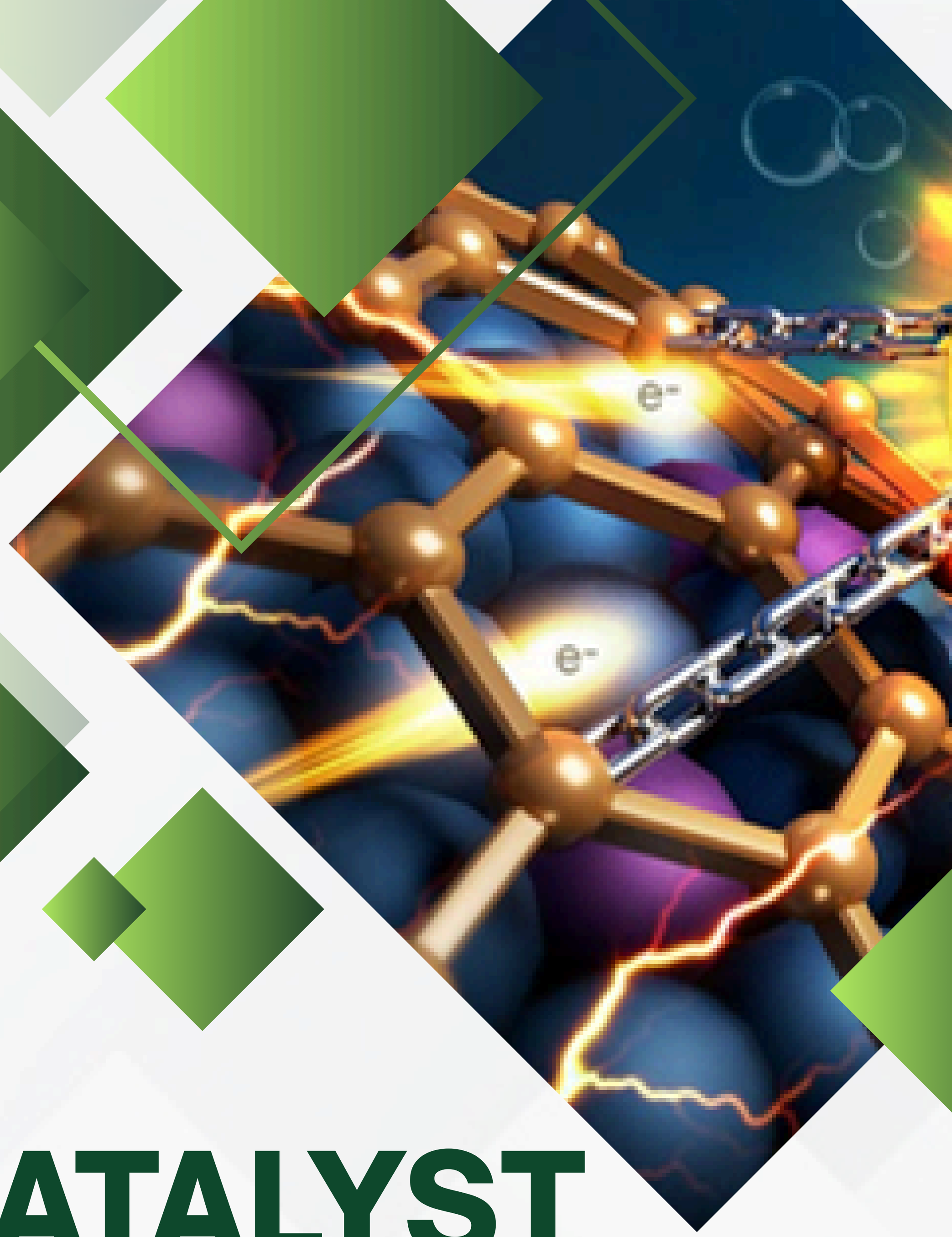

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Department of Chemistry

JSS Academy of Technical Education - Bengaluru

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- BENGALURU

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From the Editorial Desk

The Department of Chemistry is delighted to present the third volume of its annual department newsletter, CATALYST (Vol. III), for the academic year 2025–26. This publication reflects our continued commitment to nurturing academic excellence, intellectual curiosity, and collaborative learning within the field of chemistry. Catalyst serves as a dynamic platform that showcases innovative research contributions, scholarly reviews, and insightful articles spanning diverse branches of chemistry. Through this newsletter, we aim to bring readers closer to the vibrant academic, research, and outreach activities that define the Department of Chemistry. In addition to highlighting scientific advancements, Catalyst also captures the academic journeys of our students and faculty, acknowledging their achievements and the many ways in which they contribute to the department's growth and vision. The Editorial Board sincerely appreciates the continued support and encouragement extended by faculty, students, and well-wishers. As we move forward, we look forward to fostering an informed, inspired, and engaged community through Catalyst, strengthening our shared pursuit of knowledge and innovation.

Editorial Board

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With the blessings of His Holiness,

Vision of the Institute

To be among the finest Institutions providing Engineering and Management Education empowered with research, innovation, and entrepreneurship.

Mission of the Institute

- Strive towards Excellence in teaching–learning process and nurture personality development.
- Encourage Research, Innovation & Entrepreneurship.
- Train to uphold highest ethical standards in all activities.

Vision of the Department

To empower the students with the fundamentals of chemistry for an active career in technical education and research.

Mission of the Department

- To contribute quality education in applied chemistry.
- To inculcate the significance of chemistry for research and innovation.

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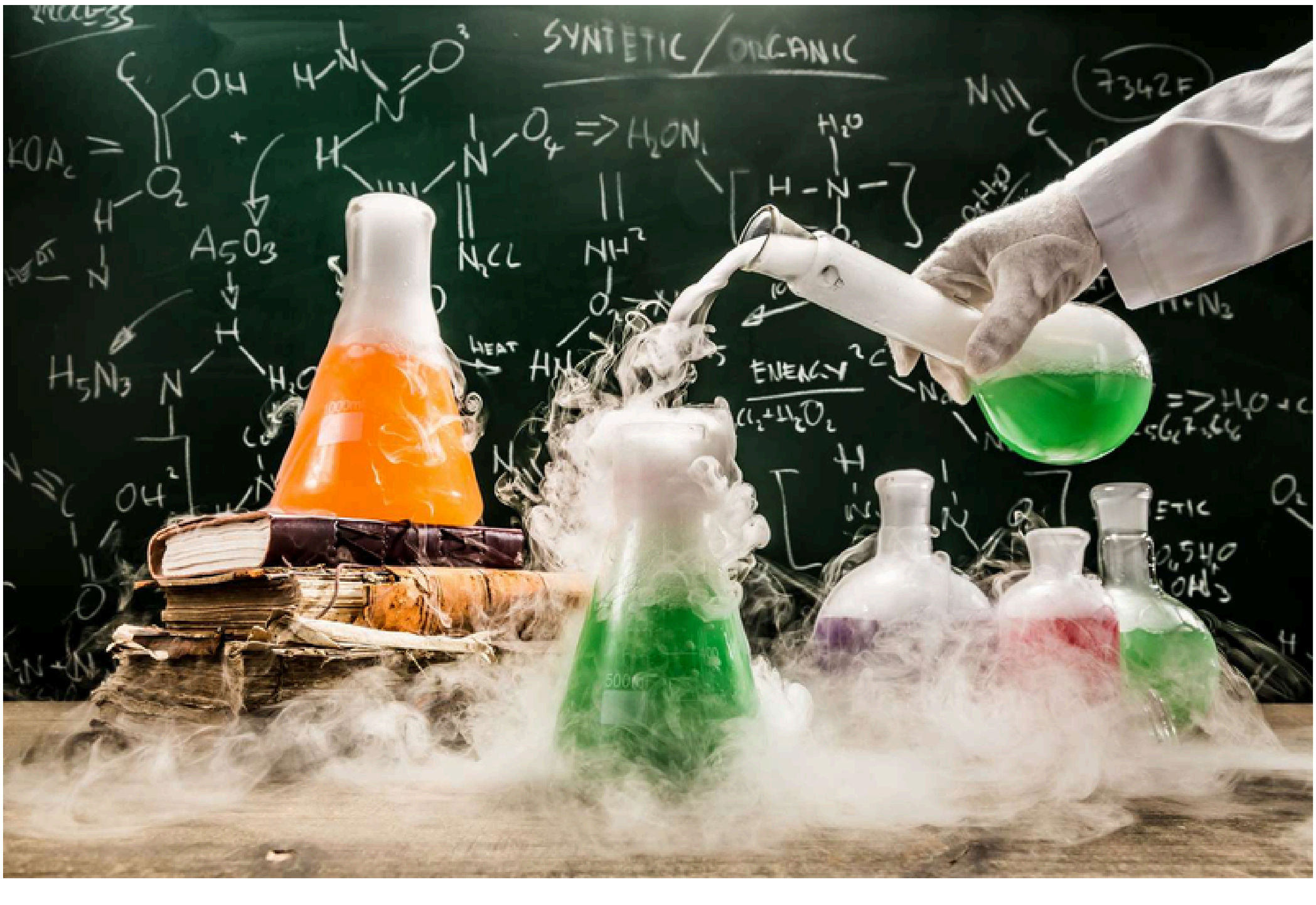
Department Activities



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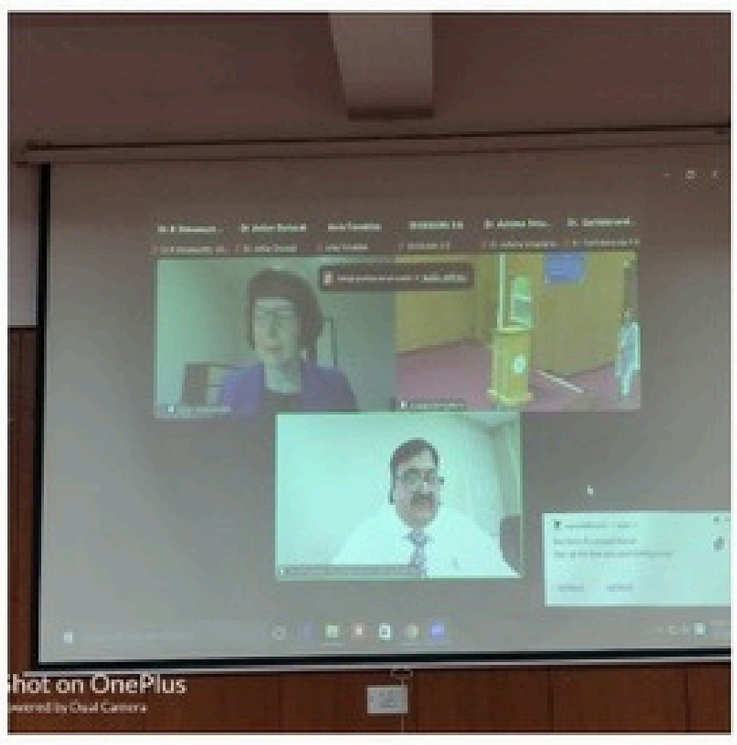

“International Conference on Polymers for Sustainable Development” was organized by the Department in association with Nicolaus Copernicus University, In Torun, Poland on 07.02.2025 online mode.

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Competitions held

Mobile Exhibition

“National Science Week - 2025” Celebration from 07.04.2025 to 19.04.2025 and expert talk by Dr. Gurumurthy Hegde, FRSC, Director, Centre for Advanced Research and Development, Christ University, Bengaluru on 19.04.2025

Inauguration by Chief Guest

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7th Popular lecture on "The Science and Technology of Food" by Dr. Suhas R, Senior Scientist, Department of Plantation Products, Spices and Flavour Technology, CSIR-Central Food Technological Research Institute (CFTRI), (Ministry of Science and Technology, Govt. of India) Mysuru.

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Faculty Accomplishments

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Visit To International Universities

Dr. Mahesh B
Professor & Dean Reasearch

- **Dr. Mahesh B, Professor of Chemistry, Dean Research, was invited as a Research Scientist at the Department of Chemistry of Biomaterials and Cosmetics, Faculty of Chemistry, Nicolaus Copernicus University, Torun, Poland in 2025, which was sponsored by Nicolaus Copernicus University, Poland, under Mobility Program.**

- **Dr. Mahesh B has been recognized as Research Fellow from 18.9.2025 to 31.12.2028, INTI International University, Malaysia.**

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Invited talks delivered

- Dr. Mahesh B, Prof. & Dean Research, presented his work as an invited speaker, at “Global Science Conference” with the theme chemistry for health, held between October 8th- 11th , 2025 at IIT Mumbai. During the conference. He also served as the Session Chair for the track on Organic & Medicinal Chemistry.

- Dr. Chamaraja N A, presented his work as an invited speaker, at “International Conference on Innovations in Nanomaterials, Nano Devices & Smart Technologies (INNOST NANO 2025), held between November 12th-14th, 2025 at SGT University, Gurugram, Haryana. During the conference he also served as the Session Chair for one of the Technical Sessions.

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Research Activities

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Research Publications

- **Shilpa, M. L., Roopashree, B., & Gayathri, V. (2025). Polymer-anchored vanadium (IV)–substituted benzimidazole: an Efficient green catalyst for aqueous oxidation of organic substrates. Research on Chemical Intermediates, 1-25.**

- **Lokesh, H. R., Kathyayani, D., Mahesh, B., Suhas, P., Prasad, C. M., Rekha, N. D., & Klepka, T. (2025). Examination of physicochemical characteristics of blends of synthetic elastin-mimetic polypentapeptide with Chitosan: Inhibitory potential on pancreatic α-amylase. Materials Chemistry and Physics, 131529.**

- **Swamy, M. M., Roopashree, B., Vergis, B. R., Sowmyashree, A. S., & Kathyayani, D. (2025). Decoding the Mechanisms of Dyes and Heavy Metals via NiO Nanoparticles: Kinetic and Isothermal Perspectives. Topics in Catalysis, 1-14.**

- **Puneetha, J., Kottam, N., Rajendrachari, S., Swarna, S., Shivaram, S. J., & Sriariyanun, M. (2025). Efficient Removal of Crystal Violet Dye Using Visible Light-Active Mixed Phase Titanium Dioxide Nanoparticles: Synthesis, Degradation Kinetics, and Reusability Assessment. Topics in Catalysis, 1-25.**

- **Ganesh, P., Mahesh, B., Roopashree, B., Revanasiddappa, M., & Gayathri, V. (2025). Improved electromagnetic shielding, optical, electrical and structural, behaviour of Poly (methylmethacrylate) composites with an Iron (III) benzimidazole complex. Solid State Communications, 116136.**

- **Aishwarya, H. N., Bindhu, S., Asha, R., Bhoomika, S., & Nagashree, S. (2025). Investigating the morphological properties of poly (lactic acid)/gadolinium oxide and poly (lactic acid)/yttrium oxide nanocomposite films for optical applications. Discover Applied Sciences, 7(10), 1174.**

- **Prabhuswamy, Veda Bandigowdanahalli, Kumara Swamy Ningappa, Madhukar Beejaganahalli Sangameshwar, Bharath Kumar Sobandhar Prakash, Kavya Rajanna, Mahesh Basavaraju, and Sangamesha Madanahalli Ankanathappa. "Enhanced optical and UV shielding performance of $CoFe_2O_4$@ GONDs embedded PVA nanocomposites." Polymer (2025): 129137.**

- **Martiz, R. M., Ramu, R., Nambisan, H., Suhail, A., Raish, M., Patil, S. Mahesh Basavaraju., & Tang, X. (2025). Identification and 3D modeling of bioactive peptides from Lactobacillus brevis RAMULAB49 protein hydrolysate with in silico ERK1 phosphorylation inhibition activity targeting diabetic nephropathy. Plos one, 20(9), e0331192.**

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- **Pavithra, S., Kathyayani, D., Nanjundaswamy, G.S., Soundarya, T.L., Thejas, R., Gouri Mirji., Krishna, B.S., Nagaraju, G., Dr. Prashanth, B. (2025). Green synthesized YSZ/polypyrrole nanocomposites for enhanced electrochemical and butane gas sensing applications. Ionics, 1-14.**

- **Shende, V. S., Jain, A., Basavaraju, M., & Zodape, S. P. (2025). Volumetric and Compressibility Studies of Antimycobacterial Drug in Aqueous and Aqueous dGlucose Solutions at Various Temperatures. Journal of Chemical & Engineering Data, 70(5), 1918-1929.**

- **Divakara, S. G., Mahesh, B., Jayanna, B. K., & Anil Kumar, H. G. (2025). Photocatalytic degradation of crystal violet dye using honey mediated synthesis of $NiFe_2O_4$ nanoparticles. Green Chemistry Letters and Reviews, 18(1), 2543931.**

- **Shende, V. S., Mahesh, B., Patel, V., Chaudhary, R. G., & Zodape, S. P. (2025). Thermodynamic and Compressibility Studies of Naphazoline Hydrochloride in Aqueous and Aqueous l-Valine Solutions: Insights into Molecular Interactions and Solvation Behavior. Journal of Chemical & Engineering Data, 70(8), 31233139.**

- **Swamy, M. M., Prashanth, G. K., Shilpa, C. D., Sowmyashree, A. S., Chougala, M., Gurushantha, K., Kathyayani, D & Prashanth, B. (2025). Eco-Friendly Synthesis of CuO Nanoparticles Using Plant Extract: Structural, Functional, and Graph Theory-Based Analysis for Advanced Applications. Chemistry Africa, 115.**

- **Suhas, P., Mahesh, B., Divakara, S. G., Nanjundaswamy, G. S., Mahadevaprasad, C. S., Sionkowska, A., & Gowda, D. C. (2025). Synergistic approaches in natural and synthetic polymer blends for biomedical applications A review. European Polymer Journal, 114161.**

- **Kavya, H. V., Chamaraja, N. A., Rekha, N. D., Suraj urs, B. S., Sneha, C. S., & Devanoor, A. (2025). Photocatalytic application of Poly-vinyl alcohol/sodium doped zirconium oxide nanocomposites against effective removal of indigo carmine dye and its agricultural application. Analytical Chemistry Letters, 1-14.**

- **Rajendrachari, S., Mahale, R. S., Ramkumar, R., Puneetha, J., Jayaprakash, G. K., & Nagarajappa, H. (2025). Electrochemical analysis of L-Tyrosine sensor using ball-milled duplex stainless steel alloy powder. Inorganic Chemistry Communications, 177, 114360.**

- **Pavithra, S., Kathyayani, D., Rao, H. A., Soundarya, T. L., Krishna, B. S., & Nagaraju, G. (2025). Influence of Sodium lauryl sulphate as surfactant on structural, morphological, electrical, and biological properties on Polypyrrole/CeO_2 composites. Solid State Communications, 400, 115918.**

- **Kokila, N. R., Mahesh, B., Ramu, R., Divakara, S. G., Mruthunjaya, K., Raghav, N., & Boreddy Shivanandappa, T. (2025). Combined in vitro and in silico approach to define alangimarckine from Thunbergia mysorensis leaves as a potential inhibitor of α-glucosidase. Journal of Biomolecular Structure and Dynamics, 1-20.**

- **Roopashree, B., Mahesh, B., Ramu, R., Rekha, N. D., Thekkekkara, D., & Gayathri, V. (2025). Cytotoxic, antimicrobial, and angiogenesis inhibition activity of novel Cobalt (II) complexes of substituted benzimidazole: Molecular docking simulation and Inhibition kinetics. Journal of Molecular Structure, 1327, 141141. https://doi.org/10.1016/j.molstruc.2024.141141**

- **Chamaraja, N. A., Swamy, N. K., Shivakumar, V., Kavya, H. V., & Basavaraju, M. (2025). Evaluation of peroxidase mimetic properties of cobalt ferrite (CoFe2O4) nanoparticles and their applications in the assay of aminophenols in water samples. Nanotechnology for Environmental Engineering, 10(1), 15.**

Patents Granted

- **The patent titled "A METHOD FOR DETERMINING FLUORIDE IN NATURAL WATERS AND FABRICATION OF A BIODEGRADABLE COLORIMETRIC FILM" was granted on March 11, 2025, by the Government of India. It was filed by Dr. Chamaraja N A and Dr. Mahesh B. on November 25, 2021, under Patent Application No. 202141054549.**

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Students Corner

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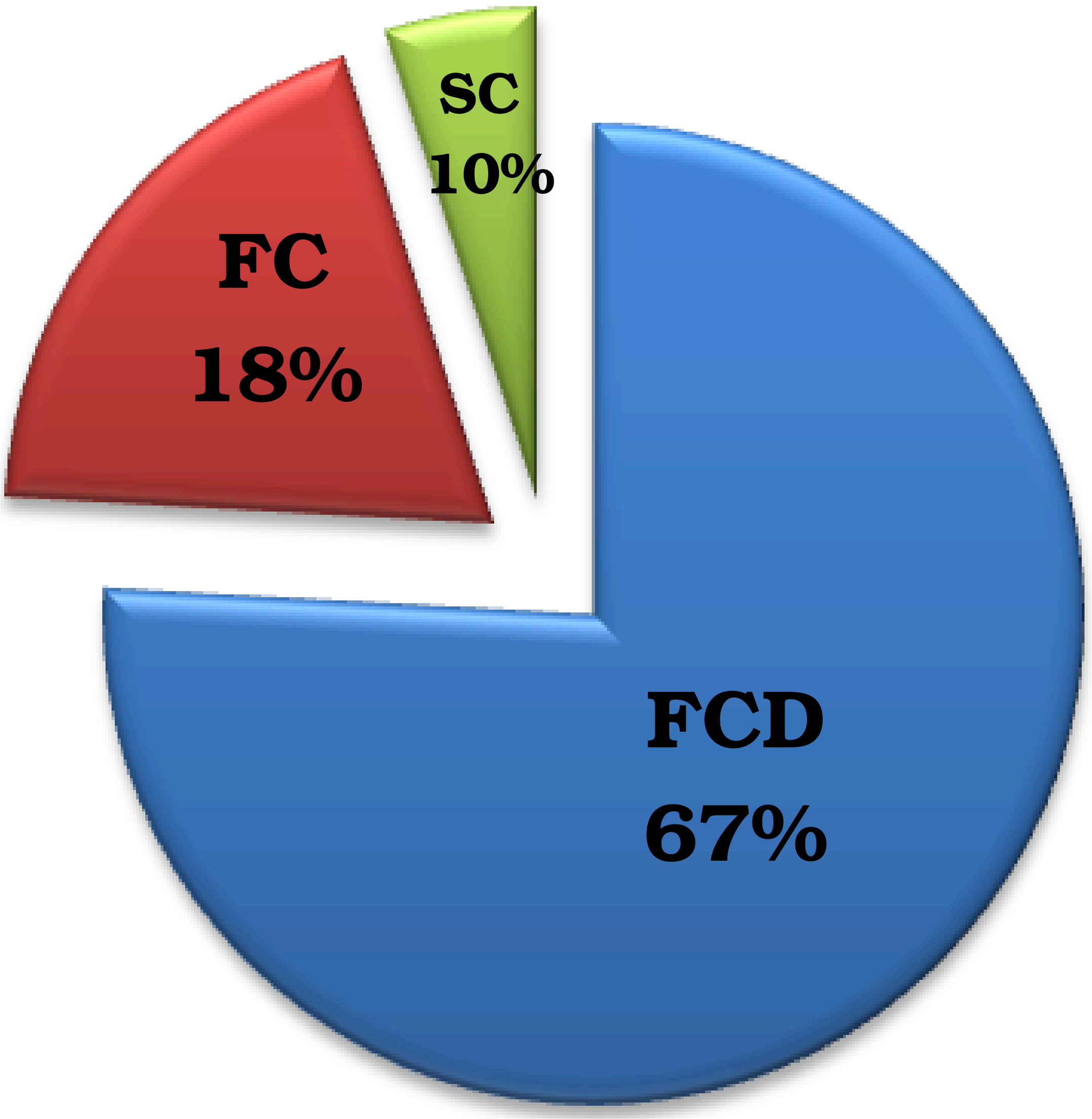
Chemistry Results in VTU exam - 2025



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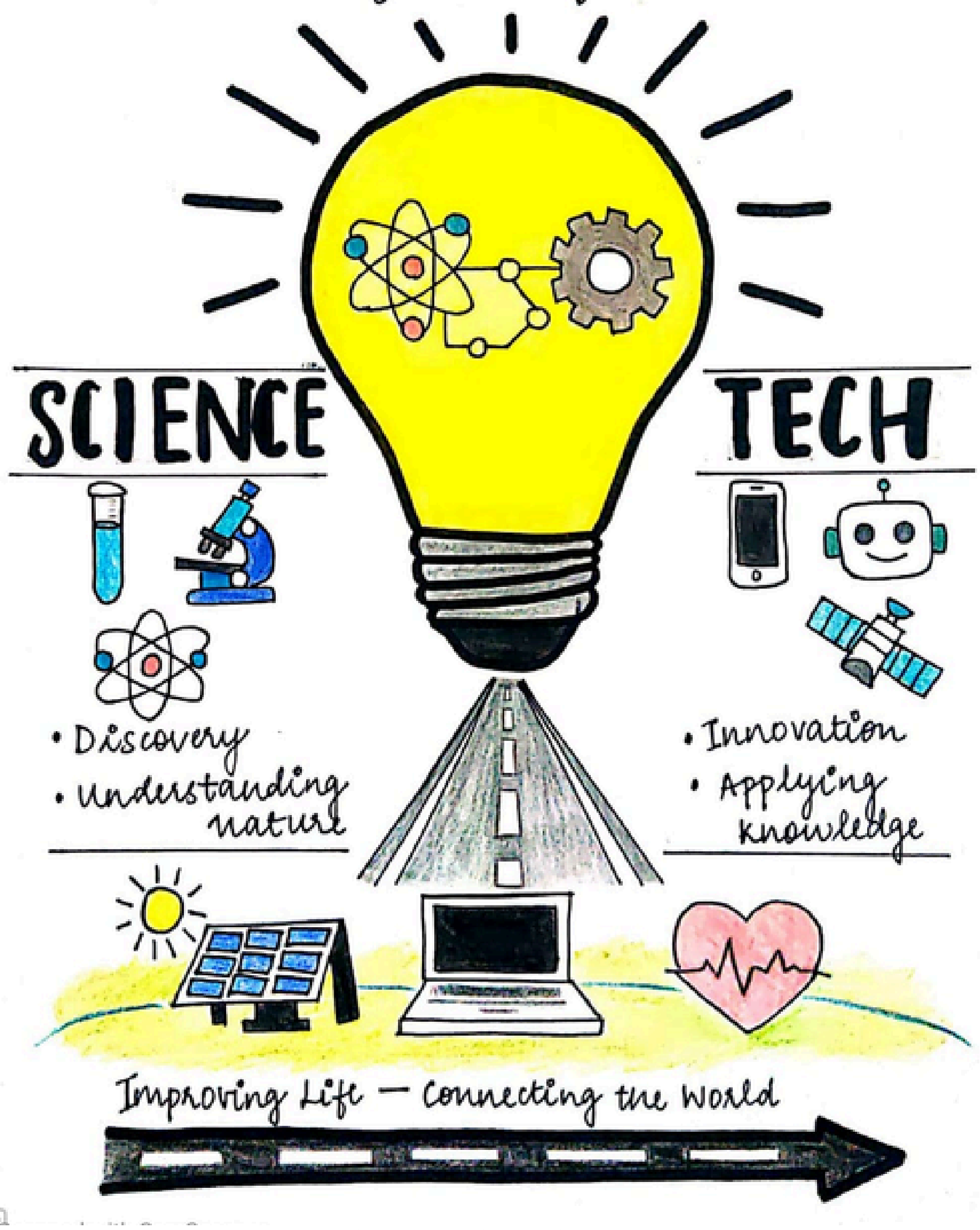
Art Gallery

"Science DISCOVERS, Technology DELIVERS"

SCIENCE & TECH:

shaping the future



Neha Padmakumar

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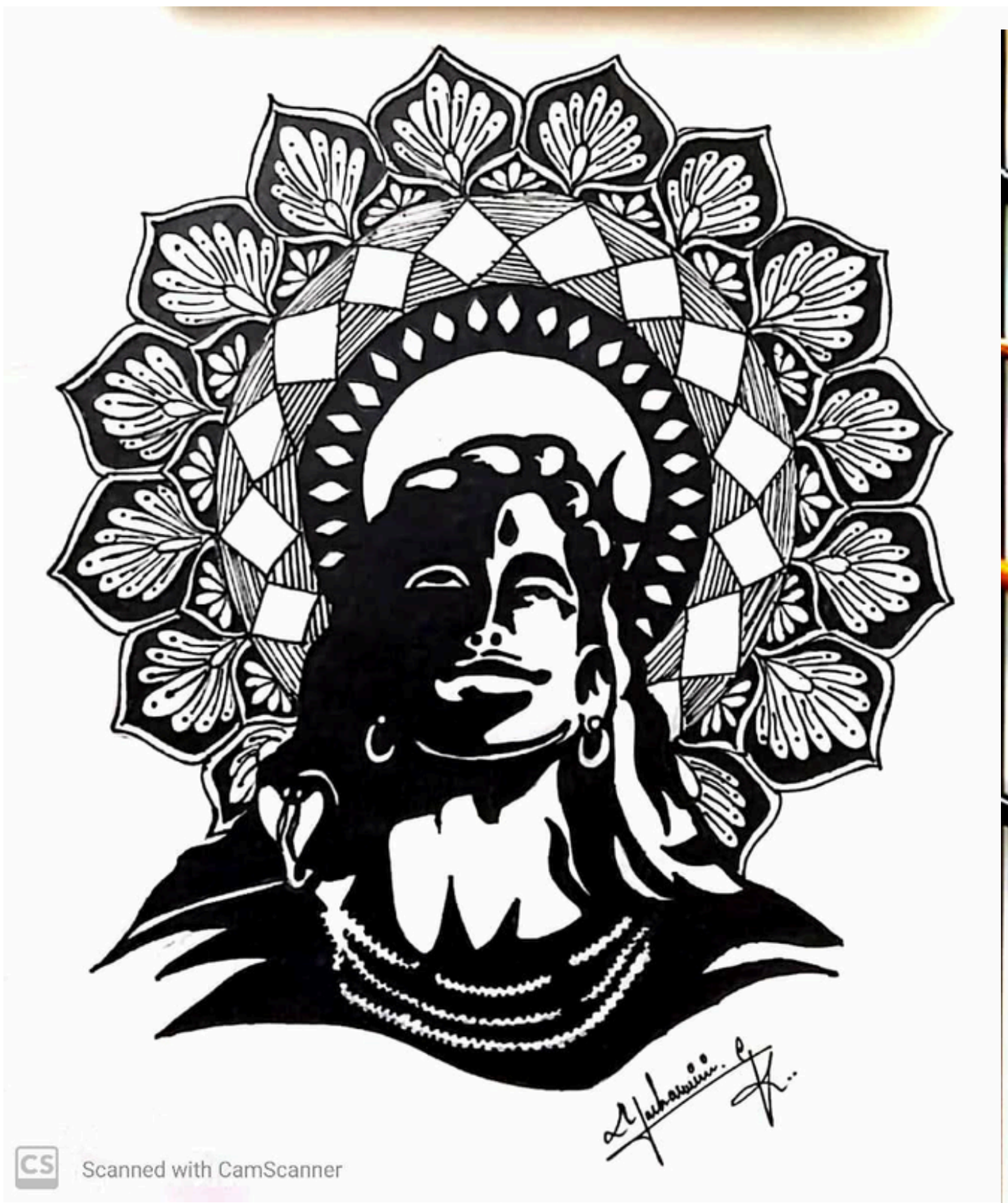

Yashaswini G K
1JS25CI102
AIML

Shiv Chopra
1JS25CI086
AIML

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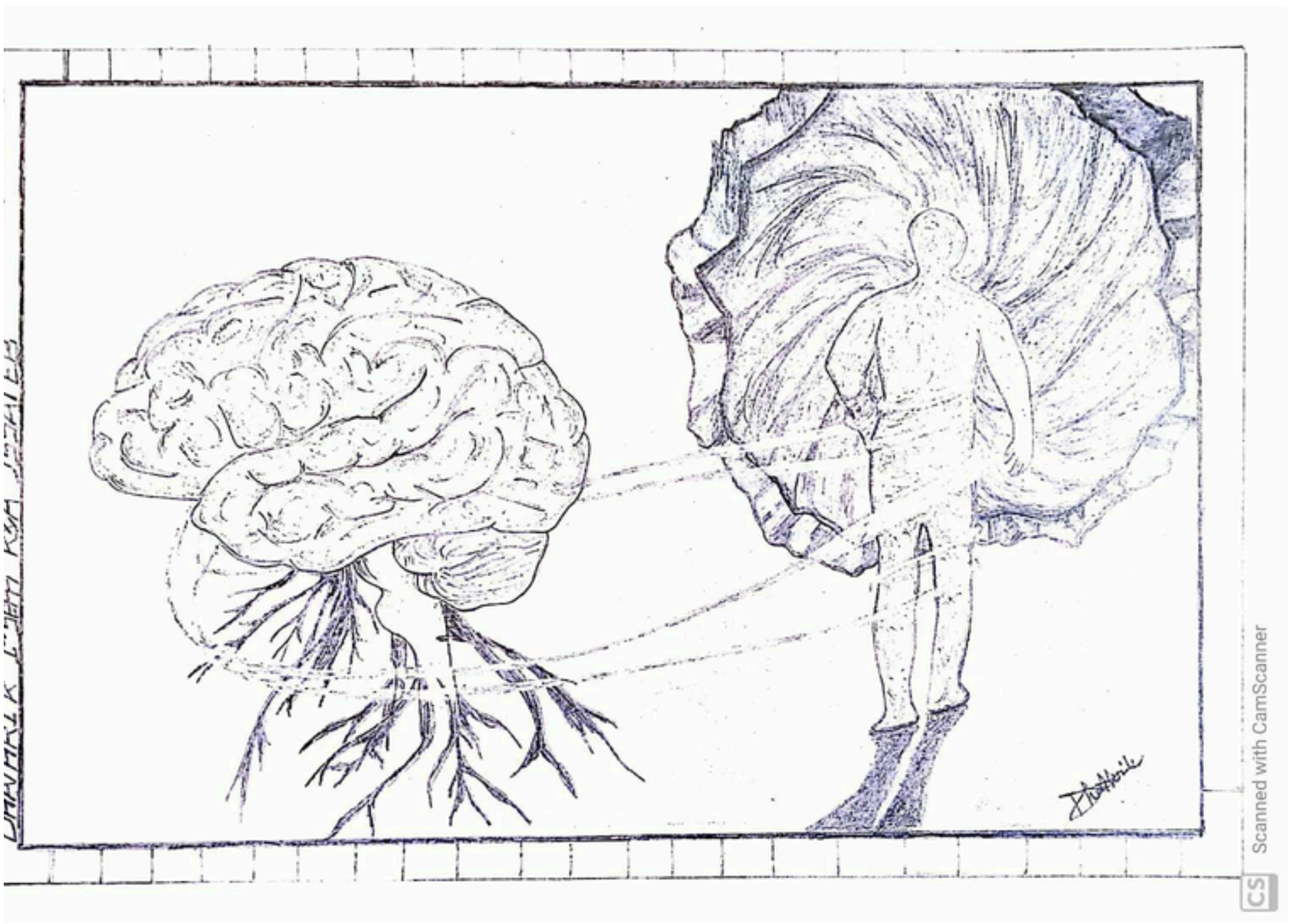
Paavana H B
1JS25EC070
ECE



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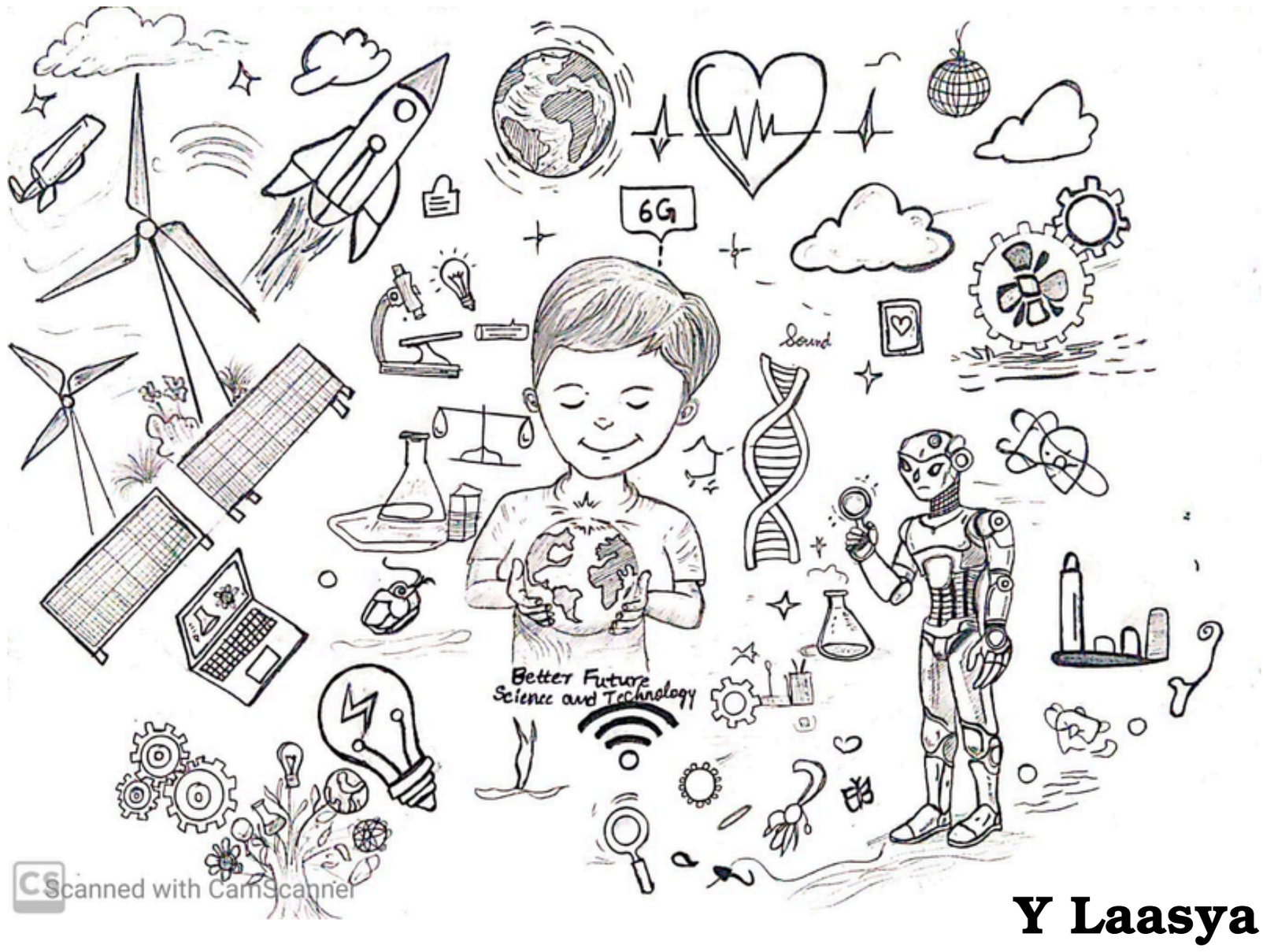

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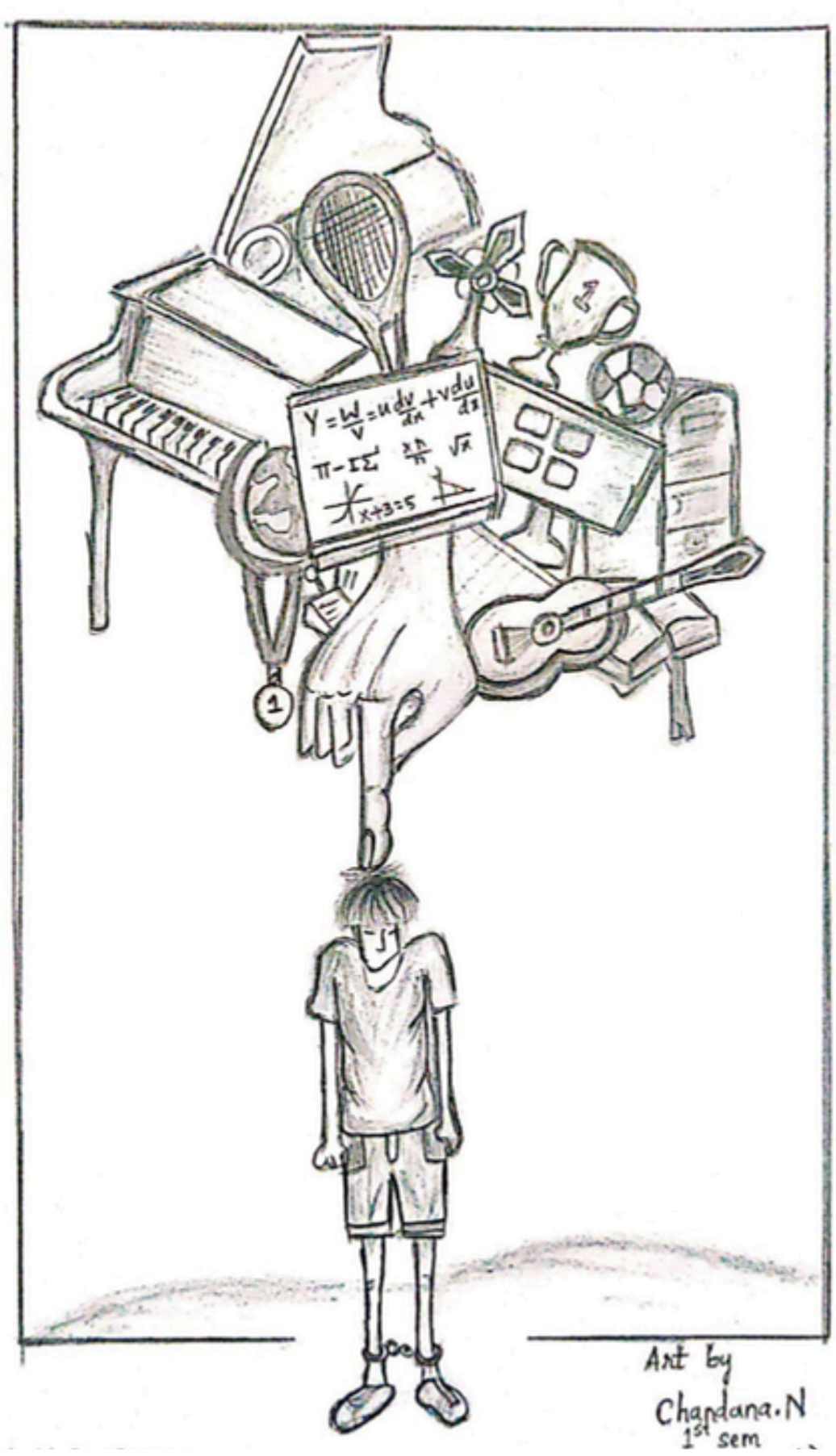

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Samrudha U

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ECE

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Knowledge Box

Know Your Lifestyle for a Quality Life

Dr. Roopashree B
HOD Chemistry

This is my first attempt at expressing my thoughts in the form of an article. Writing has always appealed to me, yet every time I picked up a pen, my ideas seemed to scatter, making it difficult to bring my perspectives together. Over time, I realised that reflection itself is a journey, and this article is an outcome of that introspection. I belong to what may be called the old-school generation. Growing up, I always saw my mother and grandmother as they were-never consciously discussing fitness, physique, or body image. They accepted themselves naturally, perhaps due to limited exposure, the absence of the internet, and fewer resources that constantly influence today's thinking. Health was never equated with appearance; life simply flowed at its own pace.

During my school and college days, most of my classmates were lean. Physical fitness was never a topic of discussion, and being overweight often became a subject of casual humour rather than concern. As time progressed and technology advanced, the narrative began to change. With the rise of social media and constant visual exposure, appearance started to matter-not only to others, but to oneself. This shift possibly explains the rapid growth of fitness centres and the increased emphasis on physical wellbeing, further reinforced by national initiatives such as Fit India.

Today, social media is flooded with advice on food habits, exercise routines, and quick fitness solutions. While some information is useful, many misconceptions also prevail-most notably the belief that fitness is synonymous with being slim. In reality, fitness and body type are influenced by several factors, including genetics, age, metabolism, and lifestyle. From my own experience, many of us remain slim until our late twenties. Gradually, reduced physical activity, sedentary work environment

slower metabolism, and frequent consumption of fast food lead to a steady but unnoticed increase in weight. It feels as though an extra layer is added each year without drawing attention.

Only after completing most of my responsibilities did I begin focusing on myself and realised how unfit I had become. Observing colleagues who transformed themselves through dieting motivated me to start my own fitness journey. Like many others, I began with dietary experiments inspired by social media. I tried fruit diets but quickly gave up-food holds strong cultural and emotional value in Indian households. I joined a gym but found the routine monotonous. At times, I blamed genetics, conveniently overlooking how my eating habits had changed over the years. As a student, I consumed mostly home-cooked food, and eating outside was occasional. Over time, eating out became frequent and convenient. Fast food slowly replaced mindful eating. Even when I recognised the need for change, household responsibilities and inconsistent routines made it difficult to sustain exercise. Despite following several diet plans suggested by professionals, the results were temporary.

After many trials and failures, I realised a fundamental truth: fitness is not a short-term goal but a lifelong commitment. It demands discipline, patience, and most importantly, an understanding of one's own body. Extreme diets-whether fruit-based, liquid-based, or highly restrictive-are not sustainable in the long run.

A significant source of motivation during this phase was my son, who often reminded me that if Europeans of all age groups can remain fit through regular exercise, there was no reason why I could not do the same. His words encouraged me to reflect on the importance of consistency and age-inclusive physical activity, reinforcing my decision to adopt exercise as a sustainable part of my daily routine.

Gradually, I reduced the frequency of eating outside food and committed to at least 30 minutes of daily exercise. I returned to simpler habits; home-cooked meals and mindful eating. I did not eliminate sugar or carbohydrates entirely; I continue to enjoy my morning tea with jaggery. I eat when my body signals hunger rather than following rigid schedules. While I do indulge occasionally in functions and parties, I ensure consistency in exercise so that what I consume is metabolised effectively.

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An important insight I gained from my physician uncle, was the role of dopamine in the life journey; the “feel-good” neurotransmitter that regulates motivation, pleasure, and reward. I understood that activities which naturally stimulate dopamine are essential for sustaining long-term fitness. For me, that dopamine surge came from dancing. Recognising this, I began incorporating dance-based movements into my regular exercise routine, which not only improved my physical fitness but also kept me motivated and emotionally engaged.

Over time, I noticed not only physical changes but also mental and emotional improvements. My stamina increased, fatigue reduced, and my mood stabilised. Regular exercise became a natural dopamine booster, keeping my motivation levels high and stress levels low. Skipping exercise now feels like something essential is missing-it has become an integral part of my life rather than a burden.

I have come to understand that while lifespan may not always be within our control, the quality of life certainly is. A balanced lifestyle, holistic eating habits, regular physical activity, and healthy dopamine regulation play a crucial role in overall wellbeing. When body and mind are in harmony, life feels lighter, more energetic, and more fulfilling.

Ultimately, knowing your lifestyle and making conscious, sustainable choices is the key to leading a quality life.

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Beyond Screens: The Rise of India's Youth Going-Out Culture

DHIREN P REDDY
1JS25CI029 – AIML

In a world filled with screens and constant notifications, India's youth, Gen Z and Millennials, are leading a lively cultural movement. They are logging off and going out, swapping the endless scroll for the excitement of live festivals, the closeness of indie gigs, and the relaxed atmosphere of new social spaces. This revival of India's "going-out culture" goes beyond a trend; it represents a significant social change driven by the desire for real connection and a solution to digital burnout. The live events market is expected to reach an impressive $35.91 billion by 2026.

A National Festival Mosaic: From Metros to Mountains

Mega Events in Metros: Mumbai's Global Youth Festival at Jio World Garden draws over 15,000 people with a diverse lineup that includes Siddharth and Shivam Mahadevan, sound healing, and women-led panels. Goa's Sunburn 2025 features EDM stars like David Guetta. In Bengaluru, Echoes of Earth combines global music with a strong environmental message, showing that events can be both entertaining and meaningful.

The Indie and Niche Scene: The heavy metal scene thrives at Bandland Bengaluru, which hosts big names like Avenged Sevenfold and Bloodywood. Holi Cow Delhi presents a lively hip-hop event during the festival of colors For a unique musical experience, Raghu Dixit's recent concert blended soulful folk melodies with contemporary sounds, creating an atmosphere that resonated deeply with the audience.

Tier-2/3 Cities Shine: The real revolutionary spirit lies in the expansion of this movement. Gangtok's Orchid Festival combines the global appeal of K-pop with local folk music against the stunning backdrop of the Himalayas. The Ziro Festival showcases indie music in Arunachal Pradesh. These smaller cities are attracting crowds by offering the excitement of a big-city lifestyle at a more affordable price.Better roads, improved transportation, and modern apps are making Tier-2 and Tier-3 cities not just possible, but key spots for event organizers.

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Young people are eager to travel; 46% of Gen Z are interested in going to events, even considering flights for major occasions like the Olympics.

Cultural Exploration: They are excited about heritage events like Lathmar Holi, which attracts 51% of youth, and traditional Onam feasts. The focus is shifting from passive consumption to active participation, moving beyond just taking selfies and promoting a sense of belonging.Streetwear collectives and queer pride marches are adding significant elements to this culture. They mix global trends with strong local pride and provide platforms for self-expression.

With over 350 million young people in India facing unemployment and digital overload, live culture offers more than just entertainment. It builds resilience and supports local businesses, with indie artists gaining visibility at events like Lil Flea Delhi.The "going-out culture" is ultimately a strong rebellion—a deliberate move towards real experiences over algorithms and a focus on shared memories rather than just likes. It is nurturing a new generation of leaders who value personal, face-to-face connections. The next time your social media feed is full of captivating event photos, take it as a hint. Join the crowd, feel the collective vibe, and create a genuine memory. India's lively and authentic going-out culture is truly here.

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Twisted Bridges to Triumph: How Epic Engineering Flops Built Safer Skies

Spanda R Saini
1JS25EC110 – ECE

From the first solved problem to the final year project, engineering teaches us to chase accuracy and avoid mistakes. Yet the real world tells a more honest story: progress often begins where plans fall apart. History is filled with engineering failures—collapsed bridges, failed missions, and system breakdowns—that initially seemed disastrous but ultimately reshaped the way engineers think, design, and take responsibility. These failures became turning points. They pushed engineers to ask better questions, test more rigorously, and design with greater responsibility. Safety standards improved, technologies evolved, and lives were saved because someone took the time to understand what went wrong. What once went wrong now protects millions. Lets look at some of the examples.

1. Tacoma Narrows Bridge Collapse (1940) – Civil Engineering

The bridge collapsed due to aerodynamic instability caused by wind.

Impact:This failure transformed bridge design worldwide, introducing wind-resistance analysis and aeroelastic testing. Today's long-span bridges are far safer because of this lesson.

2. Space Shuttle Challenger Disaster (1986) – Aerospace & Systems Engineering

A faulty O-ring failed at low temperatures, leading to an explosion shortly after launch.

Impact: NASA redesigned safety protocols, improved material testing, and changed decision-making culture—saving future missions and lives.

3. Therac-25 Radiation Machine Failure (1980s) – ECE / Software Engineering

Software errors caused massive radiation overdoses to patients.

Impact: This led to strict software verification, hardware fail-safes, and safety-critical system standards—especially important in embedded systems and medical electronics.

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Engineering failures aren't dead ends—they're launchpads for breakthroughs that make our world tougher and smarter. The failures are painful, costly, and sometimes tragic—but they are also powerful teachers. Each collapse, explosion, or system error has reshaped engineering practices, leading to stricter standards, safer designs, and better accountability. By understanding past mistakes, future engineers gain the wisdom to design responsibly and build a safer, better world.

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The Magical Science Behind Alexandrite: The Gem That Changes Colour

Purvith S
1JS25CI064 – AIML

Alexandrite is a rare variety of colour-changing chrysoberyl, reportedly changing colour from green in daylight to red under incandescent light. This was first discovered in Russia's Ural Mountains during the 1830s, it immediately gained a high reputation for the dramatic optical effects it exhibited. This effect occurs because of the chemistry of chromium ions in alexandrite's crystal structure and their interaction with light. Exploration of the chemical composition, structure, and electronic properties of this gemstone explains the scientific basis for its fascinating change in color. This article examines the chemistry that makes alexandrite one of the most amazing gems known.

Unveiling the Chemical Composition Behind Alexandrite's Magic:

Alexandrite is the chromium-bearing variety of chrysoberyl, with the chemical formula $BeAl_2O_4$. Its structure belongs to the orthorhombic crystal system, specifically the space group Pbnm. The lattice consists of AlO_6 octahedra connected by BeO_4 tetrahedra, forming a rigid three-dimensional network.

Alexandrite's Mesmerizing Colour-Change Phenomenon:

HOW DOES THE CHANGE HAPPEN?

The famous colour change in alexandrite comes from the d-electron transitions of Cr^{3+} ions and the way the crystal absorbs and transmits different wavelengths of visible light. In daylight, which has significant amounts of blue-green wavelengths, the Cr^{3+} absorption bands act like a filter such that the transmitted color is green to bluish-green.

Under incandescent lighting, the spectral distribution shifts to longer wavelengths, especially red. Since alexandrite transmits red light more effectively than green in such lighting, the apparent colour of the gemstone is red or purplish-red. Human eye sensitivity enhances the effect even further—our eyes are more sensitive to green light under bright conditions but to red under dim conditions.

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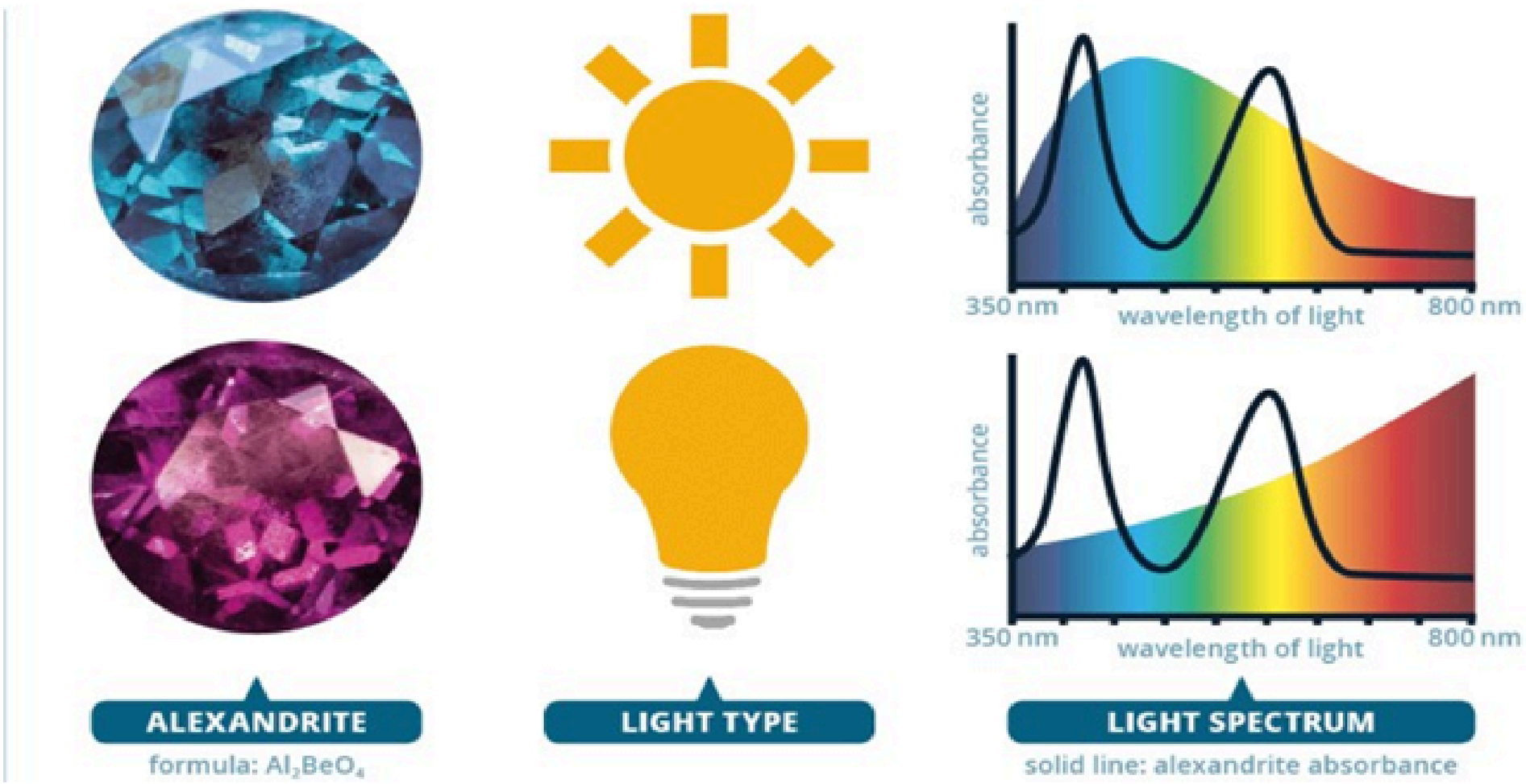

CONCLUSION :

Alexandrite is one of nature's most spectacular gemstones, appreciated not only for their beauty but also for the underlying chemistry that makes their colour change so remarkable. This effect arises from the combination of chromium impurities, crystal structure, and light sources-an elegant application of principles from crystal field theory and spectroscopy.

Alexandrite, though rare, has continued to intrigue scientists and gem enthusiasts alike. The green-to-red shift remains a striking example of how subtle atomic features create dramatic visual effects, beautifully uniting science and art in a single gemstone.

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Microplastics :The Invisible threat

Namratha K
1JS25EC065 - ECE

Microplastics are small plastics partciles that originate from two sources.Primary microparticles are manufactured for specific uses such as in cosmetics, exfoliating scrubs and synthetic clothing fibers. Secondary microplastics are formed when lager plastic products like bottles & bags , break down over time due to sunlight waves & other environmental factors.
How do they enter the food chain???.

- Through oceans & rivers marine organism such as planktons , fish & shellfish mistake these particles for food.
- Also found in fruits , vegetabls , salt & even drinking water.
- Studies have shown that bottled water can contain thousands of microplastics particles per liter (240,000 plastic particles per liter).

Hidden Health Impact

These particles may carry harmful chemicals and heavy metals , which can enter our bloodstream & tissues. They may also trigger inflammation disrupt hormones and affect vital organs. The long-term consequences could include respiratory digestive and reproductive issues.

What can be done ??

Addressing the microplastic crisis requires both global action and individual responsibility. Governments can regulate plastic production , improve waste management systems , and ban harmful single-use plastics. As individual ,we can make a difference by reducing plastic use—choosing cloth bags , avoiding plastic bottles, and supporting eco-friendly products.

Conclusion

Microplastics may be invisible to the naked eye , but their impact is immense. They have silently infiltrated every corner of our planet, including our own bodies. Recognizing this hidden threat is thefirst step toward protecting our health and the environment . Together , by making conscious choices and demandingsustainable change, we can reduce the plastic footprint and ensure a cleaner , safer future for generation to come.

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Microplastics :The Invisible threat

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The increasing global demand for energy and the growing concerns over climate change have highlighted the limitations of fossil fuels. Rising carbon emissions, environmental pollution, and energy insecurity have forced nations to explore cleaner and more sustainable alternatives. In this context, hydrogen has emerged as a promising energy carrier capable of supporting a low-carbon future. The concept of the hydrogen economy envisions a system in which hydrogen plays a central role in energy production, storage, and utilization across multiple sectors.

Hydrogen is the most abundant element in the universe, yet it rarely exists in a free state on Earth. It is typically found combined with other elements, such as oxygen in water or carbon in hydrocarbons. To use hydrogen as a fuel, energy must be supplied to extract it from these compounds. Despite this requirement, hydrogen offers a major advantage at the point of use: when consumed in fuel cells or burned, it produces only water vapor and no harmful greenhouse gases. This clean end-use property makes hydrogen an attractive alternative to conventional fossil fuels.

The production of hydrogen is a crucial aspect of the hydrogen economy. At present, most hydrogen is produced from natural gas through steam methane reforming, which releases carbon dioxide. While this method is economical, it reduces the environmental benefits of hydrogen unless combined with carbon capture technologies. A more sustainable approach is the electrolysis of water, where electricity is used to split water into hydrogen and oxygen. When renewable energy sources such as solar or wind power are used, the resulting green hydrogen is virtually emission-free and represents the most environmentally friendly form of hydrogen production. Once produced, hydrogen must be stored and transported efficiently. Due to its low volumetric energy density, hydrogen is challenging to store and requires compression, liquefaction, or advanced solid-state materials. Transportation also demands specialized pipelines or storage tanks. Although these requirements increase costs, ongoing

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Despite its potential, the hydrogen economy faces challenges related to cost, infrastructure development, and safety concerns. However, with supportive government policies, investments in renewable energy, and continued technological innovation, these challenges can be overcome. In conclusion, the hydrogen economy offers a promising pathway toward a cleaner, more sustainable, and energy-secure future, complementing renewable energy systems and helping to achieve global climate goals.

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AI and the Future: Threat, Tool, or Teammate?

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Artificial Intelligence, once a concept limited to science fiction movies and futuristic novels, has quietly become an inseparable part of our daily lives. From unlocking smartphones using facial recognition to receiving personalized content recommendations, AI is no longer the future—it is the present. As physicist Stephen Hawking famously warned, "The development of full artificial intelligence could spell the end of the human race." At the same time, many experts believe AI could be humanity's greatest ally. This contrast raises an important question: Is artificial intelligence a threat, a tool, or a teammate shaping our future alongside us?

Artificial Intelligence refers to the ability of machines to simulate human intelligence such as learning, reasoning, problem-solving, and decision-making. Using technologies like machine learning and deep learning, AI systems analyse vast amounts of data, identify patterns, and improve their performance over time. Unlike traditional machines that follow fixed instructions, AI systems adapt and evolve, making them increasingly powerful and influential.

The impact of AI on the future is already visible across various sectors. In healthcare, AI is revolutionizing diagnosis and treatment. According to McKinsey, AI technologies could add up to $100 billion annually to global healthcare by improving efficiency and accuracy. AI-powered systems can detect diseases like cancer at early stages, sometimes matching or surpassing human specialists. Bill Gates has stated, "AI is going to help us work more efficiently and free us to do things that really matter."

In education, AI enables personalized learning by adapting content to each student's pace and understanding. UNESCO reports that AI-based learning tools have the potential to reduce educational gaps, especially in developing nations. In transportation, self-driving cars and intelligent traffic systems aim to reduce accidents caused by human error, which, according to the World Health Organization, accounts for nearly 90% of road accidents worldwide.

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AI also plays a major role in industry and everyday life. Recommendation algorithms shape what we watch, read, and buy, while automation improves productivity and reduces operational costs. A report by PwC estimates that artificial intelligence could contribute up to $15.7 trillion to the global economy by 2030, highlighting its transformative potential.

Despite its advantages, AI presents serious challenges. Job displacement is one of the biggest concerns. The World Economic Forum predicts that while AI may displace around 85 million jobs by 2025, it could also create 97 million new roles, emphasizing the importance of reskilling and adaptability. Privacy and data security are also critical issues, as AI systems depend heavily on personal data. Historian Melvin Kranzberg wisely noted, “Technology is neither good nor bad; nor is it neutral,” reminding us that responsibility lies with human decision-makers.

Another pressing concern is algorithmic bias. Since AI systems learn from historical data, they may unintentionally reflect social and cultural prejudices. Over-reliance on AI could also weaken human creativity and critical thinking. These challenges highlight the need for ethical guidelines, transparency, and human oversight in AI development.

The future of AI should not be seen as a competition between humans and machines, but as a collaboration. AI lacks emotions, empathy, moral judgment, and consciousness—qualities that define humanity. As computer scientist Fei-Fei Li stated, “Artificial intelligence is not a replacement for human intelligence; it is a tool to amplify human creativity and ingenuity.”

In conclusion, artificial intelligence is neither purely a threat nor merely a tool—it is a teammate whose impact depends on human choices. With responsible innovation, ethical governance, and human values at the core, AI can help create a future that is not only technologically advanced, but also fair, inclusive, and deeply human.

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Details of Staff Members

Teaching Staff:

#	Name of the Faculty	Designation
1.	Dr. Mahesh B	Prof. & Dean Research
2.	Dr. Roopashree B	Assoc. Prof. & HOD
3.	Dr. Kathyayani D	Asst. Prof.
4.	Dr. Puneetha J	Asst. Prof.
5.	Dr. Chamaraja N A	Asst. Prof.
6.	Mrs. Bindhu S	Asst. Prof.
7.	Mrs. Kavya S	Asst. Prof.

Non-Teaching Staff:

#	Name	Designation
1.	Mr. Basavaraju B R	Lab Instructor
2.	Mr. Manjunatha	Lab Instructor
3.	Mr. Suresha C S	Lab Helper