri Ram Janmabhoomi Temple construction is managed wholly by the Shri Ram Janmabhoomi Teerth Kshetra Trust and its estimated cost of the temple's construction is expected to range between ₹ 1,400 crore to ₹ 1,800 crore. It is important to remember that design thinking is not a rigid formula but rather a framework that can be adapted to the specific needs and context of the project. Through careful implementation and a commitment to inclusivity, design thinking can contribute to the creation of a Ram Mandir that is not only magnificent but also a source of unity and peace. Ayodhya, with the Ram Mandir as its focal point, is poised to become a religious and cultural tourism destination, attracting visitors who want to see the architectural marvel and feel the spiritual aura of this sacred city.



The Shri Ram Janmabhoomi Temple, Ayodhya

☑ **Dholera Smart City:**

Dholera SIR has been conceptualized as the first smart city of India, a city located in the dynamic state of Gujarat; it is all set to define how modern India shall look like in times to come. This project is a very ambitious and dream project of both central government and Gujarat government. A lot of development has to happen in Dholera to make it as a Smart City. Like, construction of a new International Airport, Metro train, DMIC, Power Hub project etc. It is going to be a very planned city in each and every manner. Of the 100 smart cities to be developed, Dholera SIR Gujarat is leading the vision that the central government has weaved. With Rs. 3,000 crore (appx) in its kitty and land allotted by the state government, SIR Dholera has kicked off the trunk infrastructure project on an activation area of 22.5 square kilometres. SIR Dholera has kicked off the trunk infrastructure project on an activation area of 22.5 square kilometres. The project should get completed by 2018-19 and shall comprise of roads, water and sewage treatment plants, common effluent treatment and many other amenities. The city shall be connected via several modes including an international airport, high speed metro, 6 lane expressway, national highways, railways and port. The free access of Dholera SIR Gujarat to the world gives the city the strength to develop itself as a potential global trading and manufacturing hub.



Dholera Smart City, Gujarat

☑ **Narmada Valley Development Project:**

The Narmada main canal was initially 458 km long with a carrying capacity of 1,133 cubic metres per second. “Its work was completed in 10 years about 69,000-km long canal that will provide irrigation benefits to 17.92 lakh area has been completed in 20 years. This scheme is going to be completed in the year 2025 at a cost of about Rs 79,000 crore,” More than 90 per cent of the catchment area of 85,000 square km is in Madhya Pradesh, while Maharashtra’s catchment area is 1,600 square km and Gujarat has a catchment area of 9,800 square km Out of 28 million acre feet, 9 million acre feet water is given to Gujarat and remaining 18 million acre feet goes to MP. The government said that 80 per cent of the drinking water requirement of the people of Gujarat is supplied by Narmada water. Through River Bed Power House and Canal Head Power House, total 421 crore power units (Rs 4 per unit) have been produced worth Rs 1,684 crore, the government also said that it is the highest power generation recorded in the history of Narmada scheme.



Narmada Valley Development Project

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BY DEPARTMENT OF CIVIL ENGINEERING

TABLE OF CONTENTS



TECHNICAL ARTICLES

- CIVIL ENGINEERING MARVELS OF INDIA.
- THE TRANSFORMATIVE IMPACT OF ARTIFICIAL INTELLIGENCE IN CIVIL ENGINEERING.
- NANOTECHNOLOGY IN CIVIL ENGINEERING.
- WASTE TO WEALTH IN CONSTRUCTION: MYTH OR REALITY?
- FERROCEMENT TECHNOLOGY.
- SOME COOLEST SUSTAINABILITY PROJECTS IN CIVIL ENGINEERING.
- ASTONISHING EARTHQUAKE RESISTANT STRUCTURE IN THE WORLD.
- STEEL SLAG ROAD.
- JAPANS EARTHQUAKE RESISTANT BUILDINGS ARE THE FUTURE OF REAL ESTATE.
- ISRO & INDIAN SPACE PROGRAMMES.
- UNVEILING KOLKATAS SUBAQUEOUS MARVEL: THE FIRST UNDER RIVER METRO.



NON-TECHNICAL ARTICLES

- DARKNESS BEHIND DEVELOPMENT: TELKUPI A NEGLECTED VILLAGE.
- SHANTINIKETAN: A UNESCO WORLD HERITAGE SITE.



PHOTOGRAPHY



POEMS

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| <input checked="" type="checkbox"/> আঠারো বছর বয়স | |



DRAWINGS



Technical

Articles



CIVIL ENGINEERING MARVELS OF INDIA

India is home to some of the most impressive civil engineering marvels in the world, each showcasing advanced engineering techniques, innovation, and architectural prowess. From towering bridges to intricate transportation networks, these structures have not only transformed the landscape but also enhanced connectivity, economic growth, and societal development. Let's delve into the details of some of these iconic marvels:

☑ **Statue of Unity, Gujarat:**

The Statue of Unity, dedicated to India's Iron Man, Sardar Vallabhbhai Patel, is the world's tallest statue, standing at a towering height of 182 meters. Located in Gujarat, this monumental structure required meticulous planning and engineering expertise to ensure structural stability and withstand natural forces. The statue's core is reinforced with a concrete framework, while its facade is adorned with bronze panels, meticulously crafted to depict intricate details. The engineering feat behind the Statue of Unity exemplifies India's capability to undertake and execute large-scale infrastructure projects.



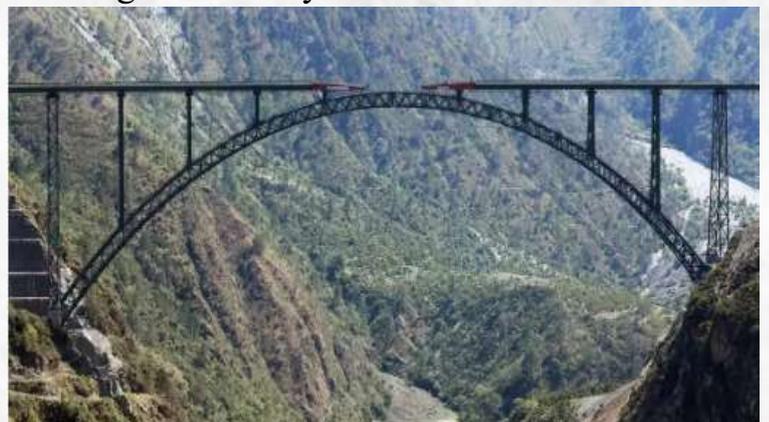
☑ **The Bandra-Worli Sea Link, Mumbai:**

Spanning across the Arabian Sea, the Bandra-Worli Sea Link is an engineering marvel that connects the suburbs of Bandra and Worli in Mumbai. This cable-stayed bridge stretches over 5.6 kilometres and stands as one of India's most prominent infrastructure projects. The bridge comprises pre-stressed concrete-steel viaducts supported by cable-stayed towers, designed to withstand high wind speeds and seismic activities. Its construction involved advanced engineering techniques to navigate the challenging marine environment and ensure durability against corrosion and erosion.



☑ **Chenab Bridge:**

Under construction in the northern state of Jammu and Kashmir, the Chenab Bridge is set to become the world's highest railway bridge upon completion. This engineering marvel spans the Chenab River gorge, connecting the Kashmir valley with the rest of India. Designed to withstand high winds, seismic activity, and extreme temperatures, the bridge utilizes state-of-the-art materials such as high-strength steel and concrete. Its arch-shaped structure not only ensures structural stability but also enhances the scenic



beauty of the region. The Chenab Bridge exemplifies India's commitment to infrastructural development in challenging terrains.

☑ **Delhi Metro Rail Network:**

The Delhi Metro Rail Network represents one of India's most ambitious civil engineering projects, catering to the transportation needs of millions in the bustling capital region. The metro system encompasses elevated viaducts, underground tunnels, and cutting-edge signalling technology to ensure safe and efficient commuting. Advanced tunnelling techniques, such as Tunnel Boring Machines (TBMs), were employed to navigate through challenging geological conditions beneath the city. The Delhi Metro stands as a model for sustainable urban transportation infrastructure, significantly reducing traffic congestion and air pollution in the national capital.

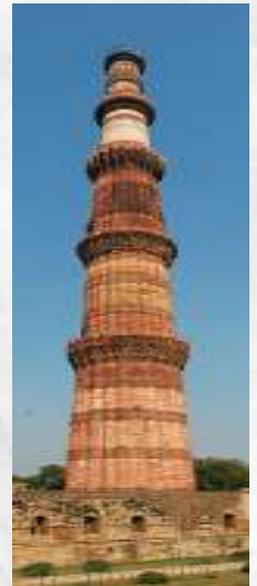
☑ **Taj Mahal:**

Standing as an epitome of love and architectural brilliance, the Taj Mahal in Agra is one of the most iconic structures in the world. Commissioned by Mughal Emperor Shah Jahan in memory of his beloved wife Mumtaz Mahal, the construction of this white marble mausoleum began in 1632 and took approximately 20,000 artisans to complete over 22 years. The architectural marvel is renowned for its symmetrical layout, intricate marble inlay work, and impressive structural engineering. Civil engineers of the Mughal era employed innovative techniques such as interlocking joints and angled walls to ensure the Taj Mahal's stability amidst seismic activities. The grandeur and beauty of the Taj Mahal continue to awe millions of visitors each year, making it a UNESCO World Heritage Site and a symbol of India's architectural excellence.



☑ **Qutub Minar:**

Located in Delhi, the Qutub Minar is another remarkable civil engineering marvel of India. Built in the early 13th century by Qutb-ud-din Aibak, the first ruler of the Delhi Sultanate, this UNESCO World Heritage Site stands at a height of 73 meters, making it the tallest brick minaret in the world. The tower is constructed with intricately carved red sandstone and marble, featuring five distinct stories with projecting balconies and decorative elements. Civil engineers of that era employed advanced techniques to ensure the stability and durability of the structure, including the use of corbelling and architectural innovations like the "magnetic bracket" to prevent lightning damage.



☑ **Konark Sun Temple:**

Constructed in the 13th century in Odisha, the Konark Sun Temple is a masterpiece of Kalinga architecture and engineering. Dedicated to the Hindu Sun God Surya, this UNESCO World Heritage Site is renowned for its intricate stone carvings and unique architectural design.

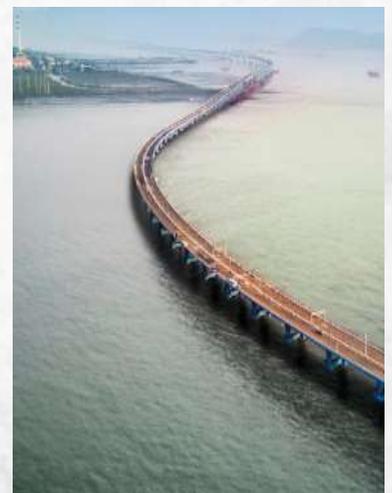
resembling a colossal chariot with 12 pairs of wheels pulled by seven horses. Civil engineers of the time utilized advanced construction methods and precise architectural planning to create the temple, which served both religious and astronomical purposes. The temple's engineering brilliance is evident in its precise alignment with the sun's movements, allowing sunlight to illuminate specific areas during different times of the day.



☑ **Golden Bridge:**

Spanning across the Mandovi River in Goa, the Golden Bridge, officially known as the Atal Setu, is a modern engineering marvel of India. Opened to the public in 2019, this cable-stayed bridge connects the state capital of Panaji with the industrial town of Cortalim, significantly reducing travel time and congestion on existing routes. The bridge's design incorporates state-of-the-art engineering principles, including pre-stressed concrete segments and high-strength steel cables, to ensure structural integrity and resilience against natural forces such as wind and seismic activity. Civil engineers employed advanced modelling and simulation techniques to optimize the bridge's design and enhance its longevity, making it a vital infrastructure asset for the region's socio-economic development.

The modern civil engineering marvels of India exemplify the nation's commitment to technological innovation, sustainable development, and social progress. From bridges and dams to metro systems and tunnels, these structures not only facilitate connectivity and economic growth but also stand as testaments to India's engineering prowess on the global stage. As India continues to embrace urbanization and infrastructure expansion, the legacy of these marvels will inspire future generations of engineers to push the boundaries of innovation further.



ANIRBAN KAR
3RD YEAR
DEPARTMENT OF CIVIL ENGINEERING

THE TRANSFORMATIVE IMPACT OF ARTIFICIAL INTELLIGENCE IN CIVIL ENGINEERING

☑ Introduction:

Artificial Intelligence (AI) is revolutionizing various industries, and civil engineering stands at the forefront of this transformative wave. As technology advances, AI's role in civil engineering becomes increasingly significant, offering unprecedented opportunities to enhance efficiency, accuracy, and sustainability across various projects. This report delves into the multifaceted influence of AI in the realm of civil engineering, exploring its applications, benefits, challenges, and future prospects.

☑ Applications of AI in Civil Engineering:

AI's applications in civil engineering span a wide spectrum, ranging from design and planning to construction and maintenance. In design and planning, AI-powered algorithms enable engineers to analyse vast datasets and optimize designs for structural integrity, cost-effectiveness, and environmental sustainability. Moreover, AI facilitates predictive modelling for assessing risks and making informed decisions, thereby enhancing the reliability of infrastructure projects. In construction, AI-driven technologies streamline processes such as scheduling, resource allocation, and quality control, leading to improved project management and timely completion. Additionally, AI-powered drones and robots are increasingly utilized for tasks like site inspection, surveying, and maintenance, enhancing safety and productivity on construction sites.

☑ Benefits of AI Integration:

The integration of AI in civil engineering offers numerous benefits that contribute to the advancement of the industry. One of the primary advantages is increased efficiency, as AI automates repetitive tasks, minimizes errors, and accelerates decision-making processes. This efficiency translates into cost savings and faster project delivery, ultimately benefiting both clients and stakeholders. Furthermore, AI enhances the accuracy and precision of engineering designs, leading to safer and more resilient infrastructure. By leveraging AI's predictive capabilities, engineers can anticipate potential issues and proactively address them, thereby reducing risks and ensuring project success. Moreover, AI-driven innovations promote sustainability by optimizing resource utilization, minimizing waste, and mitigating environmental impact, aligning with the growing emphasis on green infrastructure development.

☑ Challenges and Considerations:

Despite its transformative potential, the widespread adoption of AI in civil engineering is not without challenges. One significant hurdle is the need for skilled professionals capable of harnessing AI technologies effectively. Civil engineers must acquire proficiency in data analysis, machine learning, and computational methods to fully leverage AI's capabilities. Additionally, concerns regarding data privacy, cybersecurity, and ethical implications of AI algorithms need to be addressed to ensure responsible and transparent use of technology. Moreover, integrating AI systems into existing workflows and practices may require substantial investment in infrastructure, training, and organizational change management. Overcoming these challenges necessitates collaboration between industry

stakeholders, academia, and policymakers to foster a supportive ecosystem for AI innovation in civil engineering.

☑ **Future Prospects:**

Looking ahead, the influence of AI in civil engineering is poised to expand further, driven by ongoing technological advancements and evolving industry needs. AI's role in enabling autonomous construction processes, such as 3D printing and robotic assembly, holds immense potential for revolutionizing traditional construction methods and unlocking new possibilities in architectural design. Furthermore, AI-driven solutions for infrastructure maintenance and rehabilitation promise to prolong the lifespan of existing structures and enhance resilience against natural disasters and climate change impacts. As AI continues to evolve, interdisciplinary collaborations between civil engineers, computer scientists, and data analysts will become increasingly essential for harnessing AI's full potential and shaping the future of civil engineering practice.

☑ **Conclusion:**

In conclusion, the influence of AI in civil engineering is transformative, offering unprecedented opportunities to enhance efficiency, accuracy, and sustainability across various aspects of infrastructure development and management. By embracing AI-driven innovations, civil engineers can address complex challenges, optimize resource utilization, and build resilient infrastructure for future generations. However, realizing the full benefits of AI requires concerted efforts to overcome challenges related to skills development, data governance, and organizational adaptation. As AI technology continues to evolve, it is imperative for the civil engineering community to embrace innovation and collaboration to shape a future where AI-driven solutions drive sustainable and resilient infrastructure development.



ANIRBAN KAR
3RD YEAR
DEPARTMENT OF CIVIL ENGINEERING

NANOTECHNOLOGY IN CIVIL ENGINEERING

Nanotechnology is one of the most active research areas that encompass a number of disciplines, including civil engineering and construction materials. It seems to hold the key that allows construction and building materials to replicate the features of natural systems improved until perfection for millions of years. Traditionally, nanotechnology has been concerned with developments in most of the fields like microbiology, medicine, electronic, chemical, and materials sciences. However, the potential for application of many of the developments in the nanotechnology field in the area of construction engineering has been growing. The objective of this study is to review the role of nanotechnology in civil engineering applications. It also discusses the application of instruments to reach material properties of Nano-scale. Furthermore, it has been observed that better understanding and engineering of complex structures made by cement, steel or composite materials at Nano-level will definitely result in a new generation of construction materials with higher performance in strength, durability, and other properties.

❖ APPLICATION OF NANOTECHNOLOGY IN CONSTRUCTIONS:

Many disciplines of civil engineering, including design and construction processes, can be benefited from nanotechnology. These include products that are for: Lighter structure, Stronger structural composites, e.g. for bridges and others. Low maintenance coating, Improved pipe joining materials and techniques, Better properties of cementitious materials, reduced thermal transfer rate of fire retardant and insulation, Increased sound absorption of acoustic absorber, Increased reflectivity of glass, water repellents, Nano-clay filled polymers, self-disinfecting surfaces, UV light protector, air cleaners, Nano-sized sensors, and solar cells There are a large number of applications of nanotechnology in the construction engineering/industry. Some of these applications are examined in detail below:

➤ NANO-CEMENT

Portland cement is the most widely used construction material. It can be argued that concrete utilizes nanotechnology because it contains Nano-particles as its ingredients, including Nano-water particles and Nano-air voids. However, it is not the application of the technology at Nano-level. If it is possible to create the technological tools and organize the amount and locations of these Nano-ingredients in a scientific way, then, concrete can experience the advances of nanotechnology. Concrete is, after all, a macro-material, strongly influenced by its Nano-properties and understanding it at Nano level can provide the avenues for improvement of strength and durability. The particle size of cement can be reduced to Nano-size or can be modified by adding Nano-tubes and reactive Nano-size silica particles.

➤ **NANO-COMPOSITES**

Nano-composites can be developed by using nano-tubes, which can impart some of the outstanding properties of the nano-tubes. Alumina-silicates are mixed with carbon Nano-tubes, which can produce strong and durable conductive films. Furthermore, the current sizes of alumina-silicates (50 to 100 nm) can further be reduced to 5 to 10 nm range, and a little volume percent of Nano-tubes ($\approx 0.5\%$) can produce extraordinary composites. Besides, fibre wrapping that has been commonly used to strengthen the existing concrete structures has witnessed advancement by using fibre sheet (matrix) containing Nano-silica particles and hardeners. These Nano-particles penetrate and close small cracks on the concrete surface and, in strengthening applications, the matrices form a strong bond between the surface of the concrete and the fibre reinforcement. A detailed discussion on the different types of Nano-cement composites is presented later.

➤ **NANO-COATINGS FOR CONCRETE**

In order to protect the structures/components from abrasion, chemical attack and hydrothermal variations, and to improve aesthetics, chemical coatings are generally and routinely used. Till date, technology which limits the size of coating materials in micrometre can enjoy great advancement by using nano-science and technology. Studies are being conducted on the types of nano-particles in various binders and their effectiveness on key properties related to concrete deterioration, and it has been reported that a solvent containing a low molecular weight epoxy resin and nano-clay particles has shown promising results. Nano-meter thick coatings are durable and could have self-cleaning and self-healing properties. Nano-scale roughness of the coatings has the property to repel water and dirt, and can outdate the existing 'non-stick' technology. Self-cleaning properties of a coating made using nano-particles would also help to keep the coated surface totally free of dirt and dust.

➤ **NANO-STEEL**

Steel has played a major role in the construction industry since past two centuries. Fatigue is a significant issue for the structures subjected to cyclic loading, such as in bridges, towers, and off-shore platforms. Fatigue failure can occur at significantly low stresses than the yield stress of the material and lead to a significant reduction in service life. Stress concentration is responsible for initiating cracks which triggers fatigue failure, and research has shown that the addition of copper nano-particles reduces the surface unevenness of steel, which then limits the number of stress risers, and hence fatigue cracking. Nano-particles for Fire Protection The application of Portland cement-based coatings for fire protection of steel structures is limited since it is thick, tends to be brittle, and polymer additions are needed to improve adhesion with steel surface. It has been found that nano-cement mixing with carbon nanotubes (CNT) with Cementous material to fabricate fibre composites has outstanding properties of high strength and fire resistance.

➤ **CLAY/POLYMER NANO-COMPOSITES**

One of the most interesting interdisciplinary areas in civil engineering discipline is clay/polymer composites. This technology has received great attention in the area of nanocomposites research. It offers tremendous improvement in a wide range of physical and engineering properties for polymers with lower percentage of filler. This nano-composite approach has advantages over the so-called fibre reinforced composites in the low filler loading range.

The basic phenomenon behind this technique is “bottom-up and top-down approaches”. In the bottom-up approach, the nano-materials are made from atoms or molecules (small to big) and by adopting this principle, molecules can be made to arrange themselves automatically into useful shapes and structures. Clay/polymer nano-composites have improved physical and engineering properties. This polymer composite technique can also be useful for water-soluble hydrophilic/hydrophobic functional monomer systems for the preparation of polymer/silicate hybrid nano-materials.

➤ ENVIRONMENT

The effect of various nano-materials on natural environment is hotly debated in nanotechnology and environmental researches. Various ongoing investigations have focused on the uncertainty regarding the potential effects of materials that exist on nano-scale with properties that are different than when using the material on a micro or macro scale (NNI 2003). Some work in this regard shows that the potential effects may be minimal. As constructed infrastructure is provided in natural environment, all materials used in the construction and maintenance of these facilities need to be compatible to the natural environment and their effects on natural environment should not be negative. Typical potential problems in this regard include leaching of materials into groundwater, releasing materials into airways through the generation of dust, and exposing potentially harmful materials during construction and maintenance operations. The nanotechnology becomes a double-edged sword to the construction industry. More researches and practice efforts are needed with smart design and planning so that construction projects can be made sustainable, and therefore, save energy, reduce resource usage, and avoid damages to the environment.

Based on the nanotechnology has the potential to be the key to a brand-new world in the field of construction and building materials. Although replication of natural systems is one of the most promising areas of this technology, scientists are still trying to grasp their astonishing complexities. Furthermore, nanotechnology is a rapidly expanding area of research where novel properties of materials manufactured on Nano-scale can be utilized for the benefit of construction infrastructure, and a number of promising developments exist that can potentially change the service life and life-cycle cost of construction infrastructure to make a new world in the future.



MANAS SAHA

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING

WASTE TO WEALTH IN CONSTRUCTION: MYTH OR REALITY?

Waste is the only resource material generated every day. The idea of transforming construction waste into valuable resources – "waste to wealth" – has gained significant traction in recent times. The Waste to Wealth Mission is one of nine scientific missions established by the Prime Minister's Science, Technology, and Innovation Advisory Council (PMSTIAC) that focuses on methods and ideas for converting waste into something useful to society. The mission is to identify, develop, and deploy technologies for waste treatment, energy generation, material recycling, and resource extraction. Thereby, the concept of "waste to wealth" in construction holds immense promise for a more sustainable and resource-efficient industry. However, a crucial distinction needs to be made – it's not simply about adding any kind of waste to construction materials for increased strength. But is it a mere marketing slogan or a practical reality in the construction industry? Let's delve deeper and explore the nuances of this concept.

While it's true that reusing waste materials can contribute to sustainable construction practices and cost savings, it's essential to recognize that simply adding waste to construction or stabilization processes doesn't always lead to improved strength parameters. In fact, indiscriminate use of waste materials can have adverse effects on the structural integrity and performance of infrastructure, particularly in road construction.

The key lies in understanding the principles of material science and engineering. Reusing waste materials should be approached with careful consideration of their properties, compatibility with existing materials, and adherence to specified limits. Incorporating waste materials beyond recommended thresholds can compromise the structural integrity of roads and other infrastructure, leading to premature deterioration, reduced lifespan, and increased maintenance costs. Similarly, the addition of certain industrial by-products or organic wastes may introduce undesirable characteristics such as increased permeability, susceptibility to moisture damage, or chemical leaching, thereby undermining the performance of road infrastructure.

The key to unlocking the potential of waste to wealth lies in striking a delicate balance between innovation and caution. While there's no denying the environmental and economic benefits of repurposing waste materials, it's essential to approach their incorporation into construction projects with a critical eye and a thorough understanding of their effects on performance. Rigorous testing, quality assurance protocols, and adherence to regulatory guidelines are indispensable in ensuring the safe and effective utilization of waste materials in construction.



- ☑ **Reusing vs. Dumping:** The true spirit of "waste to wealth" lies in reusing suitable waste materials within specific limits, not just dumping any waste into construction projects. This reuse should be based on rigorous scientific evaluation and adherence to established engineering principles.
- ☑ **Strength Considerations:** Adding waste materials can sometimes weaken the final product. The strength of construction materials, like concrete used in roads, is meticulously designed based on a specific mix of ingredients. Introducing uncontrolled amounts of waste materials disrupts this balance and can lead to a decrease in overall strength.

❑ **Negative Effects of Adding Waste:** Depending on the type of waste and the amount added, negative consequences can arise. For example, adding organic waste to road construction can lead to premature cracking and deterioration. Similarly, some industrial waste might introduce harmful chemicals, compromising the structural integrity and environmental safety of the road.

The primary goal of "waste to wealth" should be to find environmentally responsible ways to manage waste materials, not just to add them for perceived strength benefits. By reusing suitable waste within defined limits, we divert these materials from landfills, conserve virgin resources, and reduce the environmental impact of construction.



Clear and well-defined standards are needed to ensure the quality and consistency of recycled materials used in construction. Additionally, regulations around acceptable waste types and usage limits need to be established and enforced.

Moreover, it's imperative to recognize that waste to wealth is not a one-size-fits-all solution. Context matters, and the feasibility and desirability of incorporating waste materials into construction projects depend on a innumerable of factors, including local regulations, project specifications, material availability, and technological capabilities. By focusing on responsible reuse within specified limits, we can harness the true potential of "waste to wealth" for a more sustainable and resource-efficient construction industry. This approach requires collaboration among researchers, engineers, policymakers, and construction companies to overcome the challenges and pave the way for a greener future.



PROF.(DR.) ARIJIT KUMAR BANERJI
ASSISTANT PROFESSOR
DEPARTMENT OF CIVIL ENGINEERING

FERROCEMENT TECHNOLOGY

Ferrocement is the composite of Ferro (Iron) and cement (cement mortar). Ferrocement can be considered as a type of thin walled reinforced concrete construction in which small-diameter wire meshes are used uniformly throughout the cross section instead of discretely placed reinforcing bars and in which Portland cement mortar is used instead of concrete. In ferrocement, wire-meshes are filled in with cement mortar. It is a composite, formed with closely knit wire mesh; tightly wound round skeletal steel and impregnated with rich cement mortar.

With Ferrocement it is possible to fabricate a variety of structural elements, may be used in foundations, walls, floors, roofs, shells etc. They are thin walled, lightweight, durable and have high degree of impermeability. It combines the properties of thin sections and high strength of steel. In addition it needs no formwork or shuttering for casting. Ferrocement have applications in all fields of civil construction, including water and soil retaining structures, building components, space structures of large size, bridges, domes, dams, boats, conduits, bunkers, silos, treatment plants for water and sewage.

Basic Methodology of forming Ferrocement members

A ferrocement structure is formed by fabricating the mesh reinforcement to the shape and size of the structure first and then mortared and cured. Method of forming a ferrocement element is as follows:

1) Welding skeletal steel framework.

A skeleton of steel bars is welded to the exact geometrical shape and size of the structure. This provides a rigid framework of the exact shape and size with correct line and level.

2) Tying mesh reinforcement tightly over it to form cage.

Weld mesh and fine wire chicken mesh is tied over this welded skeleton by stretching and tying technique. 'Tightly tying meshes' is the key point in ferrocement construction.

3) Impregnating the mesh cage with rich cement mortar, finishing and curing. The stiff cement mortar is filled in the mesh layers by press fill method. In press fill method, the mortar is to be pressed inside the meshes from both the sides. All these steps in construction are to be followed in sequence. On large size constructions, one can work simultaneously on all the three operations.

Advantages of Ferrocement

- 1) Increase in bond strength
- 2) Bond area increase
- 3) Dispersion of steel wires
- 4) Crack control
- 5) Equal strength in both directions
- 6) Containment of mortar matrix in mesh layers
- 7) Formless construction
- 8) Strength through shape
- 9) Lightweight, homogeneous and versatile material
- 10) High strength to weight ratio

Applications of Ferrocement

Liquid retaining structures

Water tanks, Effluent treatment plants, rain-water harvesting tanks, Gutters and canals of parabolic section, water-proofing treatment to leaking dams.

Soil retaining structures

Soil retaining walls, counterfort walls, grain silos, face wall panels.

Building components

Foundations-parabolic shaped, multi-bulbed under-reamed piles, RCC columns encased in ferrocrete, double walling for compound walls on expansive soils.

Special applications

Foldable ferrocrete elements, Boats, wharfs and catamarans, Cold storage structures, Portable bunkers, Cooling towers, Cladding steel framework, retrofitting of damaged buildings, Box girders for bridges, floating platforms.



Steps using ferrocement built near Katraj, Pune



Jadhav Farm House Gowe, Near Satara.



Canal or nalla closing by huge ferrocement pipe cast in Situ near Pune



Ferrocement boats and pontoons in Pune area



Nautilus House, Mexico



Oaxaca Building



Building in Kerala

Courtesy: Ferrocement Society, Pune



Fixing of 30 feet ferrocement precast bridge



Completed bridge.

Foot bridges in Sri Lanka



PROF. PRANOY ROY
ASSISTANT PROFESSOR
DEPARTMENT OF CIVIL ENGINEERING

SOME COOLEST SUSTAINABILITY PROJECTS IN CIVIL ENGINEERING

☑ **The Svart Hotel: the world's first energy-positive hotel**

Designed by the architect firm **Snøhetta** and with the help of engineering consultants Asplan Vaak, it's set to be the first energy-positive hotel in the world.

One of the most ground-breaking examples of sustainable civil engineering is the Svart Hotel, which has been hailed as the world's first energy-positive hotel. Situated in the pristine natural landscape of northern Norway, this remarkable project represents a pioneering approach to sustainable architecture and engineering.

The hotel will reduce its yearly energy consumption by 85% compared to other hotels, while harvesting enough solar power to cover all the on-site energy needs, including the energy required for constructing the building.

In other words, it will create more energy than it uses.



☑ **Museum of Tomorrow, Brazil**

A civil engineering project with the wow factor. Its commitment to sustainability can be seen in almost every aspect of the building's design. It uses solar panels that move with the sun, which enhances energy absorption, in addition to an air conditioning system that uses water filtered from the nearby Guanabara Bay. It's then cleaned and returned to exactly where it came from via a small waterfall. Architect Santiago Calatrava, alongside a team of structural engineers from Arup and Casagrande Engineering, was the mastermind behind the building.



☑ **One Central Park, Sydney, Australia**

There's much more to Australia than The Sydney Opera House: it's also leading the way when it comes to green urban environments. It's been rewarded a 5-star green star design rating. One Central Park is a living building in Sydney's central business district.

The residential property was the first in Australia to combine living walls, where vegetation is planted directly on the walls, and green façades, with cascading plants that flow down from supports.

These vertical gardens cover 1,100m² (about twice the area of a basketball court) and include 383 species.

The gardens were cleverly designed to ensure plants that thrive in sunlight were placed near the top of the building, while more delicate species inhabit the bottom.



☑ **The Shanghai Tower, China**

You'd be mistaken if you thought green buildings have to all look like One Central Park. The second tallest building in the world sits in the finance district of the bustling city of Shanghai. The shape of the building features a rotating set of double-skin cylinders sitting one after the other, making a dynamic curved shape that effectively reduces the wind loads by 24%. It has transparent walls that insulate, allow for air ventilation, and let in natural light. It uses 80% less energy for heating and cooling than other towers.

The Shanghai Tower was certified with the platinum LEED

certification in 2016 due to its strategies that

allowed it to save \$556,000 each year in energy and is one of the most sustainable buildings in China.



☑ CopenHill, Copenhagen, Denmark

CopenHill, also known as Amager Bakke. It's exemplifies the transformative potential of sustainable design and engineering. CopenHill turns sustainability into fun, for underneath the multimodal sports centre lies a waste-to-energy power plant capable of converting 440,000 tonnes of waste into clean energy every year.

That's about the same weight as 4,000 blue whales. With cutting-edge technology, the plant provides electricity and district heating for 150,000 homes annually.

The building's hiking and running trail also features a garden, which absorbs heat, reduces stormwater runoff and provides a home for birds, insects and flowers.



☑ 20 Fenchurch Street, London, UK

20 Fenchurch Street, a staple of the London skyline, is better known by its nickname, the 'Walkie Talkie'. The 1,601m-tall office building is home to the famous Sky Garden – a green oasis and observation deck offering a 360° view of the city. But the garden, populated by a variety of Mediterranean and South African species, isn't the only 'green' feature in the building.

Others include:

- The largest green wall in the UK
- Roof-mounted solar panels
- Sustainably sourced concrete and structural steelwork
- 96.4% of construction waste was diverted from landfill, recycled, reused or recovered



JOYDEEP MONDAL

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING

☑ One Angel Square, Manchester

One Angel Square in Manchester, UK, is home to The Co-Operative Bank – it's also a sustainability powerhouse!

Designed with a double-skin façade that reduces heat in summer and insulates during the winter months, its innovative design helps it achieve a whopping 80% reduction in carbon emissions.

Its quirky design has been described as looking like a sliced egg.

Beyond its unique aesthetic, it also has a rainwater recycling system, which means that up to 95% of greywater and 65% of rainwater gets recycled. As a piece of infrastructure, it's set an example of how a building can prosper commercially while fighting climate change.



☑ Eastgate Centre Harare, Zimbabwe

The Eastgate Centre is an innovative design inspired by the self-cooling mounds of African termites and indigenous masonry. This building implements the energy-efficient strategies for climate control. This green building's construction materials have a high thermal capacity, which enables it to store and release heat gained from the surrounding environment. There are integrated fan systems that run on a cycle scheduled to improve heat storage during the hot daytime and heat release during the chilly overnight. As the outside temperature fluctuates, these design elements help to minimize temperature variations inside the building. Without conventional air-conditioning or heating, the building's temperature stays regulated all year round, reducing the costs of electricity, and creating a passive cooling system without sacrificing the interior comfort of the use.



ASTONISHING EARTHQUAKE RESISTANT STRUCTURE IN THE WORLD

Earthquake is one of the most powerful and destructive forces on earth. It is sudden shaking of the ground caused when some form of energy stored in Earth's crust is suddenly released. Earthquakes have effects changes in geologic features, damage to man-made structures (buildings, bridges, embankments etc), and impact on human and animal life. Countries like Japan, China, United States experience more earthquakes than others and that is why it is important for them to construct a building that is earthquake resistant.

Here are some astonishing earthquake resistant buildings that can withstand earthquakes of very high magnitudes.

☑ **Burj Khalifa**

Location: Dubai, United Arab Emirates

Height: 2,722 feet

The most iconic super tallest building in the world. The building consists of high-performance concrete wall. At mechanical floors where outrigger walls connect the perimeter columns to the interior walls. The verticality concrete utilized to support both gravitational and lateral loads.



☑ **The Petronas Twin Towers**

Location: Kuala Lumpur, Malaysia

Height: 452 meters.

A two-story sky bridge connects the 41st and the 42nd floor of the towers which can slide in and out of the building to prevent the wind from putting loads on the building. Base isolation system is designed to absorb the energy from an earthquake and reducing the impact of seismic waves.

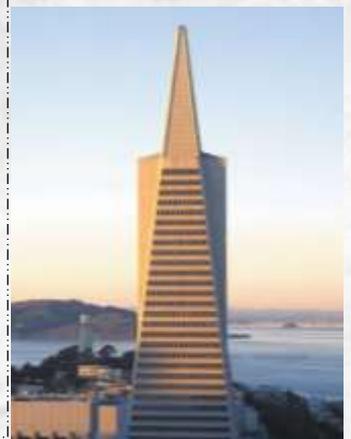


☑ **The Transamerica Pyramid**

Location: San Francisco, California

Height: 845 feet

It was built using a deep foundation of concrete and steel. In a 7.1 magnitude earthquake, the building shook for over a minute but stood its ground, unharmed and unaffected. Designed as pyramid to allow natural light to filter down to the streets below, the structure's wide base gives it stability.



☑ **Shanghai Tower**

Location: Shanghai, China

Height: 2,000 feet

Shanghai Tower is the second tallest building in the world. The Tower is located on a seismic belt with a shallow water table. Underpinning the base by installing the foundation of the superstructure, engineers used over 980 piles, created a deep foundation.



☑ **Taipei 101**

Location : Taipei, China

Height: 1,667 feet

The tower stands with a tuned mass damper to prevent damage like earthquake. A giant steel ball weighing 730 tonnes acting as a centralized pendulum to counterbalance earthquakes and its foundations by driving hundreds of piles driven deep into the bedrock below. It survived a 6.8 magnitude earthquake without any damage.



➤ **The Yokohama Landmark Tower**

Location: Yokohama, Japan

Height: 972 feet

The Yokohama tower has a flexible structure to absorb the force of earthquake. The Yokohama tower is placed on rollers, which prevent the skyscraper from shaking even when the earth below moves it.



NEHA BHATTACHARJEE

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING

STEEL SLAG ROAD

☑ Introduction

Steel slag road refers to the use of steel slag, a byproduct of steel production, in road construction. Steel slag is created during the process of refining steel from raw iron ore. When used in road construction, it is typically processed and mixed with other materials like asphalt or cement to create a durable and cost-effective road surface.

According to Geisler (1996), in 350 BC Aristotle has indicated that during the purification of iron, a byproduct is generated like a stone called iron slag. It has number of advantages but very effective for drying the injuries. The byproduct generates from the melting of scrape to produce steel by an Electric Arc Furnace (EAF), and through the conversion of iron to steel by a basic oxygen furnace (BOF). The steel slag obtained from these furnace looks like similar but the properties may differ based on the grade of steel produced and the furnace, while the chemical composition remains within the range.

The benefits of using steel slag in road construction include its hardness, resistance to wear, and ability to improve the overall strength of the road. Additionally, it helps in recycling industrial waste by utilizing a material that might otherwise be discarded. Steel slag roads are known for their durability, resistance to weathering and ability to withstand heavy loads.

☑ Sustainable in Nature: -

They contribute to sustainable practices by repurposing waste materials and reducing the demand for traditional construction materials: -

- Use of steel slag in road construction reduces the mining activity and protects the nature from different types of pollution and landscape remains untouched, since all excavations are avoided.
- The use of slag minimizes environmental impact as it saves energy and conserves resources.
- To reuse steel by-products to reduce their overall waste.
- Easy to prepare material (mixture) for pavement.
- Energy and natural resources savings are achieved through the recycling processes of steel by-products production.

- The utilisation of waste steel slag for road constructions reduces pollution created by heaps of waste dumped nearby.

Overall, the use of steel slag in road construction is an example of incorporating industrial byproducts into infrastructure development, promoting sustainability and resource efficiency.

RECENT USE OF STEEL SLAG ON ROAD CONSTRUCTION

- ✓ Surat has become the first city in the country to get a processed steel slag (industrial waste) road built as part of a joint-venture project by the Council of Scientific and Industrial Research (CSIR), Central Road Research Institute (CRRI), Union Ministry of Steel, government think-tank NITI Ayog, and Arcelor Mittal-Nippon Steel (AM/NS), at Hazira.
- ✓ The six-lane public road is a kilometre-long stretch in Hazira industries by converting mounds of steel waste into steel slag aggregate.
- ✓ According to CRRI principal scientist Satis Pandey, the construction cost of steel slag road is 30 per cent cheaper than roads built from natural aggregates. “The thickness of the road is also 30 per cent lesser than normal ones, while the durability is much longer due to the utilisation of steel slag.
- ✓ According to the Indian Road Congress guidelines for construction of a heavy traffic road that is capable of taking the load of 1,000 to 1,200 trucks per day, around 600 to 700 mm thickness of road layers are required on the foundation with 8 per cent CBR (California Bearing Ratio).
- ✓ The CRRI will now prepare guidelines and specifications for the utilisation of steel slag in road construction.
- ✓ Executive Engineer at SMC’s Road Development Department, B R Bhatt, said: “The approximate construction cost per square meter of a processed steel slag road is Rs 1,150 as against Rs 1,300 for a bitumen road and Rs 2,700 for a cement or a concrete one. The lifespan of a cement or concrete road is over 30 years while that of bitumen and steel slag road is around 15 years.



AYUSH KESHRI

2ND YEAR

DEPARTMENT OF CIVIL ENGINEERING

JAPAN'S EARTHQUAKE-RESISTANT BUILDINGS ARE THE FUTURE OF REAL ESTATE

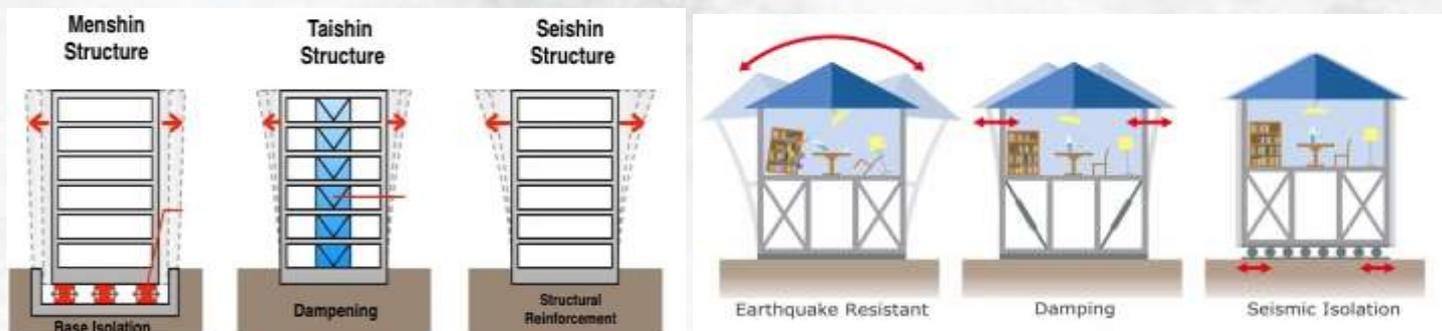
Japan is a country that is no stranger to natural disasters, particularly earthquakes. Japan's finesse at designing earthquake-proof buildings is born largely of necessity. Because the island nation sits on what is known as the **Pacific Ring of Fire**, a zone where the **Eurasian**, **Pacific** and **Philippine tectonic plates** are forced beneath one another. With a long history of devastating seismic activity, the nation has been at the forefront of developing earthquake-resistant buildings that are designed to withstand the destructive force of these tremors. As the world continues to grapple with the increasing frequency and intensity of natural disasters, Japan's approach to constructing resilient buildings offers valuable lessons for the future of real estate.

Advanced Engineering and Materials:

One of the key principles of earthquake-resistant construction in Japan is the using cutting-edge engineering techniques and materials designed to enhance their ability to withstand seismic forces. Flexible foundations, damping systems, and reinforced concrete structures are key components that allow buildings to absorb and dissipate the energy generated by earthquakes. This proactive approach minimizes damage and ensures the safety of occupants, with features such as emergency evacuation routes and secure structural elements.

Japan's earthquake proof building standards are as follows:

- **Taishin:** This is the minimum requirement for earthquake resistant buildings in Japan, and mandates that beams, pillars and walls be of a minimum thickness to cope with shaking.
- **Seishin:** The next level of earthquake-proof buildings in Japan, Seishin is recommended for high rise buildings. It uses dampers that absorb much the energy of an earthquake. Essentially, layers of thick rubber maps are placed on the ground below the foundations, thereby absorbing tremors.
- **Menshin:** This is the most advanced form of earthquake proof buildings in Japan, and also the most expensive. The building structure itself is isolated from the ground by layers of lead, steel and rubber which move independently with the earth below. This means the building itself moves very little – even during the most severe quakes.



Impact on Safety and Real Estate Market:

The adoption of earthquake-resistant building practices in Japan has not only saved countless lives but has also proven to be a sound investment for real estate developers and property owners. These resilient structures are more attractive to tenants and buyers, as they offer a higher level of safety and security in the face of natural disasters. As a result, earthquake-resistant buildings command higher rental and resale values, making them a desirable asset in the real estate market.

Global Influence and Sustainability:

Furthermore, the global trend towards sustainable and resilient construction practices has put Japan's earthquake-resistant buildings in the spotlight as a model for the future. With climate change contributing to more frequent and severe natural disasters, there is a growing recognition of the need to prioritize resilience in urban development. As a result, real estate developers around the world are looking to Japan for inspiration and guidance on how to incorporate earthquake-resistant design principles into their projects.

In addition to their resilience against earthquakes, these buildings also offer environmental benefits, as they are often constructed with energy-efficient materials and technologies. This aligns with the growing demand for sustainable and eco-friendly real estate solutions, further enhancing the appeal of earthquake-resistant buildings in the market.

A Blueprint for the Future:

In the face of climate change and uncertain natural disaster risks, Japan's earthquake-resistant buildings serve as a testament to the power of innovation and resilience in real estate development. By prioritizing safety, sustainability, and long-term value, these structures are paving the way for a new era of construction better equipped to withstand the challenges of our changing world. As other countries seek to emulate Japan's success in this field, it is clear that earthquake-resistant buildings are not just a necessity in high-risk areas but a valuable investment for the future of real estate worldwide.

Conclusion:

In conclusion, Japan's earthquake-resistant buildings represent a paradigm shift in real estate development, offering a blueprint for creating safer, more resilient, and sustainable urban environments. As other countries look to emulate Japan's success in this field, it is clear that earthquake-resistant buildings are not just a necessity in high-risk areas but a valuable investment for the future of real estate worldwide.



JOYDEEP MONDAL

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING

ISRO AND THE INDIAN SPACE PROGRAMMES

☑ SETTING UP OF ISRO:

In 1947, just few years after the end of World War II, tensions between the then two superpowers America and Soviet Union started increasing rapidly citing to their ideological and political differences between them. This heavy rivalry between the two led to the start of the Cold War between them, which eventually led to the 'Space Race' between the two. In a neck-to-neck competition between both, Soviet initially edged out with the launch of Sputnik-1 in 1957. This Race continued on further with many more launches but in the meanwhile an Indian scientist Dr. Vikram Sarabhai got quite inspired by the development of these space technologies, and realized the importance of space developments in the overall development of a country. He later on played an instrumental role in setting up country's first research center when he successfully convinced Prime Minister Jawaharlal Nehru in 1962 about having India's own Space Program, and this leads to the birth of ISRO. Initially named INCOSPAR it was renamed to ISRO in 1969, transforming it to an organization whose main aim was to use space technologies for the development of the country. Starting from carrying the parts of the rocket in bi-cycles to launching its own satellite in the orbit of Mars ISRO has have quite an eventful journey.

☑ FEW EVENTFUL DATES:

- 1975: ISRO launched India's first artificial satellite 'Aryabhata' in space.
- 1980: Launch of India's 1st Satellite Launch Vehicle, SLV-3. It was used to send the Rohini satellite to the orbit.
- 1983: The historic launch of INSAT satellite (Indian National Satellite System). INSAT is basically a series of communication satellites stationed in the Earth's orbit which were then used to communicate through radio waves. It was a very important launch mission because with this television broadcasting became possible in India, weather forecasting also became possible, warning of upcoming natural disasters like a tornado or cyclone could be predicted early on. All of which are very integral part of ours today.
- April 1984: Rakesh Sharma, a former Indian pilot created the record of becoming the first and only Indian citizen to travel in space. He stayed in space for 8 days and from there came his famous reply "*Sare Jahan Se Accha*" while answering how he feels India looks like from up in space.
- October 2008: ISRO successfully launches its moon mission with 'Chandrayan 1'. It was launched with the intention to survey the lunar surface, in order to figure out the chemical composition of surface and its topography. One major achievement of it included the discovery of widespread presence of water molecules in lunar space.

- 2013-2014: On October of 2013 ISRO successfully launched 'Mars Orbiter Mission' or 'Mangalyaan'. It was launched with a primary attempt to develop technologies for interplanetary mission and to explore Mars' surface and its atmosphere. This was successful making India the only nation in world to reach Mars' orbit in first attempt.
- 2023: Launch of Chandrayan 3(after failure of Chandrayan 2) by ISRO. This time it becomes successful and with this India became part of an elite club of countries to achieve a soft landing on moon after US, China and Soviet Union.

☑ THE COMPARISON WITH NASA:

The Indian space program being handled by the ISRO in the world stage has have its fair share of success hence the comparison with the other prominent organizations in world stage is imminent, especially NASA (set up in 1958), the U.S space association set up almost at the same time that of the ISRO. NASA has obviously been ahead of the curve from ISRO. It has furthermore gone on to become the most successful space organisation among all others and has achieved wonders starting from landing first human beings on Moon (Apollo 11 mission) to the recent James Webb Telescope they have obviously been ahead of everyone and obviously ahead of ISRO. But the comparison between NASA-ISRO isn't that straightforward because - Firstly NASA was set up as a response to Soviet Union, it was a state of war between both the countries and hence the fierce competition between them actually led to fuelling up of these developments. Compare it to ISRO which was not setup as a response in a state of war but mostly because to develop space technologies for the socio-economic benefit of the country itself.

Secondly, and the biggest issue is the budget of both the agencies. Approximately, NASA has a budget of almost 20 times that of ISRO, and this obviously gives NASA the upper hand to spend more freely in more ambitious and experimental missions as compared to ISRO. Whereas ISRO spends most of their budget in developing new technologies, space vehicles and ground stations and only few necessary missions are conducted.

In spite of, all these things there are factors in which ISRO is ahead of NASA such as Efficiency, Resourcefulness and Cost-effectiveness. Moreover, ISRO has played a good role in the overall country's development extending its resourcefulness to various sectors like educational sector(study of space in junior and higher level primarily), agricultural sector(offered innovative solutions for crop management, resource optimization; provides key data for monitoring soil, drought and crop development through remote sensing satellite), communication(helped in both mass communication and personal communication of people) and defence sector projects.

☑ CONCLUSION:

The recent missions of ISRO include X-ray Polarimeter Satellite (XPoSat) which is aimed to investigate and study the polarisation of cosmic X-rays with an expected life expectancy of 5 years. It also includes launching of the Aditya L1 to study the Sun and as of today's date it has already been inserted into Halo-Orbit around Sun-Earth. Few of ISRO's major future plan includes:

- 'Shukrayaan-1' mission to go to Venus in 2025
- ISRO's second Mars mission: 'Mangalyaan-2'
- ISRO's Gaganyaan mission which aims in sending a crew of 3 members to an outer space orbit in a human spaceflight.

ISRO currently holds a respectable position among the other space organisations in the world all thanks to its success in various ways throughout the years. It also has suffered failures the recent one being Chandrayaan-2, but that didn't stop them from launching Chandrayaan-3 carrying forward the same mission. Chandrayaan-3 was successful hence proving testament to their fact of developing from their mistake, this mission also successfully helped India enter into an elite club in terms of space programs. Chandrayaan-3 came as a redemption to Chandrayaan-2, and with all others missions planned and all the challenging projects upcoming one can only wait to see how ISRO succeeds in making a further strong statement in the world of space and can carry on being one of the torch bearers of the technological developments in our nation.



ANINDYA CHATTERJEE

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING

UNVEILING KOLKATA'S SUBAQUEOUS MARVEL: THE FIRST UNDER-RIVER METRO

In the bustling metropolis of Kolkata, where every street narrates a tale of history and progress, a new chapter has been written in the annals of transportation infrastructure. Kolkata's first under-river metro, a testament to engineering ingenuity and urban advancement, emerges as a beacon of modernity amidst the city's rich cultural tapestry. This ground-breaking project represents not only a triumph in transportation technology but also a catalyst for socio-economic development in the region.

The East West Metro Tunnel, located in Kolkata, West Bengal, is an underwater river tunnel constructed beneath the Hooghly River for the Kolkata Metro. It holds the distinction of being India's largest underwater river tunnel designed for metro rail service. Spanning a length of 10.8 kilometres (6.7 miles) and boasting a width of 5.5 meters (18 feet 1 inch), the tunnel includes a 520-meter (1,706 feet) stretch passing beneath the Hooghly River. Positioned approximately 30 meters (98 feet 5 inches) below ground level, the tunnel was successfully completed in 2021. Operated by the Kolkata Metro Rail Corporation, the East West Metro Line utilizes this tunnel for its metro rail services, with construction undertaken by Afcons Infrastructure.

As per the historical backup, it was more than 100 years ago in 1921 that a British engineer Sir Harley Dalrymple-Hay had for the first time proposed that the East and West sides of Kolkata should be connected through an underwater metro. However, the ambitious project did not see the light of day as the railways considered it too costly and difficult to handle given the alluvial soil that made up the Gangetic bed and pushed it into the background. However, Dalrymple-Hay was assigned by the Calcutta Electric Supply Corporation to build a smaller tunnel linking the two cities for electric cables. This tunnel, the first of its kind in India, was done by hand without any boring machines and completed in 1931.

Though the Howrah Bridge over the Hooghly River provided the desired connectivity when it became operational in 1946, the huge flow of traffic in the later years kept city planners on their toes for alternate connectivity routes.

In 1971, Kolkata's master plan once again emphasized the need for such a project but both the state as well as the Centre were hesitant as they lacked the confidence to go in for such a mammoth exercise. Project experts say that technological advancement in Russia and many European countries made it possible to have under-river tunnels for inter-city connectivity and this gave a cue to Indian engineers to deploy a similar technology here for an under-river project.



ANIRBAN KAR

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING



non technical

articles



DARKNESS BEHIND DEVELOPMENT: TELKUPI A NEGLECTED VILLAGE

Telkupi (or Tailakampi) is a small non-descript village on the banks of Damodar River under Raghunathpur police station in Purulia district of West Bengal, India. Many historians believe Telkupi is the ancient capital of the Shikhar kings whose capital was Tailakampi.

This area, along with most of the temples situated there, was submerged in 1959 as a consequence to the construction of a dam across Damodar river at Panchet in Dhanbad district. Archaeologist Debala Mitra, former Director General of the Archaeological Survey of India (ASI), studied these temples in 1959 and published her findings in her book *Telkupi: A Submerged Temple-site in West Bengal*. The temples were submerged between 1956 to 1962 as a consequence of the construction of Panchet Dam across Damodar. Hundreds of villages were submerged, the fertile agricultural lands of Telkupi got submerged.

Of the original 18 temples that once blessed this region, only two are visible, partially submerged in the river. It is only in the peak of summer, when the waters are low, that the top of a third temple is visible, in the middle of the waters.



<https://maps.app.goo.gl/zUrZohAVCx4pAMw7>



PROF. PRANOY ROY
ASSISTANT PROFESSOR
DEPARTMENT OF CIVIL ENGINEERING

SHANTINIKETAN: AN UNESCO WORLD HERITAGE SITE

Shantiniketan was a dream of Maharshi Devendranath Tagore that was later on nurtured Gurudev Rabindranath Tagore. The very word “Shantiniketan” means the “the abode of peace”. Indeed, the place is. Located in the north- central region of West Bengal under Birbhum district, Bolpur-Shantiniketan is the perfect place to find the self because of the serenity and absolute peace. The tranquil nature and the mesmerizing ambience of the red soil region can be the ultimate destination for those who are looking forward to escape from the city hustles and bustles. Bolpur forms itself with Shantiniketan, Sriniketan and Prantik. The famous Visva-Bharati University, the open-air schools of Shantiniketan created



by Tagore and the famous handicraft industries are the most interesting things to explore here.

UNESCO has included Santiniketan, in the World Heritage List. This was announced by the international agency on Sunday in Riyadh, Saudi Arabia, where the 45th session of the World Heritage Committee is being held till September 25. Santiniketan was established as a university town by the Nobel laureate Rabindranath Tagore in the year 1901.

☑ **Rabindranath Tagore's Influence**

The baton was later passed to his son, Rabindranath Tagore, who expanded upon this vision. Rabindranath was not just a Nobel laureate but a polymath who had a holistic view of education. He believed that learning should not be confined to the four walls of a classroom. Instead, it should be integrated with nature and culture to provide a well-rounded education.

☑ **Birth of Visva Bharati**

This led to the establishment of Visva Bharati University in 1921. The university became a melting pot of global cultures and ideologies. Rabindranath Tagore envisioned it as a place where the world could meet in one nest, a confluence of civilizations and ideas. The curriculum was designed to be interdisciplinary, incorporating arts, sciences, and humanities. It was not just an educational institution but a living laboratory for experimenting with pedagogy and social reforms.

☑ **The Open-Air Classroom Concept**

One of the most unique aspects of Shantiniketan was its open-air classrooms. Rabindranath Tagore was a strong advocate of learning in harmony with nature. The traditional Gurukul system inspired him, where education was imparted in natural settings. This was a radical departure from the conventional educational systems of the time, which were often rigid and disconnected from the environment.

☑ **A Community of Thinkers**

Shantiniketan quickly became a magnet for intellectuals, artists, and social reformers. It wasn't just a place for academic learning but a community where thinkers from diverse fields could collaborate. The institution attracted scholars from across the globe, making it a truly international hub long before globalization became a buzzword. Shantiniketan embodies Rabindranath Tagore's vision of a global meeting ground. It's a place where the mind is without fear and the head is held high, quite literally.

❑ **The Cultural and Educational Landmarks of Shantiniketan:** Shantiniketan is not just a single destination but a collection of experiences, each offering a unique glimpse into its rich cultural and educational heritage. Here's a more detailed look at the must-visit spots that encapsulate the essence of this UNESCO World Heritage site.

❑ **Visva Bharati University: The Intellectual Heartbeat**

- **Cheena Bhavana:** This institute within the university focuses on Chinese language, culture, and philosophy. It's a testament to Tagore's vision of global unity.
- **Kala Bhavana:** An institute of fine arts where students can immerse themselves in painting, sculpture, and graphic art. The place is a hive of creativity.
- **Sangeet Bhavana:** For those interested in music and dance, this institute is a treasure trove. It offers courses in both classical and folk music forms.

❑ **Uttarayan Complex: A Walk Through History**

- **Udayan:** The first of the five houses built for Tagore, it's a blend of Western and Indian architectural styles.
- **Konark:** Known for its unique design, this house was used by Tagore during the winter months.
- **Shyamali:** An experiment in rural architecture, this mud house was Tagore's attempt to promote sustainable living.

❑ **Sriniketan: The Social Reform Hub**

- **Silpa Sadan:** This centre focuses on rural craftsmanship, offering training in pottery, weaving, and other traditional crafts.
- **Palli Samgathana Vibhaga:** This institute is dedicated to rural reconstruction, offering courses in agriculture and rural development.

❑ **Amar Kutir: A Cooperative Society**

Located near Sriniketan, Amar Kutir is a cooperative society that works to promote rural handicrafts. It's a great place to pick up souvenirs and support local artisans.

❑ **Chattimtala: The Meditation Spot**

This is the spot where Maharshi Debendranath Tagore first sat in meditation, marking the inception of Shantiniketan. A simple marble platform commemorates this significant event.

❑ **Upasana Griha: The Prayer Hall**

Also known as the Glass Temple, Upasana Griha is a marvel of Belgian glass and marble. It was built by Rabindranath Tagore's father, Maharshi Debendranath Tagore, as a place for congregational prayers and meditation.

The hall is especially captivating when the sunlight filters through its glass walls, creating an ethereal atmosphere.

❑ **Rabindra Bhavan Museum: The Tagore Archive**

This museum houses a comprehensive collection of Tagore's original manuscripts, paintings, and sketches. It's a must-visit for anyone interested in the life and works of the Nobel laureate.



Each of these spots offers a unique lens through which to view Shantiniketan, making them essential stops on any visit to this newly minted UNESCO World Heritage site.

☑ **The Sonajhuri Forest: An Integral Part of Shantiniketan's Ecosystem**

While Shantiniketan is primarily known for its educational and cultural contributions, its natural surroundings play an equally vital role in shaping its identity. The Sonajhuri Forest is not just a nearby attraction but an integral part of the Shantiniketan experience. The Sonajhuri Forest complements Shantiniketan's ethos of learning in harmony with nature. Rabindranath Tagore, who was a strong advocate for environmental consciousness, often emphasized the importance of nature in education. For students and visitors alike, the Sonajhuri Forest serves as a living classroom. It offers opportunities for botanical studies, nature walks, and even artistic inspiration. Many students from Visva Bharati University engage in fieldwork here, making it a practical ground for experiential learning.



☑ **Khoai Mela: Where Culture Meets Nature**

The forest is also home to the Khoai Mela, a weekly market that celebrates local crafts and culture. This fair is not just a commercial event but a cultural gathering that aligns with Shantiniketan's broader mission of promoting indigenous arts and crafts. It's a place where the community comes together, much like the Poush Mela or Basanta Utsav celebrated within the premises of Shantiniketan. To sum up, Sonajhuri forest embodies the institution's commitment to sustainability and serves as a constant reminder of the symbiotic relationship between humans and nature.



☑ **The Cultural Tapestry of Shantiniketan**

From traditional Bengali crafts to modern art installations, Shantiniketan offers a rich palette for art aficionados. It's a living museum, a dynamic canvas that keeps adding new strokes to its composition.



MANAS SAHA

3RD YEAR

DEPARTMENT OF CIVIL ENGINEERING

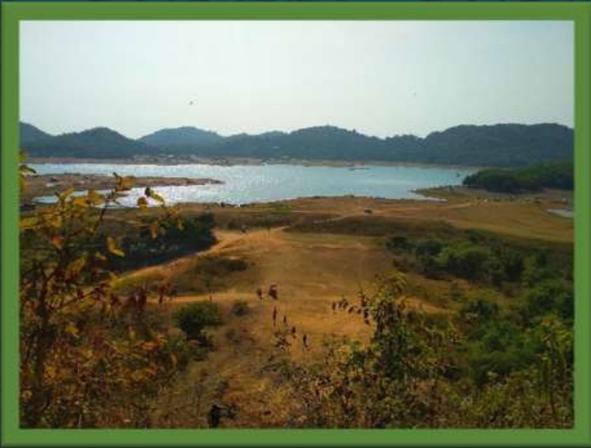


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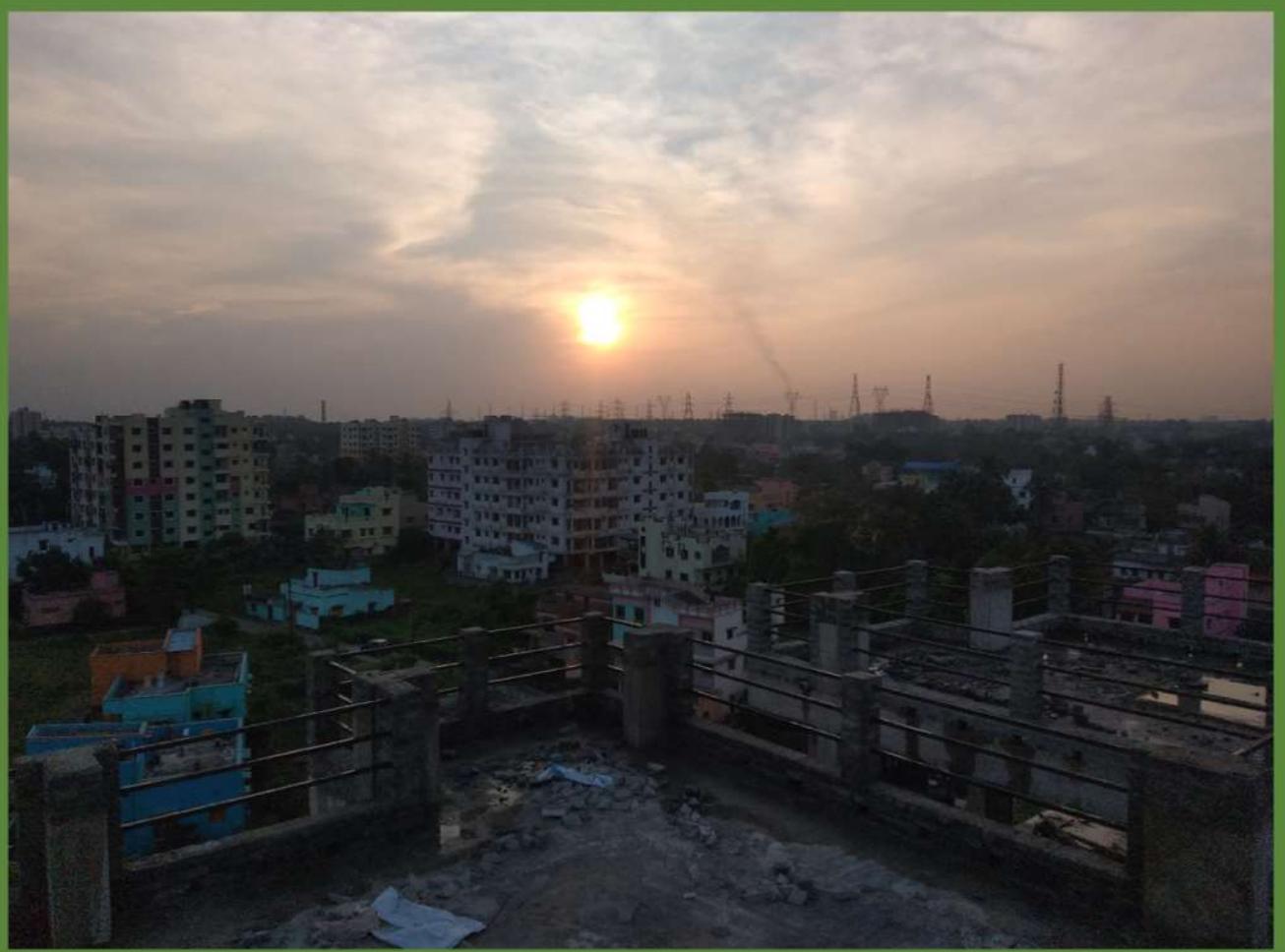


Photography is a way of feeling, of touching, of loving. What you have caught on film is captured forever...It remembers little things, long after you have forgotten everything."

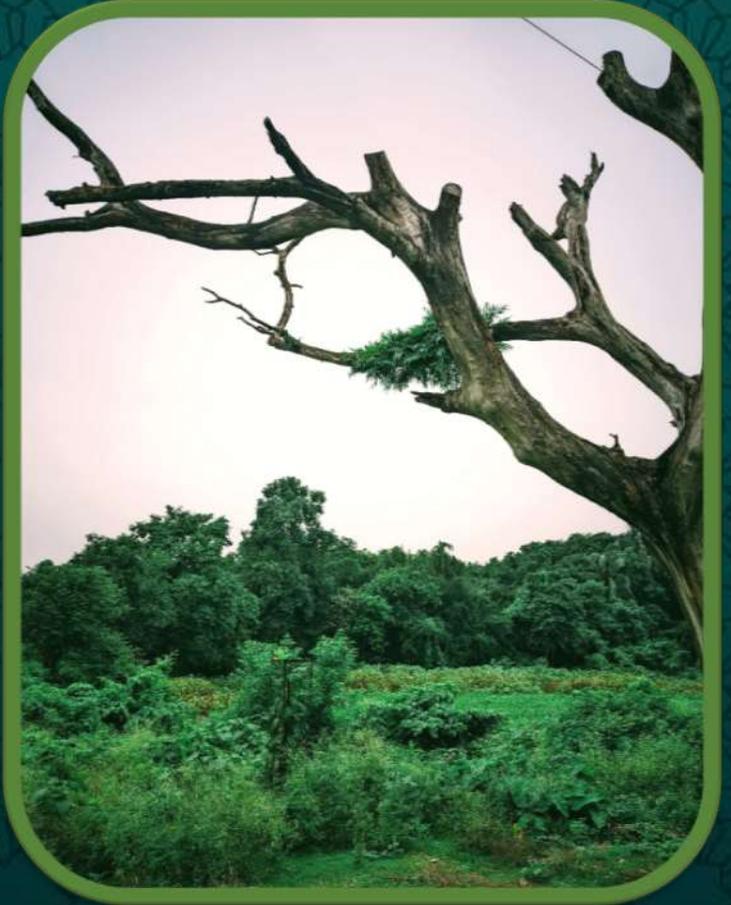
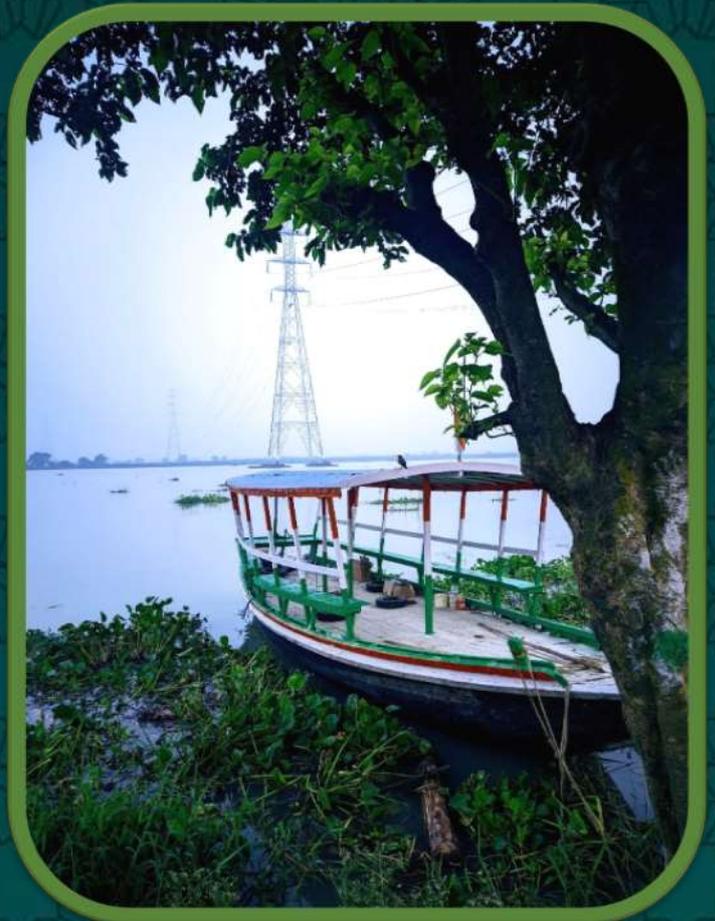
- Aaron Siskind



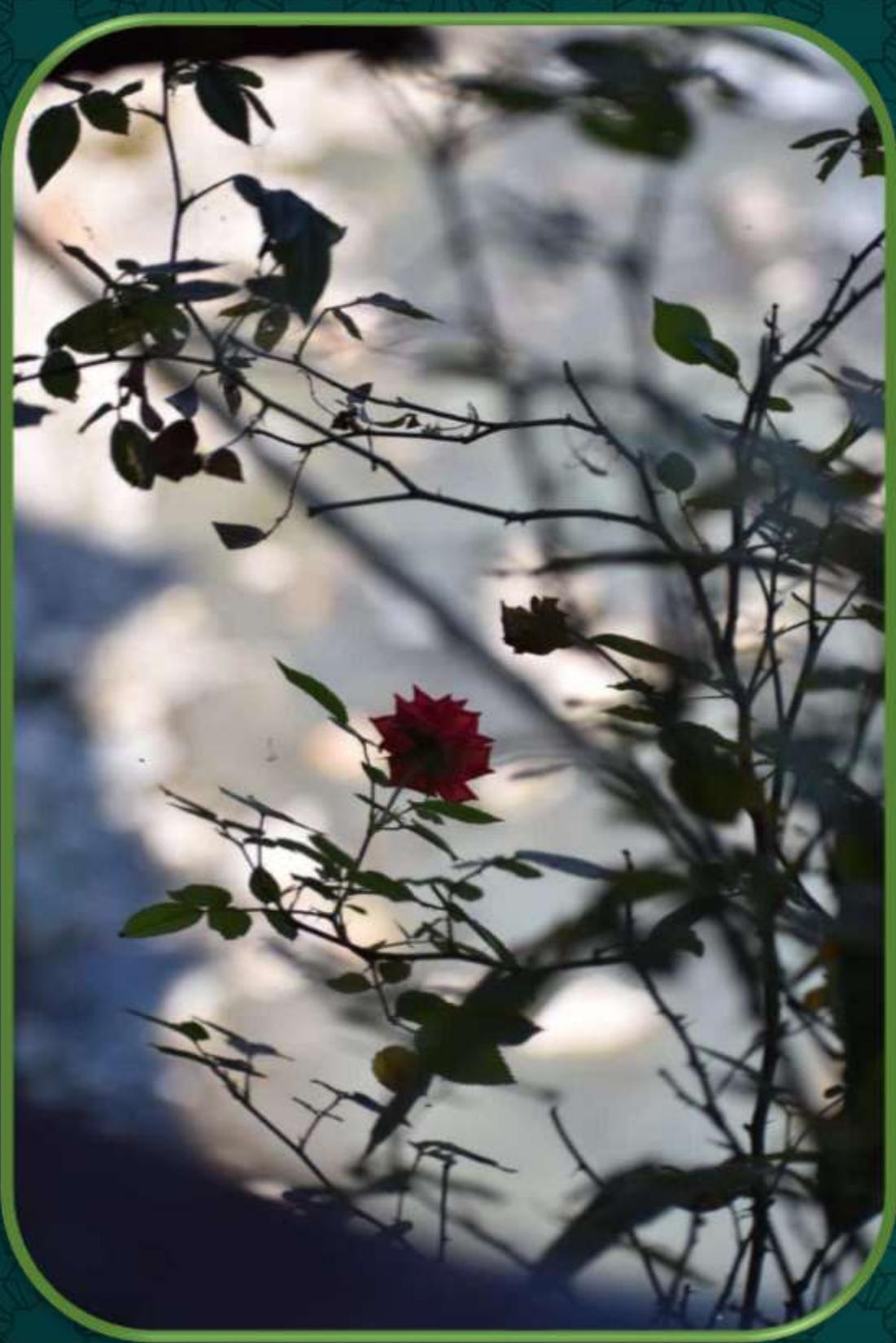
JOYDEEP MONDAL
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JOYDEEP MONDAL
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ANANYA GHOSH
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ANKITA KUNDU

3RD YEAR

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NEHA BHATTACHARJEE

3RD YEAR

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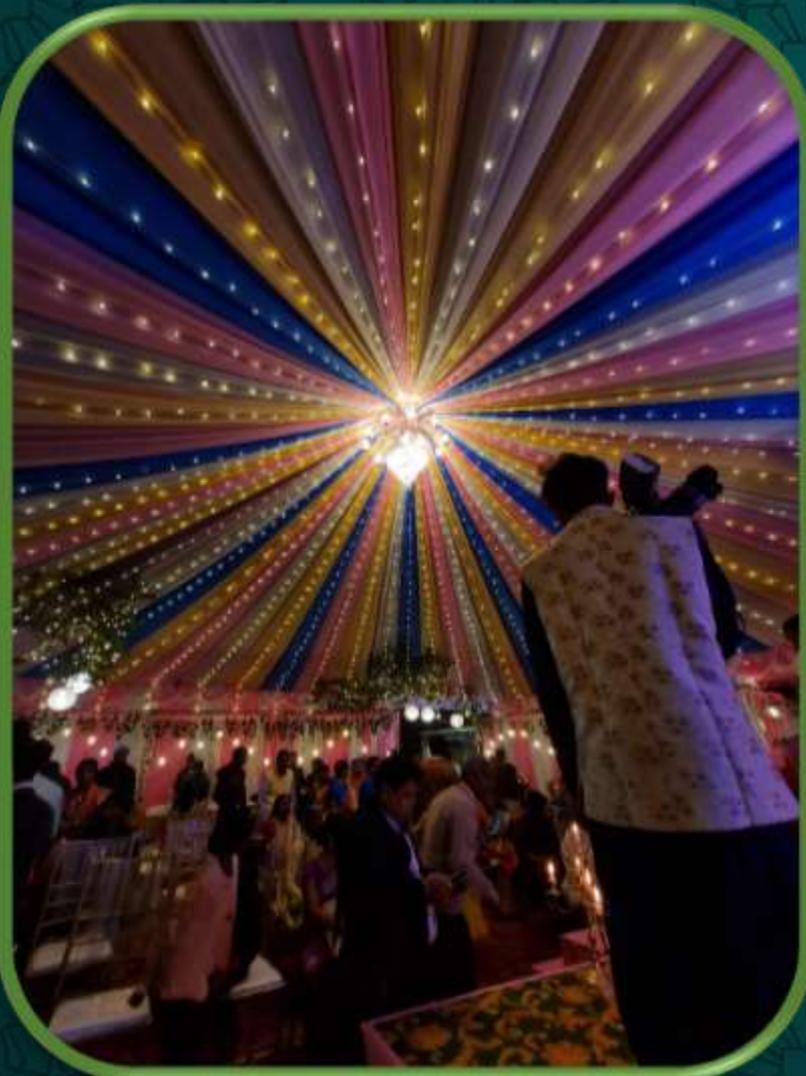
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SNEHA KARMAKAR
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RAHUL PANDIT
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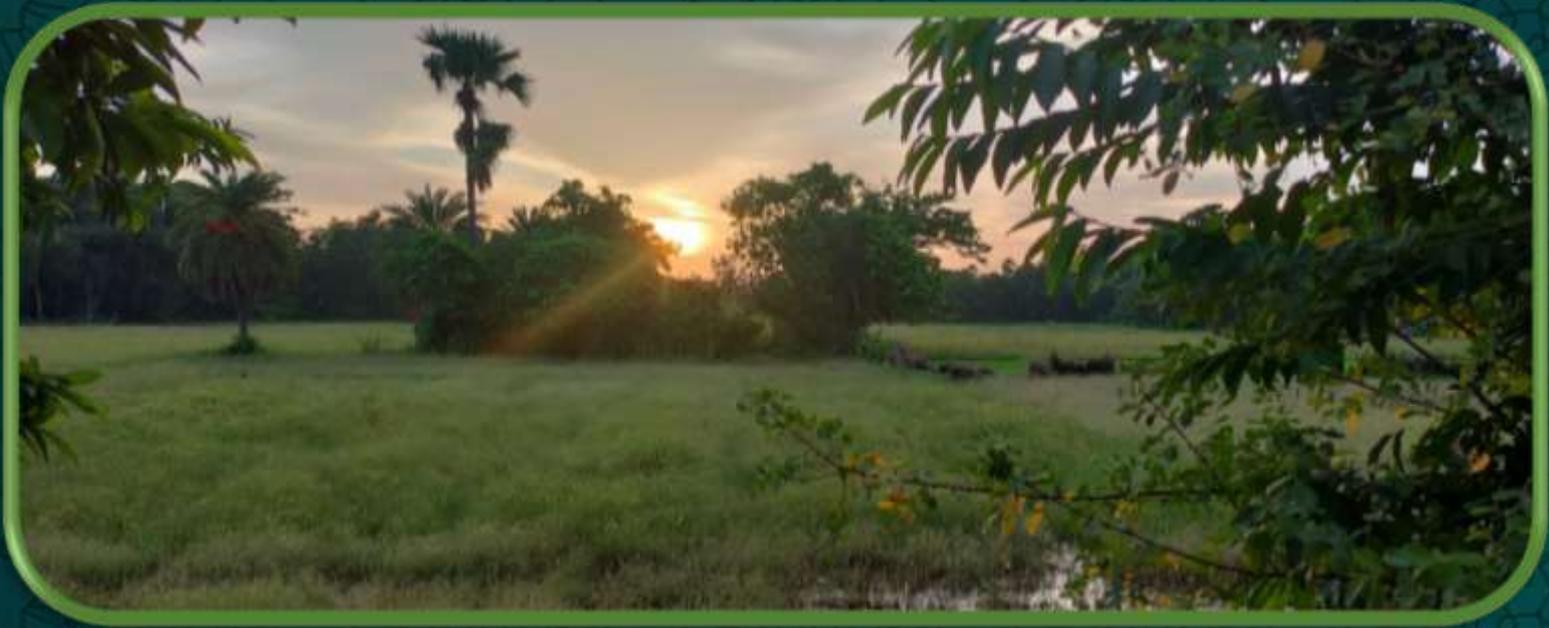
SUMAN GHOSH
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KOUSHIK MAHATA
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SANDIP PAL
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TIRTHA PRATIM DATTA
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NABAJYOTI HALDAR
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DEVSMRITI MAJEE

2ND YEAR

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SOUGATA MAJI
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ANKAN MAJUMDER
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UDIT SARKAR
2ND YEAR
DEPARTMENT OF CIVIL ENGINEERING



CHAUDHARY FAHIM AHMAD
2ND YEAR
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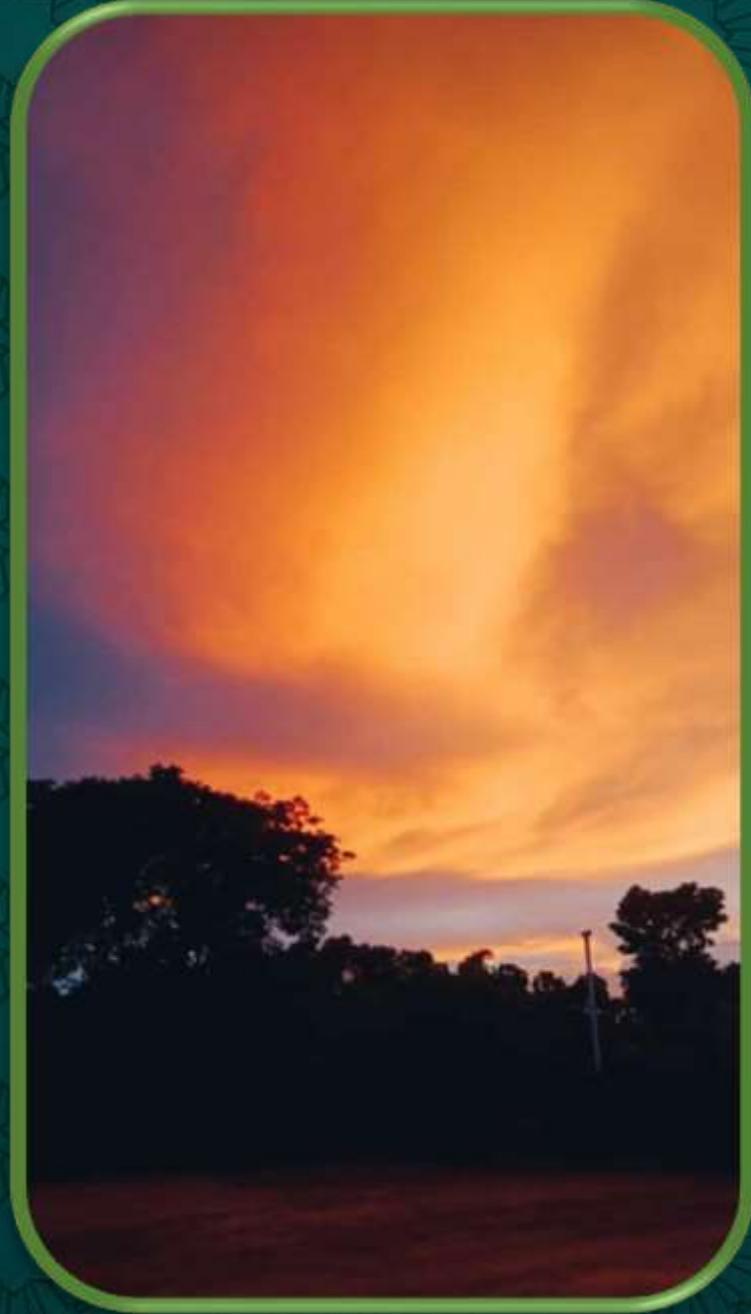
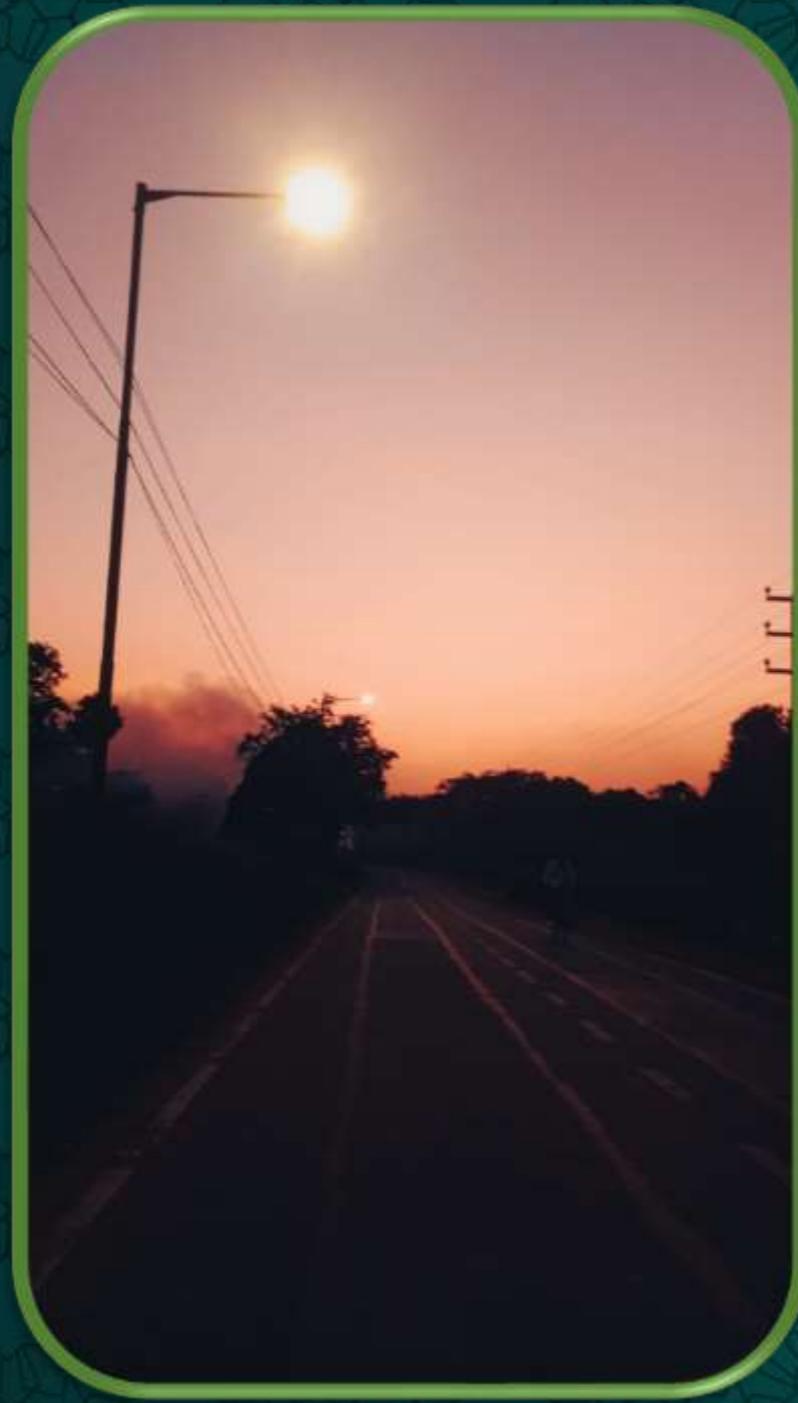
PALASH MONDAL
2ND YEAR
DEPARTMENT OF CIVIL ENGINEERING



SAHABUDDIN SEKH
2ND YEAR
DEPARTMENT OF CIVIL ENGINEERING



AYUSH KESHRI
2ND YEAR
DEPARTMENT OF CIVIL ENGINEERING



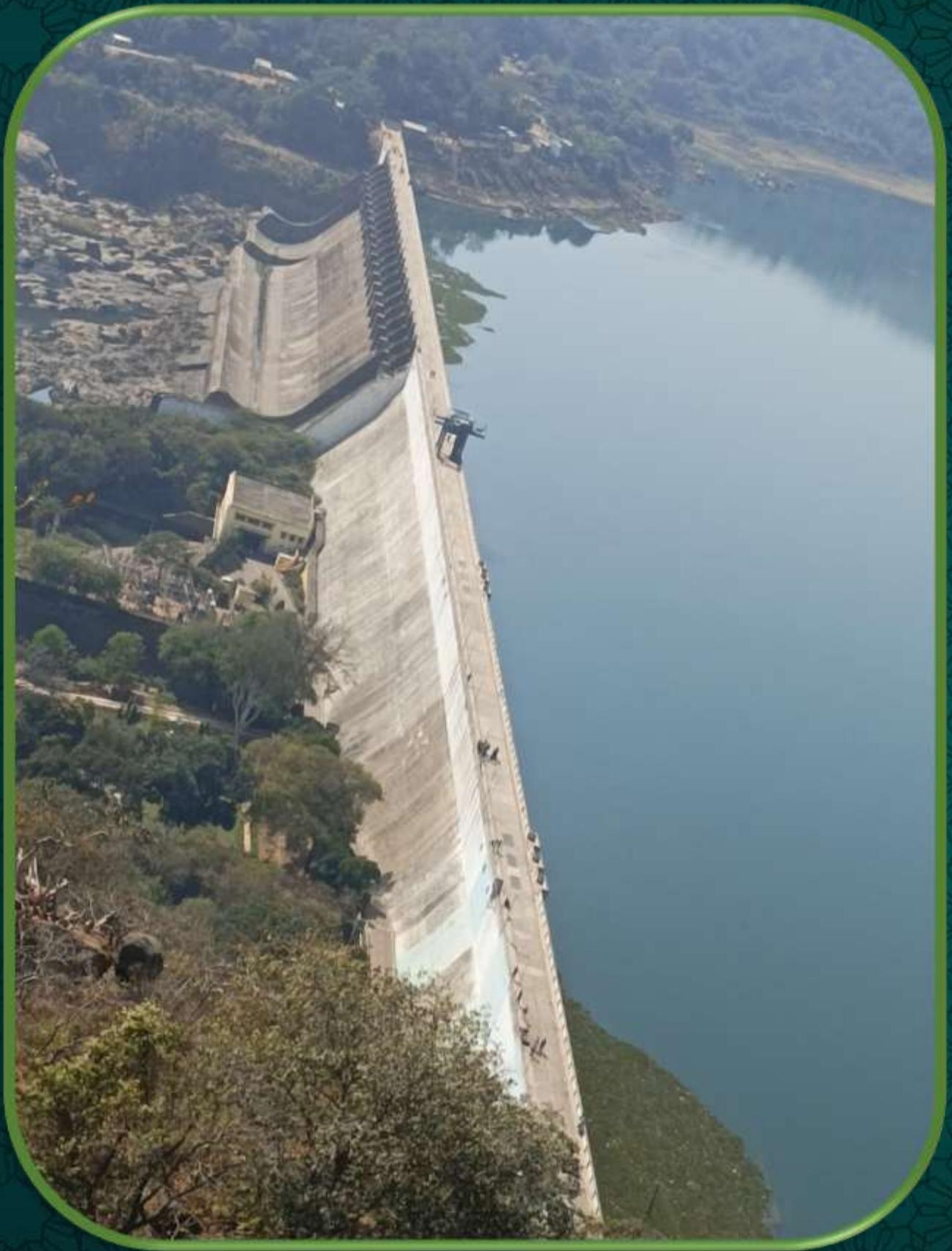
RIMPA GARAI
2ND YEAR
DEPARTMENT OF CIVIL ENGINEERING



DIVYANSH TIWARI

2ND YEAR

DEPARTMENT OF CIVIL ENGINEERING



SHEKHAR MONDAL

2ND YEAR

DEPARTMENT OF CIVIL ENGINEERING



ARGHADIP DEY
2ND YEAR
DEPARTMENT OF CIVIL ENGINEERING



PURBA SAHA
3RD YEAR
DEPARTMENT OF CIVIL ENGINEERING



Poetry

A GOOD WRITER IS ALWAYS A
PEOPLE WATCHER

WHISPERS OF DAWN



Nawed Shakil
(2ND YEAR)

*In the stillness of dawn, where shadows dance,
Whispers of morning grace the earth's expanse.
Silent symphonies, the world begins to sing,
As the sun emerges, on golden wing.*

*Each dewdrop glistens, a diamond in the light,
Nature's canvas painted, in hues so bright.
In every petal, the secrets of the day,
Unfold with grace, in a delicate display.*

*Through ancient forests, where the whispers flow,
And rivers of time, in endless motion go.
Stars above, with their celestial gleam,
A timeless story, in the cosmic dream.*

*In the hearts of souls, where dreams take flight,
And hope ignites the darkest night.
A tapestry woven, with threads of love,
Guiding us, to the heavens above.*

*In every moment, a story to be told,
In every heartbeat, a melody unfolds.
For in the symphony of life, we find our art,
A masterpiece of love, stitched in every heart.*



আমার শহর



নবজ্যোতি হালদার

(দ্বিতীয় বর্ষ)

আমার শহর সোনায় মোড়া,
চলছে কতই গাড়ি-ঘোড়া!
চিড়িয়াখানায় পাখির মেলা—
চলছে মাঠে হরেক খেলা।
জাদুঘর, ভিক্টোরিয়া, লুগলি সেতু—
আসে লোকে দর্শন হেতু।
ফোর্ট ডেইলিয়াম শহীদ-মিনার,
নামি সত্যে আছে চেনার।
জোড়াসাঁকোয় 'বিশ্বকবি' -
দর্শনীয় আছে সবই।
সৌরভ -সহ 'নামকরা' -
এই শহরেই হলেন সেরা।
সকল স্মৃতি মনে গাঁথা
প্রিয় শহর এ কোলকাতা।



শারদীয়া



নবজ্যোতি হালদার

(দ্বিতীয় বর্ষ)

শরৎকালে ভারি মজা, দুর্গাঠাকুর দেখা,
ট্রেন নৌকা নানা থিয়ে, অনেক হলো শেখা!
ষষ্ঠিদিই দিনটাতে ধূপ- ধুনো আনা-
পুত্রোহিত নেচে নেচে, করে আরাধনা।
সপ্তমী-অষ্টমী, খাই মিঠে গজা,
নবমীতে বেড়িয়েছি, হলো খুব মজা!
দুর্গার দশ হাতে, অস্ত্র যে বেশ-
অসুর আর মহিষ তো, দু'জনেই শেষ!
বিজয়াতে কাঁদে লোকে, দুঃখ যে ভারি,
দশমীতে মা এখন, যাবে স্বস্তরবাড়ি।



আঠাবো বছর বয়স



অনিন্দিতা সেনগুপ্ত

সেই আঠাবো বছর বয়স আজি
কোথায় গেল? কবি তোমার;
নির্ভীক চোখে, আগুন বুকু
যার ছিল শুধু জয়জয়কার।
যে আঠাবো বছর বয়স বাঁচে,
দুর্যোগ আর ঝড়ে।
আজ সেই আঠাবো বছর ভাসে,
বিলাসিতার জোয়ারে।
পাথর বাধা ভাঙে যে বয়স,
নির্ভীক পদাঘাতে।
আজ সেই আঠাবো, জর্জরিত
চুচ্ছ আঘাতে।
যে আঠাবো এগিয়ে থাকে
মুহূন কিছু করার অগিদে।
আজ সেই আঠাবোর সময় কাটে
ফেসবুক আর হোয়াটসঅ্যাপে।
যে আঠাবোর হয় জয়
সে ভীক কাপুরুষ নয়।
আজ আলিঙ্গন করবে মূঢ়্যকে সে
ব্যর্থ প্রেমের অনুশোচনায়।
খুঁজছে নয়ন তোমায় আবার,
কোথায় তুমি সেই আঠাবো?
ফিরে এসো তুমি দুফান নিয়ে
নষ্টে সমাজের হাল ধর।।





जीवन



स्वरचित...

राहुल पंडित

(तृतीय वर्ष)

जीवन में हंसते रहो, रोना बच्चों का काम है, जीवन में उतार-चढ़ाव आएंगे, मुस्कुराहट के साथ इसे पार करना समझदारों का काम है।

जीवन में इतनी ऊंचाइयों को छू लो कि जब नीचे देखो तो तुम्हें सिर्फ बीते हुए खूबसूरत यादें ही याद आएँ क्योंकि बुराइयाँ और गंदगी तो नीचे से दिखाई देती है आसमान से तो खूबसूरती ही नजर आती है,

तुम्हें नीचे रहकर भीड़ में कहीं खो जाना है या ऊपर उठकर भीड़ से अलग दिखना है यह समझना तुम्हारा काम है।

जो जल रहा है उसे जलने दो क्योंकि वही तुम्हारे चारों तरफ रोशनी दिखाएंगे। दूसरों को मत देखो दूसरों से मत जलो हमेशा खुश रहो खुश रहना ही जीवन का दूसरा नाम है।

इसे समझना तुम्हारा काम है.....



স্বাধীনতা



রিম্পা গরাই

(দ্বিতীয় বর্ষ)

স্বাধীনতা আজ মিথ্যে জ্বলে জর্জরিত ফাঁদে
স্বাধীনতা আজ বিকিয়ে গেছে ঢোকার বিনিময়ে,
স্বাধীনতা আজ ডেল্টো দিকে হাঁটছে এক মনে,
মনুষ্যের বিচার করো ভালো মানুষ কহে?
স্বাধীনতা আজ বডু একলা, তোমার সঙ্গী সাথীরা কহে?
দেশের শিশু জানে না কো স্বাধীনতা দিবস
তার কাছে স্বাধীনতা দিবস মানে পালিত একবেলা উৎসব!
দিন শেষে রাত নামে রাত শেষে দিন
খাঁজ কী নিয়েছ শত শত মানুষ হৃদয় ভরে খাইনি কতদিন ?
পড়াশোনা আজ বইয়ের ভেতরে সঞ্চিত কত ভিগ্ন
স্বাধীনতা তুমি ঘোমটা খোলো করো না নিজেকে বিক্রি
স্বাধীনতা তুমি ফিরে এসো মানুষের মাঝে
পর্যাপ্ততার জ্বলে কেমন ভাবে থাকবে ছোটে খাঁজে?





স্মৃতি



অর্ঘ্য মুখার্জী
(দ্বিতীয় বর্ষ)

জটিয়ে কি বসন্তের শান্ত রঙে..

তোর সকল স্মৃতি গুলো উড়িয়ে দেওয়া সম্ভব???

তোর স্মৃতি ধরেই তো বাঁচতে চেয়েছি..

ভুলতে পারিনি তোকে আজও ,তাই তো বেঁচে আছি,এটাই বাস্তব....

বসন্তের এই পূর্ণিমায় যখন চাঁদের গায়েও রঙ লেগেছে...

ঘরের একটা কোনায় নিঃশব্দে ,নিরবতায় দিন আমার ও কাটেছে....

হয়তো চাঁদ ও আজকে নিজের আলোয়... আলো ফোটেতে ব্যর্থ...

চারিদিকের রঙের স্নেহায় ,সেই স্নিগ্ধ আলো আজ অনেক কথার অর্থ ...

লালমাটির পলাশ ফুলের সেই ঘ্রাণ... আজও তোরই গন্ধ বয়ে আনে ...

তোর মিস্তি গন্ধ মাথা নাড়ে... জটিয়ে কি অন্য গন্ধ আজও মানে ???

বসন্তের কোকিলের ন্যায় গানের কুঞ্জ... আজও ভাসে আমার কানে ...

কোলে মাথা দিয়ে গান সোনার গুঞ্জন করার দিন ,সেই বুঝি আর মনে....

শীতের ঠাণ্ডায় ঝোরে যাওয়া পাতার ন্যায় যদি মূহ্য হয়েছিলে আমার.....

বসন্তের নতুন পাতার মত নতুন ভাবে জন্ম নেবো আবার.. জন্ম নেবো আবার ॥



drawing

*"Art is the lie that enables
us to realize the truth."*

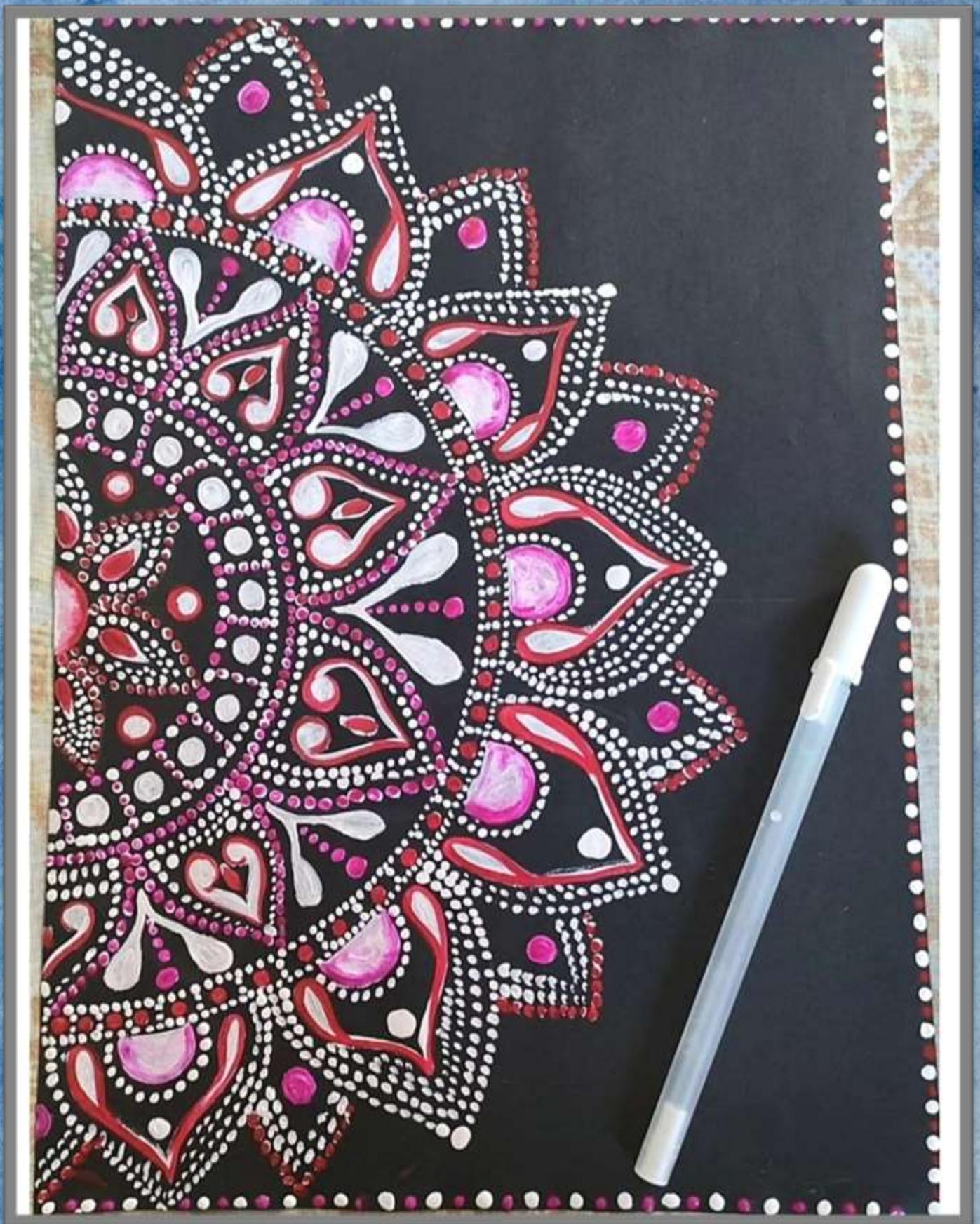
--Pablo Picasso



ANKITA KUNDU

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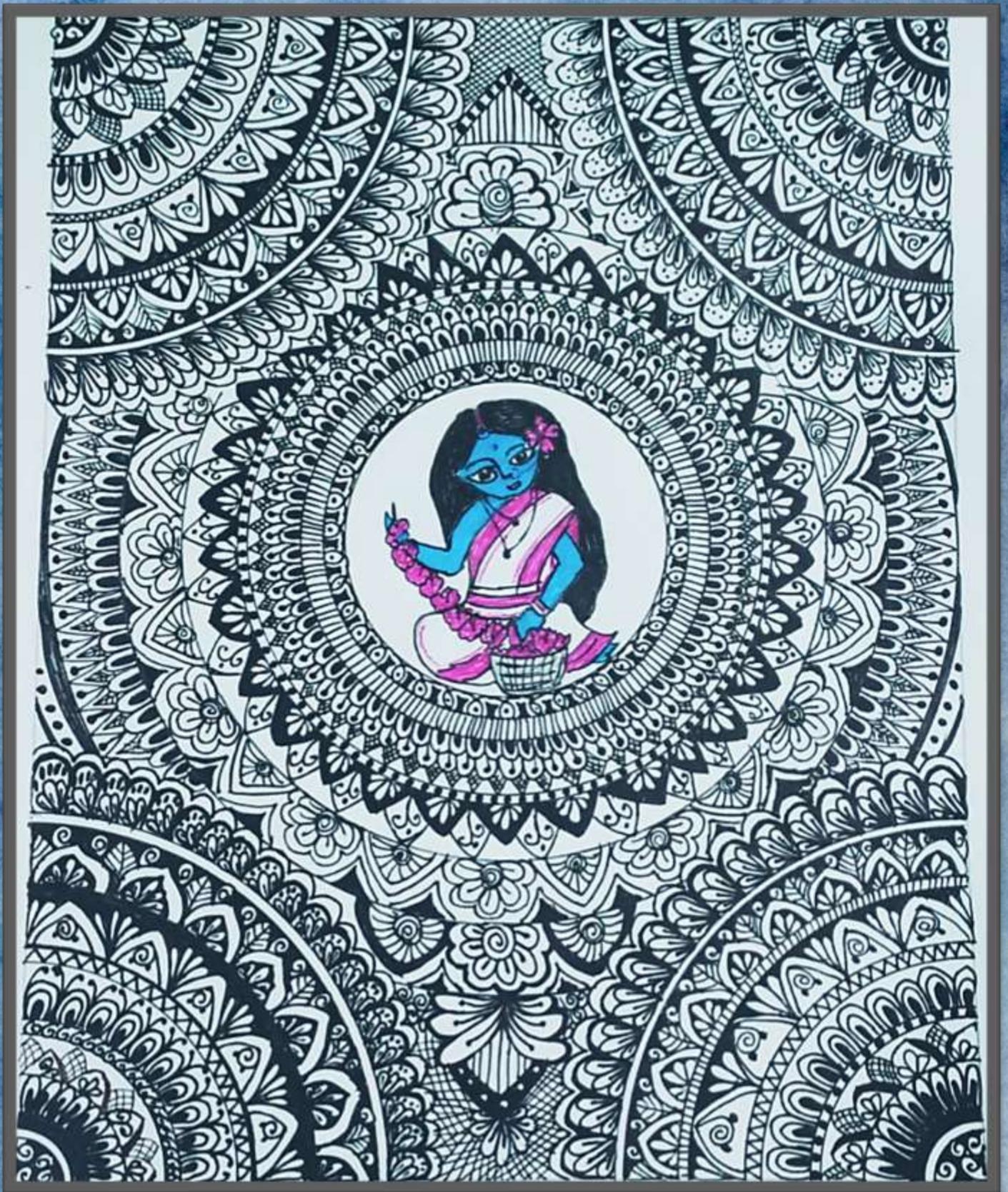
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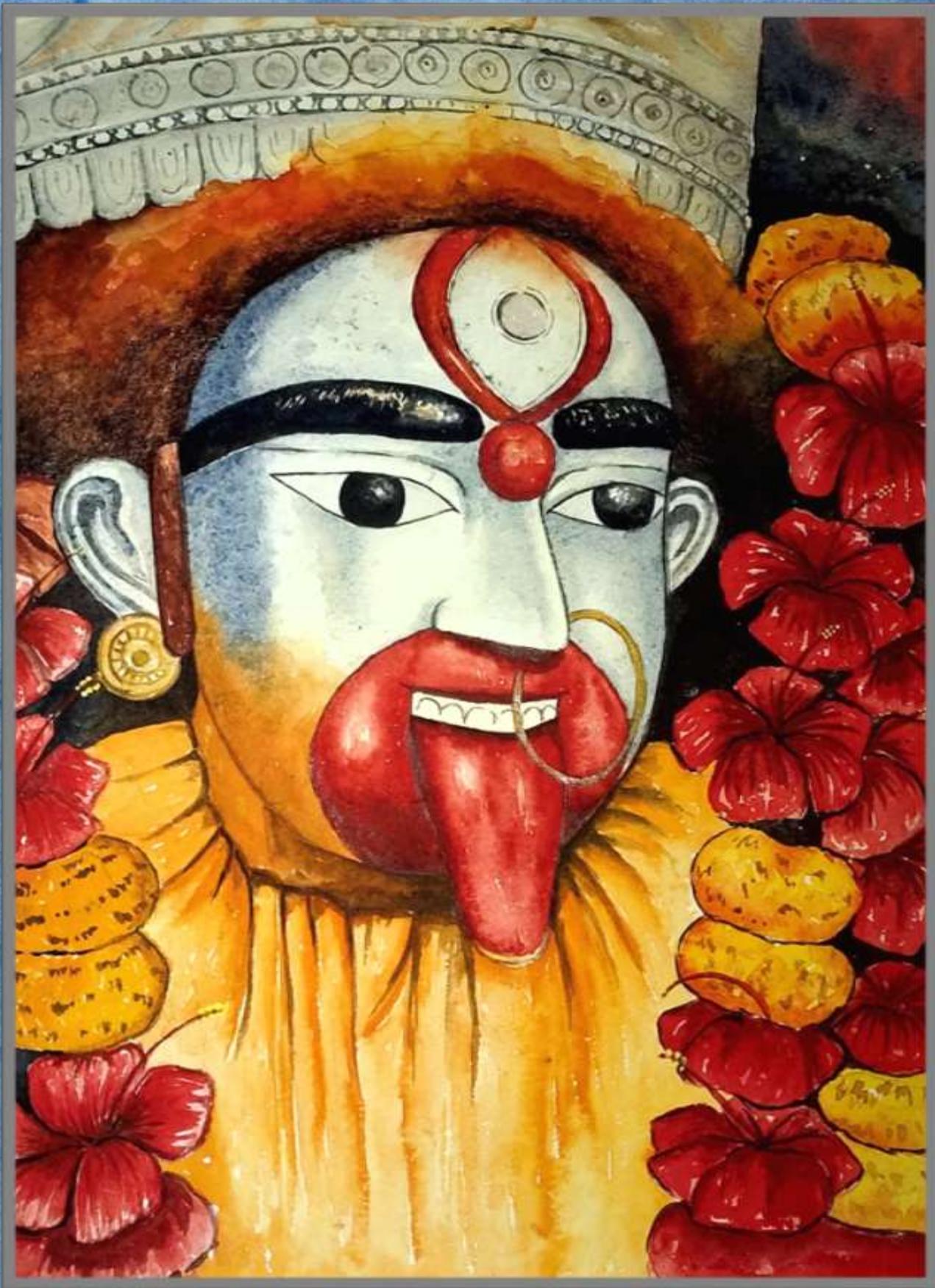
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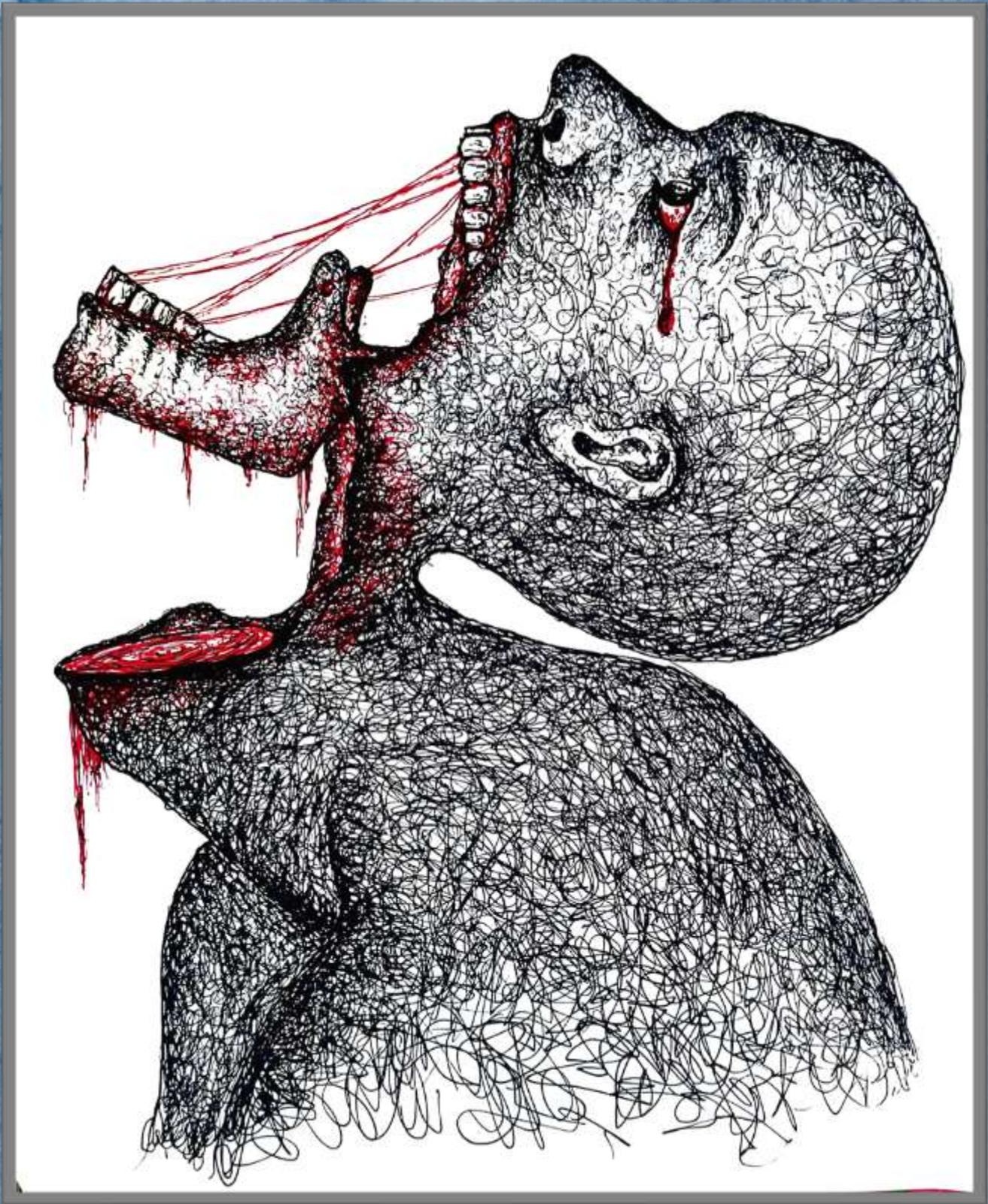
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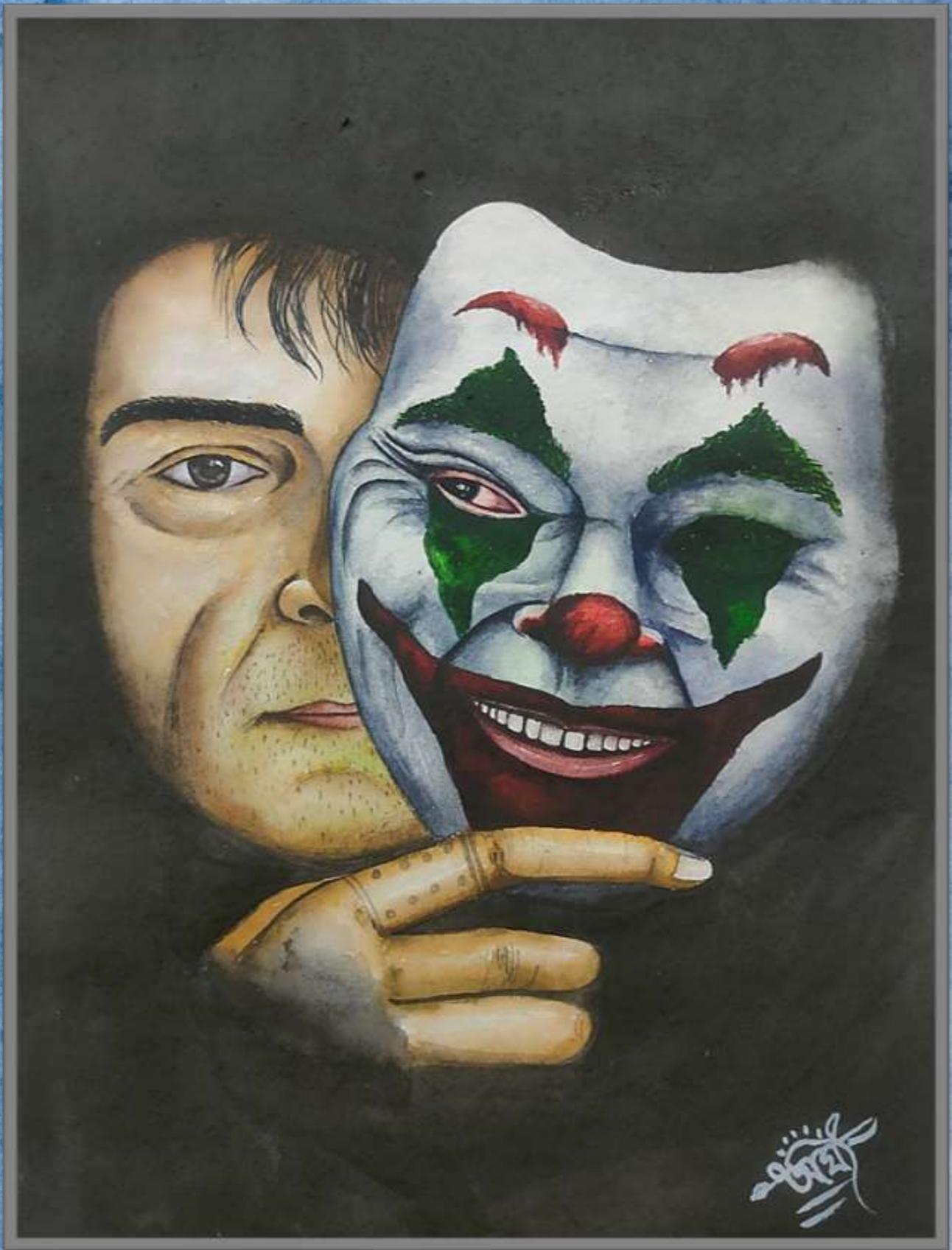
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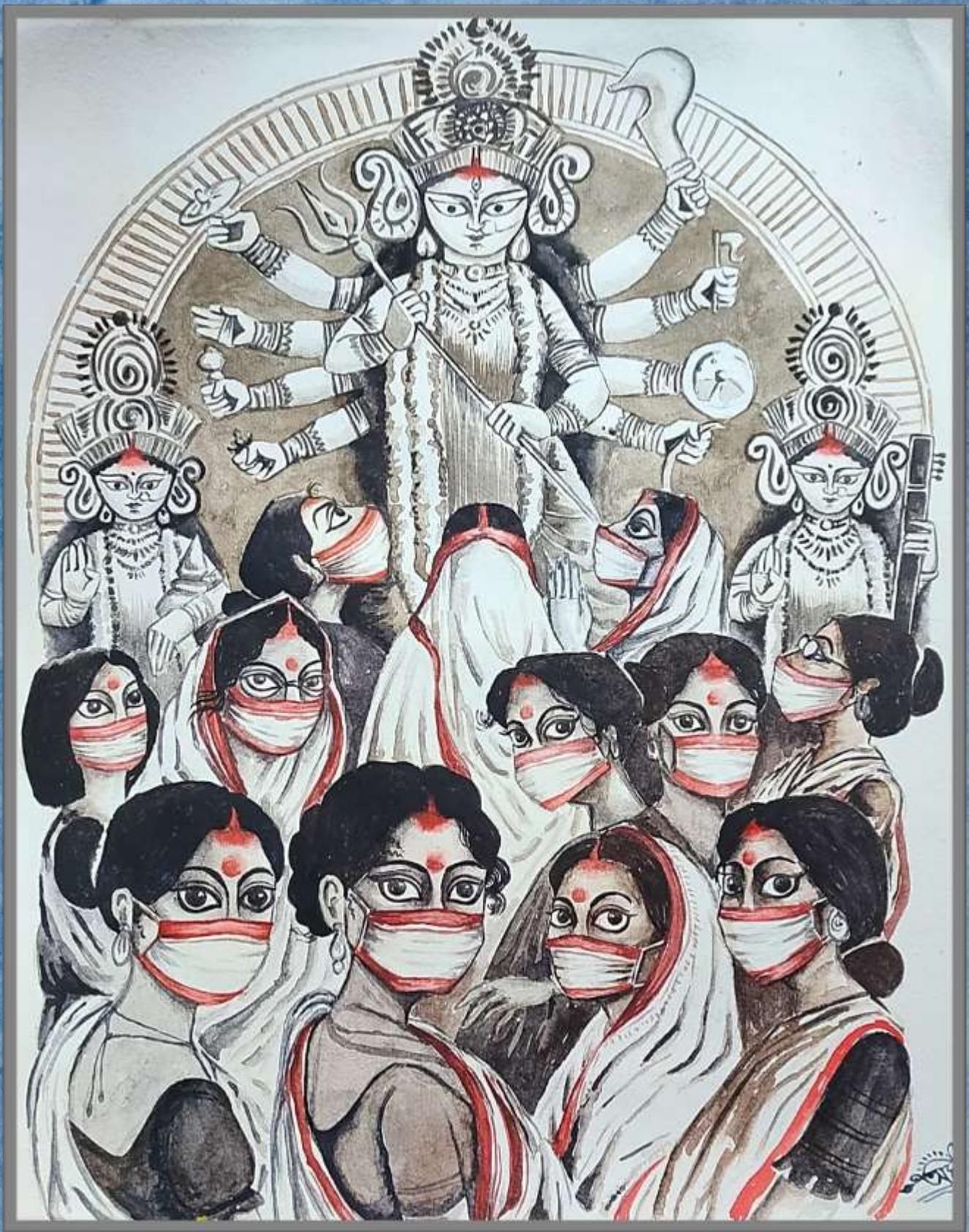
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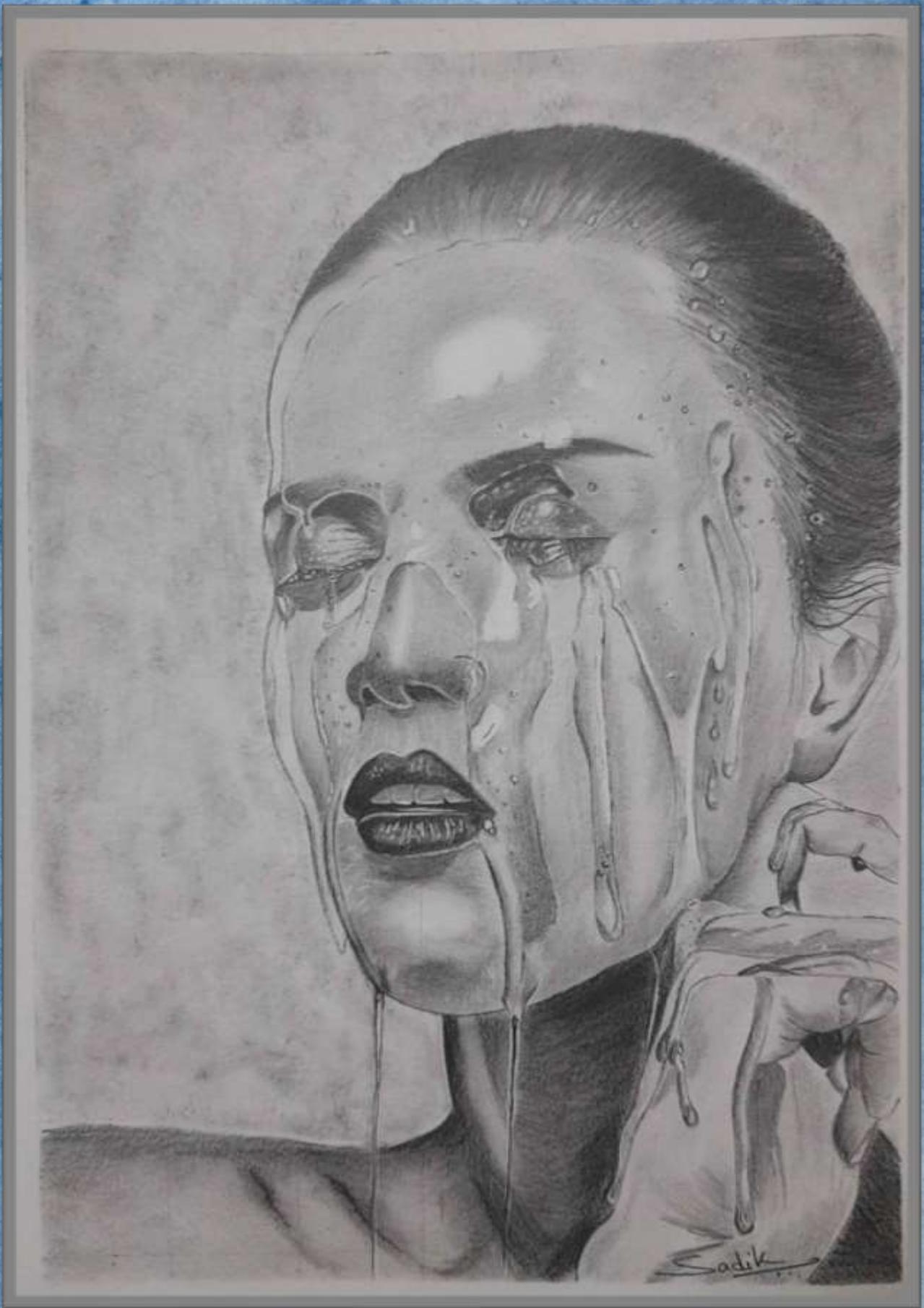
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दशरौकरी

VOL: 4

Dear Readers,

As we prepare for our upcoming Publication, we find ourselves at an exciting juncture, poised to curate another enriching experience for you, our valued audience. With each edition of our E-Magazine, we endeavour to deliver content that both captivates and enlightens. Technical Articles, Literatures, Poetry, Drawings and Photography are the topic to invited for our next Publication & also we invited your input and suggestions for content that you would like to see featured.

🌀 Guidelines for submission to the magazine:

- Topic of Article: Technical or Literature
- Language: English, Hindi and Bengali
- Word limit: 2000
- Articles are to be sent as Microsoft Word document.
- For Photography and Drawings send photos only in jpg/jpeg/png format.
- Provide Particulars: NAME, Roll. No/Registration No., Year, Branch/ Department, and Contact Number.
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