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A pharmaceutical magazine

SHADOW CULTIVATE

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PREFACE

We are delighted to present the inaugural volume of Shadow Cultivate, a vibrant and multifaceted academic magazine published under the aegis of Sanaka Educational Trust's Group of Institutions, and curated under the insightful leadership of Chief Editor Dr. Rajiv Jash. This publication is more than a compilation of articles and artworks—it is a collective journey of thought, creativity, inquiry, and expression that brings together scientific intellect, literary soul, and civic consciousness into a single cohesive platform. The vision behind Shadow Cultivate stems from the desire to break disciplinary silos and to encourage students, scholars, artists, and educators from all streams to participate in an open dialogue that both reflects and shapes the academic spirit of our time. This magazine is not just a reflection of our institutional excellence but a mirror of our students' voices—of their curiosity, concerns, creativity, and courage. Volume 1 celebrates that very spirit of cultivation, of nurturing ideas and cultivating knowledge, imagination, and awareness. This issue is thoughtfully divided into three major sections: Scientific Advancements, Art & Literature, and Current Affairs. Each segment opens a window into a different realm of human understanding while remaining rooted in the larger ethos of education, inquiry, and cultural expression. The Scientific Advancements section covers emerging and impactful areas such as nanotechnology in neurological treatment, green chemistry in sustainable pharma, and the future of drug delivery through skin patches. It also delves into topical and foundational subjects like gene therapy, sleep science, herbal cosmetics, and the ethical and innovative implications of modern biomedical research. These articles, meticulously researched and articulated, reflect the scientific temperament of the young contributors and provide valuable insights into fields that are shaping our future. In Art & Literature, we have curated a soulful selection of poems, paintings, short stories, and reflective pieces—both in English and Bengali—that reflect the emotional, cultural, and spiritual landscape of today's youth. Whether it is the empowering image of the divine feminine in visual art, the moving poetry that explores love, identity, or nature, or prose pieces that narrate stories of pain, escape, hope, and resilience, these entries reveal the depths of student thought and artistic potential. Special mention must be made of works such as "*Crescent Crowned*", "*Adya Shakti*", and "*Flame-Born Gaze*", which powerfully blend mythology and feminine symbolism in modern visual forms. The Current Affairs section underscores our commitment to social awareness and civic engagement. From India's historic hosting of the G20 Summit and the passage of the ANRF Act to the urgent and bold narratives around gender equality and #MeToo in Indian sports, this section brings sharp focus to the political, social, and cultural conversations that matter. It empowers young minds to look beyond the classroom and engage meaningfully with the world around them. This magazine is the result of months of hard work, collaboration, and unwavering enthusiasm. We express our heartfelt gratitude to all the student authors, artists, editorial team members, and faculty mentors who have contributed their time, talent, and passion to bring this issue to life. Each submission was carefully reviewed and thoughtfully presented, ensuring a high standard of academic and creative quality throughout. We would also like to thank the Sanaka Educational Trust's Group of Institutions for their constant encouragement and infrastructural support. Under the dynamic guidance of Dr. Rajiv Jash, this magazine has found its rhythm and voice—elevating the collective spirit of our institution and

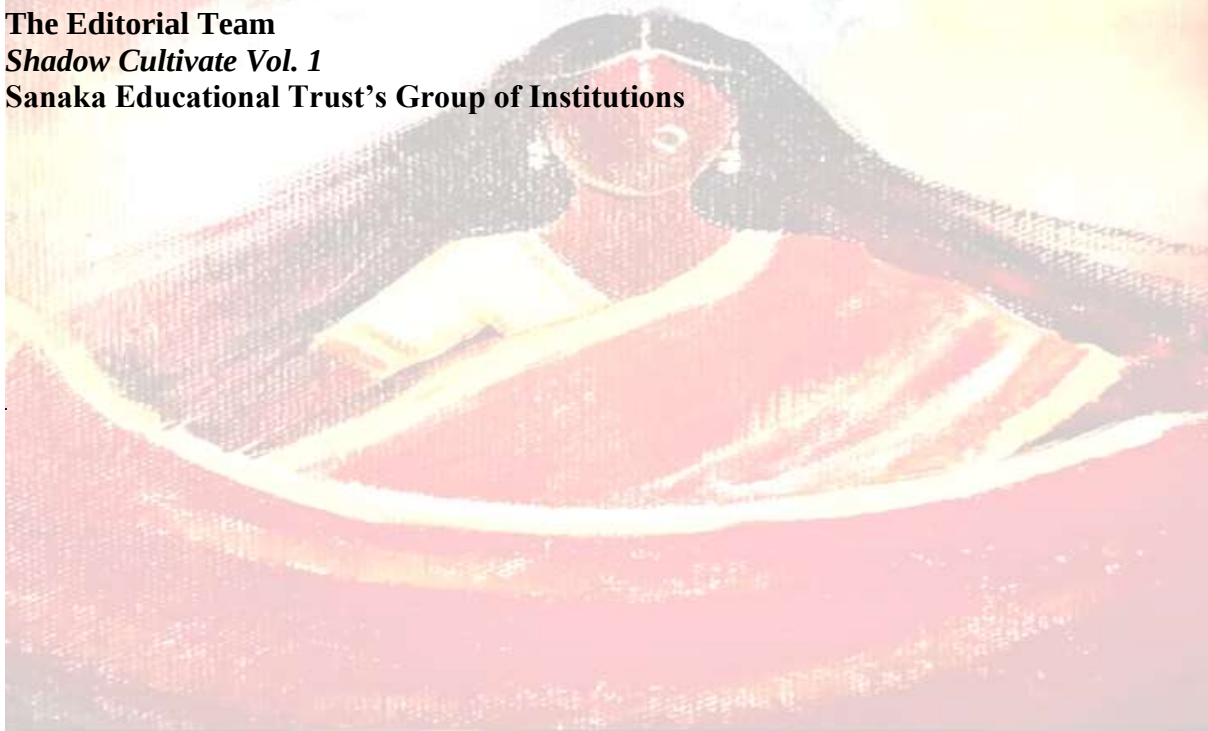
enriching its intellectual culture. As you turn these pages, we invite you to engage—not just as a reader but as a fellow cultivator of ideas. We hope that *Shadow Cultivate Vol. 1* inspires critical thought, stirs your imagination, and awakens a deeper connection to the world we live in. May this be the beginning of an ongoing dialogue between disciplines, languages, generations, and minds.

Let this be not just a magazine, but a movement of minds—a shared space where science meets poetry, art meets activism, and thought meets transformation.

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Shadow Cultivate Vol. 1

Sanaka Educational Trust's Group of Institutions



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DIRECTOR'S NOTE



It is with great pride and pleasure that I extend my warmest regards through this special note as we unveil Shadow Cultivate, an intellectual and creative endeavor initiated under the banner of Sanaka Educational Trust's Group of Institutions. More than just a magazine, Shadow Cultivate stands as a dynamic forum that captures the academic, artistic, and innovative expressions of our students and faculty. It bridges disciplines, ideas, and imaginations—where science meets art, and thought meets action. This edition reflects the diversity and depth of our institution, with contributions spanning scientific advancements, literary works, socio-political commentaries, and current affairs. At the heart of this vibrant collective is the Department of Pharmacy, a pillar of academic excellence within our institution. The articles and research insights from this department illustrate not just the intellectual potential of our students, but also their readiness to address the challenges of modern healthcare with integrity, innovation, and empathy. Pharmacy as a profession is rapidly evolving in the 21st century. It is no longer limited to dispensing medicine; it has expanded into areas such as drug discovery, nanotechnology, pharmacovigilance, regenerative medicine, and personalized therapeutics. Our Department of Pharmacy recognizes this shift and is committed to preparing students for this broader, interdisciplinary future. The work showcased in this magazine—on topics like green chemistry, nanotechnology in neurology, sustainable drug design, and smart drug delivery systems—demonstrates a forward-thinking mindset. It is especially heartening to see students not only engaging in rigorous scientific inquiry but also reflecting on the ethical and environmental dimensions of their work. This balance of scientific rigor and social responsibility is what we aim to instill through our academic programs. Shadow Cultivate also serves as a mirror to the cultural and emotional richness of our campus. Poems, paintings, and prose featured in this volume remind us that science and art are not opposites but allies in the pursuit of truth and beauty. The inclusion of multilingual literary expressions and artwork ensures that every student voice—regardless of discipline or background—is heard and celebrated. As Director, I believe that this spirit of openness, diversity, and interdisciplinary dialogue is essential to nurturing the next generation of responsible global citizens. I congratulate all contributors, editors, and coordinators who have worked tirelessly to bring this vision to life. Your dedication is visible in every page and every word. May this magazine continue to grow as a testament to the values we cherish—excellence in education, innovation in research, and compassion in service. I urge all readers—students, faculty, and visitors—to engage deeply with this volume, and to carry forward the ideas and inspirations it offers. Let us cultivate not only knowledge, but also the wisdom to use it for the betterment of humanity

FROM THE PRINCIPAL'S DESK



It is with immense pride and a deep sense of purpose that I, on behalf of the Department of Pharmacy, Sanaka Educational Trust's Group of Institutions, contribute this note to celebrate the spirit and substance of Shadow Cultivate, a magazine that has become a beacon of academic, cultural, and intellectual integration across our institution. This platform has not only given voice to diverse ideas and talents but has also established itself as a unique bridge between science and the humanities—something our department strongly believes in and strives to cultivate. The Department of Pharmacy has always emphasized the development of students as complete professionals—individuals who are not only equipped with technical knowledge but are also ethically aware, socially conscious, and culturally sensitive. In this context, Shadow Cultivate serves as an ideal mirror, reflecting the multidisciplinary essence of modern pharmacy. The field of pharmacy is no longer confined to traditional roles; it is now a dynamic and evolving discipline intersecting with biotechnology, nanoscience, pharmacogenomics, clinical research, green chemistry, and regulatory affairs. Our students' contributions in this magazine on topics such as nanotechnology in neurology, sustainable drug design, stem cell research, transdermal drug delivery systems, and herbal pharmacology reflect a clear engagement with cutting-edge global issues and a forward-thinking academic culture. Their ability to critically analyze scientific challenges while also expressing themselves through poetry, prose, and art is both inspiring and commendable. It reinforces our belief that science and creativity must go hand in hand, and that emotional intelligence is as vital as technical expertise in a healthcare professional. As principal of the department, I have observed with pride how our students are developing as future pharmacists who are ready to navigate the increasingly complex demands of healthcare, technology, and patient-centered innovation. At Sanaka Educational Trust's Group of Institutions, we are committed to creating an ecosystem where learning extends beyond the laboratory and classroom. With well-equipped infrastructure, dedicated faculty, and a learner-centric approach, we are continuously working to ensure our students are not only job-ready but also research-oriented and socially responsible. The initiative and engagement shown by our students in contributing to Shadow Cultivate is a testament to this environment of academic freedom and encouragement. I would like to extend my sincere gratitude to the editorial team, faculty mentors, and every contributor who made this volume a success. Their combined effort reflects the collaborative ethos that defines our department and our institution. As we move forward, I encourage every student and faculty member to continue engaging with platforms like Shadow Cultivate, to express ideas, share innovations, question norms, and create knowledge that is not only functional but also transformative. Let this magazine remain a symbol of our shared academic journey—one that values curiosity, compassion, and the pursuit of excellence in all its forms

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1 Scientific Advancements

Impact of nanotechnology on neurological treatment

Barsan Banerjee (4th year), Abhishek Ghosh

Nanotechnology, the manipulation of matter at the atomic and molecular scale, has emerged as a transformative force in medical science, particularly in the realm of neurological treatment. By leveraging materials and devices at the nanoscale—typically ranging from 1 to 100 nanometers—this interdisciplinary field offers unprecedented precision in diagnosing, treating, and managing neurological disorders. These conditions, which include Alzheimer's disease, Parkinson's disease, epilepsy, stroke, traumatic brain injuries, and brain tumors, affect millions globally and pose significant challenges due to the complexity of the nervous system and the protective barriers, such as the blood-brain barrier (BBB), that limit therapeutic access. Nanotechnology's ability to engineer targeted, efficient, and minimally invasive solutions has revolutionized how we approach these disorders, offering hope for improved outcomes where conventional treatments often fall short. This essay explores the multifaceted impact of nanotechnology on neurological treatment, encompassing advancements in drug delivery, diagnostics, regenerative

medicine, and neuromodulation, while also addressing challenges and future prospects. One of the most contributions of nanotechnology to neurological treatment is its enhancement of drug delivery systems. The BBB, a highly selective barrier formed by endothelial cells in brain capillaries, restricts the passage of most therapeutic agents, rendering many conventional drugs ineffective for neurological conditions. Nanoparticles (NPs), such as liposomes, polymeric NPs, and gold nanoparticles, have been engineered to overcome this barrier. These nanoscale carriers can be functionalized with ligands, such as transferrin or antibodies that enable them to cross the BBB via receptor-mediated transcytosis. For instance, studies have demonstrated that polyethylene glycol (PEG)-coated nanoparticles can deliver drugs like dopamine to specific brain regions for Parkinson's disease treatment, achieving higher concentrations than traditional systemic administration. Moreover, nanoparticles can be designed for controlled and sustained drug release, reducing the frequency of dosing and minimizing side effects. For example, in the treatment of glioblastoma, a highly aggressive brain tumor, nanoparticles loaded with chemotherapeutic agents like temozolomide have shown enhanced tumor penetration and prolonged drug retention, improving efficacy while reducing systemic toxicity. This targeted approach not only enhances therapeutic outcomes but also mitigates the adverse effects associated with high-dose systemic treatments, such as neurotoxicity and cognitive impairment. Beyond drug delivery, nanotechnology has revolutionized neurological diagnostics by enabling earlier and more precise detection of disorders. Early diagnosis is critical in conditions like Alzheimer's disease, where irreversible neuronal damage often precedes clinical symptoms. Nanosensors and nanoparticle-based imaging agents have been developed to detect biomarkers

associated with neurological diseases at their earliest stages. For example, gold nanoparticles conjugated with antibodies can bind to amyloid-beta plaques, a hallmark of Alzheimer's, and enhance their visibility under magnetic resonance imaging (MRI). Similarly, quantum dots—semiconductor nanoparticles with unique optical properties—has been used to track neuroinflammatory processes in real time, offering insights into conditions like multiple sclerosis. These nanoscale imaging agents provide higher resolution and sensitivity than traditional methods, allowing clinicians to monitor disease progression and treatment response with unprecedented accuracy. Additionally, lab-on-a-chip nanodevices, which integrate multiple diagnostic functions onto a single platform, enable rapid analysis of cerebrospinal fluid or blood for biomarkers of neurological conditions. Such advancements facilitate timely interventions, which are crucial for slowing disease progression and improving patient outcomes. Nanotechnology also plays a pivotal role in regenerative medicine for neurological disorders, particularly in repairing damaged neural tissue. Traumatic brain injuries and neurodegenerative diseases often result in irreversible neuronal loss, leading to motor and cognitive deficits. Nanomaterials, such as carbon nanotubes, graphene, and nanofibers, have been employed to create scaffolds that mimic the extracellular matrix, promoting neural regeneration. These scaffolds provide a supportive environment for stem cell growth and differentiation, guiding the formation of new neurons and synapses. For instance, studies have shown that carbon nanotube-based scaffolds can enhance the differentiation of neural stem cells into functional neurons, offering potential for spinal cord injury repair. Additionally, nanoparticles can deliver growth factors, such as brain-derived neurotrophic factor (BDNF), to stimulate neurogenesis and synaptic plasticity. In

animal models of Parkinson's disease, nanoparticle-mediated delivery of growth factors has restored dopaminergic neuron function, improving motor symptoms. These regenerative strategies hold promise for restoring lost neurological function, addressing a critical unmet need in conditions where current treatments focus primarily on symptom management. Neuromodulation, the process of altering neural activity to treat disorders, has also been transformed by nanotechnology. Traditional neuromodulation techniques, such as deep brain stimulation (DBS), rely on invasive electrodes that can cause tissue damage and have limited precision. Nanoscale devices, such as nanoelectrodes and magnetic nanoparticles, offer less invasive and more targeted alternatives. For example, magnetic nanoparticles can be guided to specific brain regions using external magnetic fields and activated to stimulate neurons with high precision, a technique known as magnetothermal stimulation. This approach has shown promise in treating epilepsy by suppressing abnormal neural activity without the need for surgical implants. Similarly, optogenetic nanoparticles, which respond to light, enable precise control of neural circuits, offering potential for conditions like depression and Parkinson's disease. These nanotechnology-based neuromodulation techniques reduce the risks associated with invasive procedures and improve therapeutic specificity, paving the way for safer and more effective treatments. Despite these advancements, the application of nanotechnology in neurological treatment faces several challenges. One major concern is the potential toxicity of nanomaterials. While nanoparticles can be engineered for biocompatibility, some materials, such as heavy metal-based quantum dots, may accumulate in the body, leading to neurotoxicity or immune responses. Rigorous testing and optimization of nanoparticle composition, size, and surface

chemistry are essential to ensure safety. Another challenge is the scalability and cost of nanotechnology-based therapies. Producing nanoparticles with consistent properties and scaling them for clinical use requires sophisticated manufacturing processes, which can be expensive and time-consuming. Additionally, regulatory hurdles pose a significant barrier, as the long-term effects of nanomaterials in the human body are not fully understood, necessitating extensive preclinical and clinical studies. Ethical considerations also arise, particularly regarding the use of nanotechnology for neuromodulation, which could potentially alter cognitive or behavioral functions, raising questions about consent and autonomy. Looking ahead, the future of nanotechnology in neurological treatment is promising, with ongoing research addressing current limitations and exploring new applications. Advances in machine learning and computational modeling are aiding the design of smarter nanoparticles that can respond to specific physiological cues, such as pH or enzyme activity, for more precise drug release. Additionally, the integration of nanotechnology with other emerging fields, such as gene therapy and immunotherapy, is opening new avenues for treatment. For example, nanoparticles are being developed to deliver CRISPR-Cas9 gene-editing tools to correct mutations associated with neurological disorders like Huntington's disease. Similarly, nano-immunotherapy approaches are being explored to modulate immune responses in neuroinflammatory conditions like multiple sclerosis. Furthermore, the development of multifunctional nanoparticles that combine diagnostic, therapeutic, and monitoring capabilities—so-called theranostic platforms—could streamline patient care by enabling simultaneous diagnosis and treatment. As our understanding of the brain and its disorders deepens, nanotechnology will likely play an increasingly central role in personalized

medicine, tailoring treatments to individual patients based on their genetic and molecular profiles. The societal impact of nanotechnology in neurological treatment extends beyond clinical outcomes. By improving the efficacy and accessibility of treatments, nanotechnology has the potential to reduce the economic and emotional burden of neurological disorders on patients, families, and healthcare systems. For instance, targeted therapies that reduce the need for frequent hospital visits or invasive procedures can lower healthcare costs and improve patients' quality of life. Moreover, early diagnostic tools enabled by nanotechnology could shift the focus from reactive to preventive care, reducing the incidence of advanced-stage neurological diseases. However, ensuring equitable access to these advanced therapies is critical, as high costs and limited availability could exacerbate healthcare disparities. Collaborative efforts between researchers, policymakers, and industry stakeholders are needed to address these challenges and ensure that the benefits of nanotechnology reach diverse populations.

In conclusion, nanotechnology has profoundly impacted neurological treatment by offering innovative solutions for drug delivery, diagnostics, regenerative medicine, and neuromodulation. Its ability to overcome longstanding barriers, such as the BBB, and provide precise, targeted interventions has transformed the management of complex neurological disorders. While challenges like toxicity, scalability, and regulatory approval remain, ongoing research and technological advancements are paving the way for safer and more effective therapies. As nanotechnology continues to evolve, it holds the potential to not only improve clinical outcomes but also redefine how we understand and treat the brain, ushering in a new era of precision medicine for neurological disorders. By addressing current limitations and fostering

interdisciplinary collaboration, the field can unlock the full potential of nanotechnology, offering hope to millions affected by these debilitating conditions.

2 Scientific Advancements

Influence of colorants in soft-drinks

Maheswar Barik (3rd year), Dr. Anjan De

Colorants in soft drinks play a pivotal role in shaping consumer perceptions, preferences, and behaviors, while also influencing the sensory experience, marketing strategies, and health implications of these widely consumed beverages. Soft drinks, encompassing carbonated beverages, energy drinks, fruit-flavored drinks, and sports drinks, rely heavily on visual appeal to attract consumers, and colorants—whether natural or synthetic—are integral to achieving this aesthetic allure. The vibrant hues of colas, lemon-lime sodas, or fruit-flavored beverages create immediate sensory associations, influencing taste expectations, brand recognition, and purchasing decisions. Beyond aesthetics, colorants can impact the psychological and physiological responses of consumers, raise concerns about health and safety, and drive innovations in the beverage industry to meet evolving regulatory and consumer demands. This essay explores the multifaceted influence of colorants in soft drinks, examining their roles in sensory perception, consumer psychology, health implications, regulatory frameworks, and the shift toward natural alternatives, while highlighting their broader implications for the beverage industry and society. The

sensory impact of colorants in soft drinks is profound, as color significantly shapes taste perception and consumer expectations. Human perception of flavor is a multisensory experience, where visual cues, particularly color, can influence how taste and aroma are interpreted. For instance, a bright red soft drink is often associated with flavors like cherry or strawberry, while a clear or light green beverage might evoke expectations of lime or lemon. Studies in sensory science have shown that color can alter perceived sweetness, tartness, or even intensity of flavor. In experiments, participants rated an orange-colored drink as sweeter than an identical drink without color, demonstrating how visual cues can override actual taste profiles. This phenomenon, known as cross-modal sensory interaction, is leveraged by beverage manufacturers to enhance the appeal of their products. For example, the deep amber hue of cola, often achieved using caramel color (E150) not only reinforces brand identity but also primes consumers to expect a rich, slightly bitter taste. Similarly, vibrant blue colorants, such as Brilliant Blue FCF (E133), in energy drinks create an impression of exotic or intense flavors, even if the actual flavor compounds are minimal. By carefully selecting colorants, manufacturers can manipulate sensory experiences, making color a critical tool in product formulation.

Consumer psychology is another domain where colorants exert significant influence. Colors evoke emotions, cultural associations, and memories, which soft drink brands exploit to build loyalty and drive sales. For instance, red, often used in beverages like cola or cherry-flavored drinks, is associated with excitement and energy, appealing to younger demographics or those seeking a bold experience. Green, commonly used in lime or apple-flavored sodas, conveys freshness and naturalness, aligning with health-

conscious consumer trends. Blue, a less common but striking choice in energy or novelty drinks, evokes innovation and uniqueness, appealing to adventurous consumers. These psychological associations are not universal but vary across cultures. In Western markets, purple might suggest grape flavor, while in some Asian cultures, it could evoke exotic fruits like lychee. Beverage companies invest heavily in market research to align color choices with regional preferences, ensuring their products resonate with target audiences. Moreover, colorants contribute to brand differentiation in a crowded market. Iconic brands like Coca-Cola and Pepsi rely on their signature dark hues to maintain brand consistency, while new entrants use bold, unconventional colors to stand out on shelves. This strategic use of colorants underscores their role as a marketing tool, transforming soft drinks into more than just beverages but symbols of lifestyle and identity.

The health implications of colorants in soft drinks are a critical aspect of their influence, sparking debates among consumers, health advocates, and regulators. Synthetic colorants, such as Tartrazine (E102), Allura Red (E129), and Sunset Yellow (E110), have been widely used due to their stability, vibrant hues, and cost-effectiveness. However, concerns about their safety have led to scrutiny and, in some cases, bans or restrictions. For example, Tartrazine has been linked to allergic reactions in sensitive individuals and behavioral changes, such as hyperactivity, in children, prompting warning labels in the European Union. Similarly, some studies have raised concerns about the potential carcinogenicity of certain azo dyes, though conclusive evidence remains limited. These health concerns have fueled consumer demand for natural colorants derived from sources like beetroot (for red), turmeric (for yellow), or spirulina (for blue). Natural colorants are perceived

as safer and more wholesome, aligning with the clean-label movement, where consumers seek products with minimal artificial ingredients. However, natural colorants pose challenges, including higher costs, less vibrant hues, and lower stability under varying pH, temperature, or light conditions typical in soft drinks. For instance, anthocyanins from berries may degrade in acidic environments, altering the beverage's appearance over time. Balancing health considerations with aesthetic and practical requirements remains a key challenge for the industry. Regulatory frameworks governing colorants in soft drinks significantly influence their use and development. Regulatory bodies, such as the U.S. Food and Drug Administration (FDA), the European Food Safety Authority (EFSA), and the Food Safety and Standards Authority of India (FSSAI), set strict guidelines on permissible colorants, maximum usage levels, and labeling requirements. In the U.S., the FDA approves synthetic colorants like FD&C Red No. 40 and FD&C Blue No. 1, requiring rigorous safety assessments. In contrast, the EU has stricter regulations, mandating warning labels for certain synthetic dyes linked to hyperactivity in children. Some countries, like Norway and Austria, have banned specific artificial colorants outright, pushing manufacturers toward natural alternatives. These varying regulations create challenges for global beverage companies, which must reformulate products to comply with regional standards. For example, a soft drink sold in the U.S. might use Allura Red, while its European counterpart might use beetroot extract to achieve a similar hue. Compliance with these regulations not only affects production costs but also influences consumer trust. Transparent labeling and adherence to safety standards reassure consumers, while non-compliance can lead to recalls or reputational damage. As consumer awareness grows, regulatory bodies are increasingly pressured to

prioritize natural colorants and restrict synthetic ones, shaping the future of soft drink formulations.

The shift toward natural colorants reflects broader trends in consumer preferences and industry innovation. The global demand for clean-label and organic products has driven research into plant-based and bioengineered colorants. For instance, spirulina-derived phycocyanin offers a vibrant blue hue, while betalains from beetroot provide stable reds. Advances in nanotechnology and microencapsulation have also improved the stability and shelf life of natural colorants, addressing their limitations in acidic or carbonated environments. Companies are investing in sustainable sourcing of natural colorants, such as partnering with farmers to grow pigment-rich crops like saffron or annatto. However, the higher cost of natural colorants can increase product prices, potentially limiting accessibility for lower-income consumers. Additionally, the environmental impact of cultivating these crops, such as water and land use, raises sustainability concerns. Innovations like microbial fermentation, where genetically engineered bacteria produce pigments like anthocyanins, offer a promising solution by reducing reliance on agricultural resources. These advancements highlight how the beverage industry is adapting to consumer demands for healthier, more sustainable products while maintaining the visual appeal that colorants provide.

The economic and cultural implications of colorants in soft drinks extend beyond the beverage itself. The global soft drink market, valued at over \$400 billion in 2024, relies on colorants to drive consumer engagement and sales. Vibrant, consistent colors help brands maintain a competitive edge, particularly in emerging markets where visual appeal can influence purchasing decisions among new consumers. Culturally, soft drinks with

specific colors can become symbols of tradition or modernity. For example, the deep red of traditional cola drinks is iconic in Western cultures, while bright green matcha-flavored sodas have gained popularity in East Asia, reflecting cultural preferences for tea-based beverages. However, the reliance on synthetic colorants has sparked criticism from health and environmental advocates, prompting brands to invest in corporate social responsibility initiatives. Some companies sponsor research into safer colorants or fund sustainability projects to offset their environmental footprint. These efforts not only address consumer concerns but also enhance brand loyalty in an era where ethical consumption is increasingly valued.

In conclusion, colorants in soft drinks wield significant influence across sensory, psychological, health, regulatory, and economic domains. They shape how consumers perceive and interact with beverages, driving purchasing decisions through visual appeal and emotional resonance. While synthetic colorants offer cost-effective and vibrant solutions, health concerns and regulatory restrictions have spurred a shift toward natural alternatives, fueled by consumer demand for transparency and safety. Innovations in natural colorants and sustainable production methods are reshaping the industry, balancing aesthetic needs with health and environmental considerations. As the global soft drink market continues to grow, colorants will remain a critical factor in product development, marketing, and consumer satisfaction. By addressing challenges like cost, stability, and regulatory compliance, the beverage industry can harness the power of colorants to create products that are visually appealing, culturally relevant, and aligned with modern values of health and sustainability, ensuring their enduring influence in the world of soft drinks.

3 *Scientific Advancements*

The Science of Sleep: How Rest Shapes Memory, Emotion, and Immunity

Nilanshu Samanta (2nd year), Soumendu Mondal

In a world that prizes productivity and hustle, sleep often becomes an afterthought. However, emerging research in neuroscience paints a very different picture—sleep isn't a passive activity but a biological necessity that fuels memory consolidation, emotional balance, and even immune strength.

Sleep and Memory: The Night Shift in Your Brain

Have you ever wondered why a good night's sleep helps you remember what you studied? That's because sleep plays a vital role in memory formation. During deep stages of sleep, especially slow-wave sleep (SWS) and rapid eye movement (REM) sleep, your brain is actively sorting, strengthening, and integrating new information.

Sleep helps convert short-term memories into long-term storage—a process known as memory consolidation. According to a

study by the Harvard Medical School, students who slept after learning retained more vocabulary words than those who remained awake. Sleep essentially acts as the brain's "save" button.

Emotion Regulation: Sleep as a Natural Mood Stabilizer

Sleep is not just about recharging the brain—it's also about balancing our emotions. The amygdala, the brain's emotional center, becomes hyperactive when sleep is deprived. This means even small stresses can feel overwhelming when you're tired. REM sleep, in particular, plays a role in processing emotional experiences. It is during this phase that the brain revisits emotionally charged events and helps you make sense of them. This is why dreams often carry emotional content. Studies show that people with chronic sleep deprivation are at a higher risk for anxiety, depression, and irritability. A good night's sleep allows your prefrontal cortex—the part of your brain responsible for judgment and decision-making—to communicate more effectively with the amygdala. This helps you respond rather than react to emotional challenges.

Immunity and Sleep: Building Natural Defenses

Your immune system, too, works on a schedule—and it loves sleep. During deep sleep, the body produces and releases cytokines, proteins that fight off infection and inflammation. Sleep also supports the production of T-cells, which are essential for immune defense.

In 2022, a study published in *Nature Communications* showed that individuals who slept fewer than six hours per night were more likely to develop infections after exposure to viruses like the common cold. In contrast, those who got 7–8 hours of restful sleep had a stronger and quicker immune response. Especially in the post-COVID era, this connection between sleep

and immunity is more critical than ever. A healthy sleep routine may serve as a first line of defense against emerging diseases.

The Circadian Clock: Your Body's Sleep-Wake Timer

All of these benefits are tightly regulated by your circadian rhythm, the internal body clock that governs your 24-hour sleep-wake cycle. Disruptions—such as pulling an all-nighter or excessive screen time before bed—can throw this rhythm off balance, leading to fatigue, poor memory, and even metabolic issues.

To optimize sleep:

- Stick to a regular sleep schedule—even on weekends.
- Avoid caffeine and heavy meals before bed.
- Limit screen exposure at least an hour before sleep.
- Create a calm, dark, and cool sleeping environment.

Conclusion: Sleep Is Science, Not Luxury

Sleep is not a waste of time—it's a biological investment in your memory, emotional health, and immune system. For students juggling assignments, deadlines, and exams, sacrificing sleep may seem tempting, but it's counterproductive in the long run. Quality sleep enhances cognitive performance, resilience, and well-being. In short, rest is a form of learning, healing, and growing.

4 *Scientific Advancements*

Rewiring the Brain: The Rise of Stem Cells, Gene Therapy, and Anti-Amyloid Drugs in Neuroscience

Avijit Biswas (3rd year), Surabhi Mandal

Neuroscience is undergoing a transformative era, where cutting-edge innovations are tackling some of the most complex and devastating neurological disorders. Among the most promising advances are stem cell therapy, gene therapy, and anti-amyloid drugs—each holding the potential to reshape how we treat conditions like Alzheimer’s disease, Parkinson’s disease, and other neurodegenerative disorders.

Stem Cell Therapy: Regeneration From Within

Stem cells are undifferentiated cells capable of developing into various specialized cell types, including neurons and glial cells. In neuroscience, they are being explored for their potential to repair damaged brain tissue, restore lost neuronal

functions, and slow disease progression. In Parkinson’s disease, for instance, stem cells are being used to replace the dopaminergic neurons that degenerate over time. Clinical trials using induced pluripotent stem cells (iPSCs)—adult cells reprogrammed to an embryonic-like state—have shown encouraging results in generating dopamine-producing neurons. Similarly, in spinal cord injuries and multiple sclerosis, stem cell therapy offers hope in regenerating myelin sheaths and promoting neural repair. In India, institutions like AIIMS and NIMHANS are exploring stem cell applications in stroke rehabilitation and spinal trauma recovery, indicating a growing national interest in this therapy. However, challenges remain: immune rejection, tumor formation, and ethical concerns surrounding embryonic stem cells continue to limit broader adoption.

Gene Therapy: Rewriting Faulty Codes

Gene therapy aims to treat or prevent diseases by modifying or replacing defective genes. In neurological disorders—many of which have a genetic basis—this approach can potentially correct the root cause rather than merely alleviating symptoms. One of the landmark successes of gene therapy is in treating Spinal Muscular Atrophy (SMA)—a rare genetic disorder that affects motor neurons. The drug Zolgensma, approved by the FDA, delivers a healthy copy of the SMN1 gene using a viral vector, effectively halting the disease in infants if treated early. In Huntington’s disease and certain forms of epilepsy, gene silencing techniques like RNA interference (RNAi) and CRISPR-Cas9 gene editing are being explored to suppress toxic protein production or repair gene mutations. India is also catching up, with biotechnology companies and premier institutes like IGIB and CSIR conducting trials and developing indigenous gene therapies. The biggest hurdles here include

delivery challenges (especially crossing the blood-brain barrier), long-term safety, and high costs. Still, the potential to “cure” diseases, rather than manage them, keeps gene therapy at the forefront of modern medicine.

Anti-Amyloid Drugs: Alzheimer’s Under Attack

Alzheimer’s disease, affecting over 50 million people worldwide, has long defied effective treatment. One hallmark of the disease is the accumulation of amyloid-beta plaques in the brain, which interfere with neural communication and cause cell death. After decades of failed trials, 2023 marked a turning point. The FDA approved Lecanemab (Leqembi)—a monoclonal antibody that targets and clears amyloid-beta plaques. Clinical trials showed it slowed cognitive decline in early-stage Alzheimer’s patients by around 27%.

While this is far from a cure, it marks the first real progress in disease modification rather than symptomatic treatment. Drugs like Donanemab are also in the pipeline, further solidifying this class of drugs as a new frontline in Alzheimer’s therapy. Critics, however, caution about potential side effects such as brain swelling and bleeding, making patient monitoring essential.

The Road Ahead

The integration of stem cell therapy, gene editing, and targeted drugs represents a multi-pronged approach to tackling neurological diseases. These innovations shift the medical paradigm from treatment to transformation—from managing symptoms to potentially reversing or curing disease. For young researchers, doctors, and scientists, this is an exciting frontier. The brain, long considered the final medical mystery, is slowly giving up its secrets. With ethical diligence, technological advancement, and

collaborative global research, the future of neuroscience is brighter than ever.

5 *Scientific Advancements*

Sustainable Pharma: The Rise of Green Chemistry in Drug Design

*Nilanshu Samanta (2nd year), Saptarshi
Mandal*

In recent decades, the pharmaceutical industry has made tremendous advances in drug discovery and therapy. However, behind the success of modern medicine lies an inconvenient truth—drug manufacturing is often energy-intensive, chemically wasteful, and environmentally harmful. As the global health sector becomes increasingly aware of its ecological footprint, green chemistry has emerged as a sustainable and ethical solution to modern drug development.

What is Green Chemistry?

Green chemistry refers to the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances. In pharmaceuticals, this means developing drugs and manufacturing methods that are safer, cleaner, and more efficient, both for the environment and human health.

The 12 principles of green chemistry, formulated by Paul Anastas and John Warner, guide chemists to reduce waste, avoid toxic reagents, use renewable feedstocks, and design for energy efficiency. Applying these principles in drug design is not just good for the planet—it's also smart science.

Green Chemistry in Drug Design

Green chemistry plays a role at every stage of drug development—from synthesis to formulation and disposal:

Eco-Friendly Synthesis

Traditionally, drug synthesis involved multiple steps, toxic solvents, and heavy metals. Green chemistry replaces these with biocatalysts (enzymes) and microwave-assisted reactions to reduce reaction time, temperature, and waste. For example, Pfizer implemented green synthesis routes in the production of Sertraline (Zoloft), reducing waste by nearly 60%.

Solvent Alternatives

Solvents contribute to over 80% of pharmaceutical waste. Green chemistry promotes water, ethanol, and supercritical CO₂ as safer alternatives to toxic solvents like dichloromethane.

Atom Economy

Maximizing the incorporation of all materials into the final product reduces waste. This “atom economy” principle ensures that fewer by-products are generated during synthesis.

Renewable Feedstocks

Instead of petrochemicals, green chemistry encourages the use of bio-based raw materials. Plant-derived compounds and waste biomass are now being explored to develop drug intermediates.

Notable Green Pharma Practices

Merck's Januvia®: The synthesis of this diabetes drug was redesigned using an enzyme-catalyzed process, cutting waste and carbon emissions by half.

Green Aspirin: Aspirin, a classic drug, can now be synthesized using plant-based acetic acid and natural catalysts, offering a teaching model in academic labs.

Continuous Flow Chemistry: Replacing batch reactors with continuous flow systems improves safety, control, and reduces energy consumption in drug manufacturing.

Why It Matters

Environmental Impact: Pharmaceutical industries are responsible for significant chemical emissions, water contamination, and energy usage. Green chemistry helps reduce this burden.

Economic Benefits: Cleaner processes save money by reducing waste disposal costs, energy use, and raw material consumption. Health and Safety: Safer reagents and cleaner reactions mean fewer hazards for workers and end-users.

India's Role in Green Pharma

As one of the largest producers of generic medicines, India has a crucial role in promoting green chemistry. Institutions like CSIR-NCL, IICT Hyderabad, and ICT Mumbai are pioneering green processes in drug manufacturing. Government initiatives under the "Green Pharma India" campaign also aim to reduce pollution from pharmaceutical units and encourage green practices through incentives.

Conclusion

Green chemistry is not just a trend—it is the future of pharmaceutical innovation. As students and future scientists, embracing this sustainable approach means designing a world where life-saving medicines no longer come at the cost of

environmental damage. With the right education, policy support, and industry adoption, the green chemistry revolution can make "health for all" truly sustainable.

6 Scientific Advancements

Beyond the Needle: Advances in Skin-Patch Drug Delivery

Mehuli Josh (3rd year), Romit Bhattacharjee

The thought of injections often brings discomfort—even fear—to many. However, the medical world is witnessing a quiet but revolutionary shift in how medications are delivered. Gone are the days when needles were the only option for fast-acting or long-lasting therapies. Enter transdermal patches—a painless, patient-friendly alternative that's changing the face of drug delivery.

What Are Skin Patches?

Transdermal drug delivery systems (TDDS), commonly called skin patches, are adhesive patches applied to the skin that deliver medications directly into the bloodstream through the skin layers. While the concept has existed for decades (remember nicotine patches?), recent advances have dramatically expanded their capabilities, making them effective for a wider range of diseases and drug types.

How Do They Work?

Skin patches release small, controlled doses of a drug over time. The drug diffuses through the stratum corneum, the

outermost layer of skin, then moves into deeper layers and eventually into the bloodstream. Modern innovations use microneedles, chemical enhancers, or ultrasound technology to improve drug absorption and bioavailability—especially for larger or more complex molecules like insulin or vaccines.

What's New and Exciting?

1. Microneedle Patches

These contain tiny, painless needles made from biodegradable polymers. Once applied, they pierce the outer skin layer without pain, dissolve, and release the drug. Researchers have successfully used microneedle patches to deliver:

- Flu and COVID-19 vaccines
- Insulin for diabetes
- Cancer medications

Microneedle patches offer the efficacy of injections without the drawbacks—no risk of needle-stick injuries, easy disposal, and no need for trained personnel.

Smart Patches

Integrating sensors with patches has led to "smart" transdermal systems that monitor physiological parameters like heart rate, glucose levels, and hydration—then adjust drug release accordingly. For example, a diabetic patient could soon wear a patch that detects rising glucose levels and automatically administers insulin.

High-Barrier Drug Delivery

Recent studies have enabled the use of skin patches for high-molecular-weight drugs like biologics and peptides, which were traditionally considered too large to pass through the skin. Techniques like iontophoresis (using a small electric current) and liposomal carriers are making this possible.

Impact on Healthcare

Skin patches offer several benefits:

- Improved patient compliance, especially for the elderly, children, and those with needle phobia
- Sustained drug release, reducing the need for multiple daily doses
- Lower healthcare costs, as they reduce hospital visits and the need for injections
- Portability and convenience, ideal for travel or remote areas without medical infrastructure

In countries like India, where healthcare access and compliance are ongoing challenges, transdermal systems could prove transformative.

Future Applications

Research is ongoing into patches for:

- Neurological conditions like Parkinson's and Alzheimer's
- Hormone therapy and contraception
- Chronic pain management
- Personalized medicine, using patches tailored to genetic or metabolic profiles

Scientists are even exploring edible and implantable patches, potentially ushering in a new era of drug delivery that adapts to individual needs.

Conclusion

The rise of skin-patch drug delivery reflects a broader trend in medicine—moving from invasive, one-size-fits-all treatments to patient-friendly, intelligent therapies. As students of science and healthcare, it's essential to keep an eye on such innovations that challenge traditional norms and prioritize patient comfort, accessibility, and efficiency. So, the next time you think of medicine, don't just picture a syringe or a pill—imagine a tiny patch on your arm, silently doing the work of an entire treatment course.

7 Scientific Advancements

Herbal Cosmetics: Plants in Beauty and Skincare Formulations

Abhisikta Saha (4th year), Dr. Rajendra Chouksey

In a world where consumers are increasingly drawn to clean, natural, and sustainable beauty, herbal cosmetics have emerged as a trusted and growing trend. Unlike synthetic products, herbal cosmetics are formulated using plant-based ingredients that are often free from harmful chemicals, making them safer and more skin-friendly. From ancient civilizations to modern labs, the power of plants in enhancing beauty and promoting skin health has stood the test of time.

What are Herbal Cosmetics?

Herbal cosmetics are formulations enriched with bioactive compounds extracted from medicinal plants, herbs, and natural oils. These products are designed not just for aesthetic appeal but also to nourish, heal, and protect the skin. Common examples include herbal soaps, creams, face packs, oils, shampoos, and sunscreens.

What sets herbal cosmetics apart is their multifunctional nature—they are often anti-inflammatory, antioxidant,

antimicrobial, and rejuvenating—all thanks to the phytochemicals they contain.

Common Medicinal Plants Used in Herbal Skincare

Aloe vera (*Aloe barbadensis miller*)

- Rich in polysaccharides and vitamins A, C, and E.
- Soothes sunburn, hydrates dry skin, and promotes wound healing.

Neem (*Azadirachta indica*)

- It has antibacterial and antifungal properties.
- Used in acne treatment, dandruff control, and skin detox.

Turmeric (*Curcuma longa*)

- Contains curcumin, a powerful antioxidant and anti-inflammatory compound.
- Brightens complexion, treats scars, and fights free radicals.

Sandalwood (*Santalum album*)

- Calming and aromatic, used in face packs to reduce blemishes and even skin tone.

Tulsi (*Ocimum sanctum*)

- Known for its purifying properties.
- Controls oil, reduces skin infections, and improves circulation.

Rose (*Rosa centifolia*)

- Rosewater is a natural toner; rose oil hydrates and soothes the skin.
- Often used in facial mists and moisturizers.

Licorice (*Glycyrrhiza glabra*)

- Contains glabridin, which reduces hyperpigmentation and inflammation.

Cucumber (Cucumis sativus)

Cools, hydrates, and de-puffs the skin, especially under the eyes.

Why the Shift toward Herbal Beauty Products?

With rising awareness about the side effects of synthetic chemicals (e.g., parabens, sulfates, silicones), consumers are turning toward greener alternatives. Herbal cosmetics offer:

- Eco-friendliness: Biodegradable and sustainably sourced ingredients.
- Minimal Side Effects: Lower risk of allergic reactions or irritation.
- Holistic Benefits: Improve skin health alongside appearance.
- Cultural Acceptance: Many Indian households already use DIY herbal remedies, making these products relatable and trusted.

Challenges in Herbal Cosmetic Industry

Despite their popularity, herbal cosmetics face issues such as:

- Lack of standardization and regulation.
- Variability in plant extracts quality.
- Need for scientific validation and clinical trials.

To combat these, research in Pharmacognosy—the study of medicinal plants—plays a crucial role in identifying, extracting, and standardizing active phytoconstituents.

Future Scope and Industry Trends

The herbal cosmetics market in India is expected to grow at over 8% CAGR through 2025. Innovations include:

- Plant stem cell technology in anti-aging creams.
- Herbal sunscreens with UV-blocking plant extracts.

- Cruelty-free and vegan formulations aligned with global ethics.

Startups and traditional brands like Forest Essentials, Biotique, Mamaearth, and Khadi are thriving in this space—bridging traditional Ayurvedic wisdom with modern packaging and marketing.

Conclusion

Herbal cosmetics reflect a harmonious blend of nature and science. As students of pharmacy and life sciences, it is crucial to explore and innovate in the realm of plant-based cosmetology—not just to meet consumer demands, but to champion sustainability and well-being. The future of skincare lies in our roots—quite literally.

8 Art & Literature

Painting

Crescent crowned

~Pratyushi De (1st year)

This artwork depicts a divine feminine figure in a red saree, crowned with a crescent moon, symbolizing strength, grace, and cosmic energy. The fiery background and flowing form evoke the power and mystique of the eternal goddess.



Adya Shakti

~ Pratyushi De (1st year)

This artwork depicts a powerful and serene face of Goddess Durga, with her third eye symbolizing divine vision and strength. The warm glow of the nearby lamp adds a sacred, devotional aura to her presence.



Twilight Whispers

~Debanjana Mondal (Faculty)

This painting portrays a serene seaside sunset with a glowing sun, soaring birds, and a swing hanging from a tree, evoking peace and nostalgia.



9

Art & Literature

Prose & Poetry

Author

মা

~Subhankhi Mukherjee (3rd year)

মা, তুমি সাগরের গভীরতা, অঁথে জলের
মতো,
তোমার কোলে শান্তি, স্বপ্নের সোনালি রথ।
তোমার হাসি আকাশ, নীলের মাঝে রঙ,
তোমার চোখে জ্বলে, ভালোবাসার সুরঞ্জন।

মা, তুমি প্রভাতের প্রথম আলোর ছটা,
রাতের অন্ধকারে পথ দেখানো রাত।
তোমার হাতের পরশ, জীবনের প্রথম গান,
তোমার কণ্ঠে বাজে, মধুর স্বপ্নের তান।

ত্যাগের মূর্তি তুমি, নিঃস্বার্থ ভালোবাসা,
দুঃখের মেঘে তুমি, আশার এক ফোঁটা
আশা।
মা, তুমি আমার শক্তি, জীবনের প্রথম ধন,
তোমার কাছে এ জগৎ, হয়ে ওঠে রঙিন
স্বপন।

তোমার মমতার কথা, কীভাবে বলি আমি,
তুমি যে আমার মাটি, আমার আকাশ আমি।
মা, তুমি চিরন্তন, আমার হৃদয়ের গান,
তোমার ভালোবাসায়, জীবন হয় অমলান।

Flame-Born Gaze

~Dhrita Chatterjee (4th year)

Beneath the veil of sacred night,
She blooms in gold, a blaze of light.
With eyes that burn through time and
fate,
She guards the stars at heaven's gate.

A crescent flame beside her sways,
Yet brighter still her silent blaze.
Her third eye—wound and wisdom
sewn,
A world undone in gaze alone.

Red sindoor crowns her brow divine,
Where mortal breath meets soul and
shrine.

She is the hush between two bells,
The tale all ancient silence tells.

O Mother wrapped in dusk and fire,
Your smile is calm, your stare is pyre.
You are the chant, the sword, the
song—
The right in war, the end of wrong.

A Silent Escape

~Amisha Agarwal (2nd year)

Lila was sixteen when the promise of a better life lured her from her village. A man with a kind smile, claiming to be a recruiter for a city factory, offered her a job, good wages, and a chance to support her family. Her parents, burdened by debt and hunger, saw hope in his words. With a heavy heart, they let her go. The journey began with a crowded bus, then a train, and finally a van that rattled through the night. Lila clutched her small bag, her only possessions—a photo of her family and a worn scarf

her mother had knitted. The other girls in the van were quiet, their eyes reflecting the same mix of fear and anticipation. When they arrived, there was no factory. The building was a crumbling house on the edge of a sprawling city, its windows boarded, its air thick with dread. The kind man's smile vanished, replaced by a cold command to follow. Lila's heart sank as she realized the truth: she had been sold. Days blurred into weeks. The girls were locked in small rooms, forced to work in ways Lila couldn't have imagined in her worst nightmares. The traffickers were shadows, faceless men who barked orders and delivered punishments. Food was scarce, sleep a luxury, and hope a distant memory. But Lila held onto the scarf, her mother's love woven into its threads, a quiet reminder to survive. One night, a new girl, Meera, was brought in. She was different—sharp-eyed, whispering plans of escape when the guards weren't listening. Meera had overheard a delivery driver mention a nearby shelter that helped girls like them. "We just need one chance," she told Lila, her voice steady despite the fear. The chance came during a rare moment of chaos. A guard was distracted, arguing with another over money. Meera slipped a key from his pocket, her hands trembling but sure. In the dead of night, they unlocked their door, hearts pounding, and crept through the dark house. The other girls were too scared to follow, their eyes pleading but silent. Outside, the city was a maze of noise and shadows. Lila and Meera ran, the scarf trailing behind Lila like a lifeline. They dodged alleys and hid from headlights, guided only by Meera's memory of the shelter's name. Dawn was breaking when they found it—a small building with a sign that read "Safe Haven." A woman with kind eyes opened the door, ushering them inside.

The shelter gave them food, a bed, and safety. They learned that the police were investigating the trafficking ring, using information from other escapees. Lila and Meera shared what they knew, their voices shaking but resolute. Slowly, Lila began to heal, though the scars of her ordeal remained. Months later, Lila stood at a bus station, the scarf around her shoulders, ready to return to her village. Meera, now her friend, hugged her tightly. "We made it," Meera whispered. Lila nodded, clutching the photo of her family. She was going home, not as the girl who left, but as a survivor, carrying a story that could warn others. As the bus pulled away, Lila looked out the window, the city fading behind her. She vowed to speak, to tell her village the truth about the promises that steal lives. In her heart, she carried a spark of hope—not just for herself, but for every girl still trapped in the shadows.

The River's Path

~Arnab Dey (3rd year)

In a rugged mountain range, a trickle of water emerged from a hidden spring, barely more than a whisper against the stone. The young river dreamed of reaching the vast ocean, a place it had only heard of in the murmurs of the wind. But the path ahead was daunting—jagged rocks, steep cliffs, and tangled forests stood in its way. At first, the river hesitated, its flow weak and uncertain. A boulder blocked its path, unmovable and cold. "You're too small to pass," the boulder mocked. But the river didn't argue. It flowed around the edges, carving a small groove, day after day. The work was slow, the progress invisible, but the river kept moving, trusting its purpose. Seasons changed. Storms brought torrents that strengthened the river,

while droughts shrank it to a thread. Through it all, the river adapted—slipping under roots, wearing down stone, finding paths where none seemed possible. It carried silt and seeds, giving life to the banks it touched. Frogs sang in its shallows, and trees leaned in for its nourishment. One day, after years of quiet persistence, the river reached a cliff's edge. Below, the ocean sparkled, vast and alive. The river paused, reflecting on its journey—the obstacles it had overcome, the life it had created. With a final leap, it plunged into the sea, its waters merging with the infinite. As it joined the ocean, the river realized its strength hadn't come from size or speed, but from never stopping. It had shaped mountains, fed forests, and found its way by flowing forward, no matter how small the step. The ocean's waves seemed to hum: *Every journey begins with a single drop. Keep flowing, and you'll carve your own path.*

स्कूल जीवन

~Anand Prasad (2nd year)

स्कूल के दिन, वो सुनहरे पल,
यादों का मेला, सपनों का जल।
सुबह की घंटी, कतिबों का बोझ,
दोस्तों के साथ, हंसी का संतोष।

कक्षा में बैठे, गुरुजी का ज्ञान,
कभी शरारत, कभी सपनों का सम्मान।
खेल के मैदान में, दौड़ की धूम,
हर कदम में बस, बचपन का जादू।

कागज की नाव, बारिश में बहाई,
टफिनि बांटकर, दोस्ती नभाई।
परीक्षा की चिंता, रातों की जाग,
फरि भी मन में, एक अनोखी आग।

स्कूल वो मंदिर, जहां बने हम,
सपनों के पंख, यहीं से चमके हम।
वो दिन, वो पल, अब याद बन गए,
स्कूल के वो लम्हे, दिल में सज गए।

শেষ চিঠি

~Supriya Ghosh (3rd year)

শীতের এক দুপুর। ধোঁয়া ওঠা চা-টা হাতে নিয়ে বালকনিতে দাঁড়িয়ে তৃষা চেয়ে আছে দূরের পাহাড়ের দিকে। মেঘে ঢাকা সেই পাহাড় যেন লুকিয়ে রাখে কত না অজানা গল্প। আজ হঠাৎই একটা পুরনো খাম পাওয়া গেছে মা-বাবার আলমারির এক কোণে। খামের উপরে লেখা – “তৃষার জন্য, পড়বে আমার চলে যাওয়ার পরে।” চিঠিটা বাবা লিখেছিলেন, যেদিন থেকে তিনি অসুস্থ হয়ে বিছানায় পড়ে গিয়েছিলেন। তৃষা তখন কলেজে পড়ে। সময়ের ঘূর্ণিতে সে আজ একজন সাহিত্য পত্রিকার সম্পাদক। কিন্তু বাবার সেই চিঠি সে কোনোদিন পড়েনি, না পড়ার সাহস হয়নি। চিঠিটা খুলল সে ধীরে ধীরে। ভেতর থেকে বেরোল একটা পাতলা কাগজ। বাবার সুপরিচিত হাতের লেখা। “প্রিয় তৃষা, যখন তুমি এই চিঠি পড়বে, আমি হয়তো আর থাকবো না। কিন্তু আমার গল্পটা শেষ হয়নি—তুমি তা শেষ করবে। আমি জানি, তুমি গল্প ভালোবাসো। তোমার লেখার হাত অসাধারণ। কিন্তু সব গল্প কেবল বইয়ে থাকে না—কিছু গল্প রয়ে যায় জীবনের অলিগলিতে। একটা গল্প আছে আমার জীবনে, যেটা কাউকে বলা হয়নি।

কলেজে পড়ার সময় আমি ভালোবেসেছিলাম একজনকে। তার নাম ছিল শর্মিলা। সুন্দর, হাসিখুশি, কবিতা লিখত দারুণ। কিন্তু সমাজ

আমাদের এক হতে দেয়নি।
পরে আমি তোমার মাকে বিয়ে করি,
ভালোবাসা ছিল, কিন্তু শর্মিলার স্মৃতি
কখনো মুছে যায়নি।
আমি চাই তুমি শর্মিলার গল্পটা খুঁজে
বের করো। সে এখন কোথায়, কেমন
আছে—জানি না।
যদি পারো, একদিন তার লেখা
কবিতাগুলো প্রকাশ করো তোমার
পত্রিকায়। তাতে আমার একটি
অসমাপ্ত অধ্যায় পূর্ণ হবে।

ভালোবাসা ও আশীর্বাদ রইলো,
—তোমার বাবা।” তুষার চোখ ভিজে
যায়। এতদিন ধরে সে ভাবত বাবার
জীবনে কোনও রহস্য নেই। অথচ
একটা অজানা ভালোবাসা, একটা না
বলা গল্প রয়ে গেছে সেই মানুষটার
ভিতরে যাকে সে এতটা চেনে বলে
ভেবেছিল। সেই মুহূর্তেই তুষা সিদ্ধান্ত
নেয়—সে শর্মিলাকে খুঁজে বার করবে।
তার কবিতা, তার কথা তুলে ধরবে
পৃথিবীর সামনে। কারণ, কিছু গল্প
সময়ের গর্ভে হারিয়ে গেলে, জীবনও
অসম্পূর্ণ থেকে যায়।

Gender Equality: Shaping a Fairer Tomorrow

~ Souvik Maity (1st year)

In today's evolving world, gender equality stands not just as a social demand but as a moral necessity. It refers to equal rights, responsibilities, and opportunities for individuals of all genders — including women, men, and those who identify beyond the traditional binary. For college students, the future torchbearers of society, understanding and supporting gender equality is more important than ever. Historically, gender roles were rigid and unequal. Women were often confined to household responsibilities, while men

dominated education, employment, and leadership. Even today, despite significant progress, deep-rooted gender biases still affect many aspects of life — from the wage gap to underrepresentation in politics and technology. Educational spaces like colleges play a pivotal role in challenging these stereotypes. When classrooms promote open dialogue, inclusive content, and equal participation, they empower students to question traditional norms. A truly inclusive campus allows a female student to lead a tech club, a male student to pursue arts without judgment, and a transgender student to live with dignity and respect. In the workplace, gender equality means more than just hiring women. It includes equal pay, career growth, maternity and paternity support, and policies that address harassment and discrimination. As future professionals, college students must be aware of these standards and actively support workplaces that promote fairness and inclusivity. Beyond legal reforms and institutional policies, gender equality begins with mindset. It's in how we speak, behave, and think. Everyday actions matter—whether it's not interrupting a female peer in a discussion, standing up against sexist jokes, or supporting a friend struggling with gender identity. Importantly, gender equality is not about making one gender dominant over the other. It is about balance—where everyone, regardless of gender, gets equal chances to learn, express, lead, and succeed. Studies have shown that gender-equal societies are more peaceful, innovative, and economically stronger. In India, we see inspiring change. From women leading ISRO missions to girls outperforming boys in board exams, from male feminists supporting equality campaigns to transgender rights gaining recognition—each step forward brings

us closer to a truly equal society. As students and youth, we are not just observers of change—we are drivers of it. Let us raise questions, celebrate diversity, and build a campus culture where gender is not a limitation but simply a part of one's identity. Because gender equality is not a distant dream—it starts here, with us.

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Current affairs

Equal Marriage Age: A Landmark Move for Women's Rights in India

Tanmoy Manna (4th year)

In a significant push towards gender equality, the Indian Parliament introduced The Prohibition of Child Marriage (Amendment) Bill, 2021 in December 2021. The bill aimed to raise the legal marriage age for women from 18 to 21 years, aligning it with the minimum age for men and superseding any religious or customary laws

Timeline & Legislative Process

June 2020: A task force chaired by Jaya Jaitly was formed by the Ministry of Women & Child Development to assess the impact of marriage age on health, education, and empowerment. Their December report recommended

raising the marriage age for women to 21 years

December 21, 2021: Formal introduction of the Amendment Bill in Lok Sabha, proposing changes to the Child Marriage Act, 2006

- Referred to the Parliamentary Standing Committee on Education, Women, Children, Youth & Sports for review
- The committee received multiple extensions, most recently until May 2024, but the 17th Lok Sabha was dissolved in June 2024, causing the Bill to lapse and require reintroduction

Supreme Court's Take

In early 2023, the Supreme Court, led by Chief Justice D.Y. Chandrachud, reviewed Public Interest Litigations seeking to raise the women's marriage age to 21. In both the Ashwini Upadhyay and Shahida Quraishi cases (Feb–Mar 2023), the Court dismissed the pleas, explaining that such legislative changes must be made by Parliament, not the judiciary.

Why This Matters

Gender Equity: The shift recognizes women's need for emotional maturity, education, and career development before marriage.

Health Benefits: Delaying marriage helps prevent early pregnancies, reducing maternal and infant health risks.

Legal Parity: It removes gender-based legal discrepancies between men and women as envisioned in the Constitution.

Challenges Ahead: Legislative Hurdles: Parliamentary dissolution halted the Bill's progression—requiring

reintroduction in the 18th Lok Sabha. Implementational Gaps: In regions with prevalent child marriages, enforcement and awareness must accompany the law.

Conclusion: The proposal to equalize the legal marriage age at 21 marks a historic shift towards women's empowerment and justified gender equality. Though the Bill has lapsed, the parliamentary debate, expert recommendations, and judicial restraint collectively lay the groundwork for future legislative action. Let this reform not remain a proposal—but evolve into law, fulfilling its promise to ensure that every girl has the time, freedom, and dignity to shape her life before marriage.

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Current affairs

G20 Summit in New Delhi: A Global Stage, An Indian Vision

Ankit Ghosh (3rd year)

In September 2023, the eyes of the world turned toward India as it hosted the prestigious G20 Summit in New Delhi for the very first time. With the theme "Vasudhaiva Kutumbakam" (One Earth, One Family, One Future), India didn't just play host—it set the tone for global dialogue on some of the most pressing issues of our time: climate change, digital transformation, inclusive development, and women's empowerment.

The G20—an intergovernmental forum of 19 countries and the European Union—represents around 85% of the global GDP, 75% of international trade, and two-thirds of the world's

population. India's presidency of the G20 came at a crucial time, with the world grappling with climate crises, post-pandemic recovery, rising inflation, and geopolitical tensions.

A Greener Global Future: Climate Finance Takes the Lead

One of the major pillars of the summit was climate finance—supporting developing nations to meet climate goals through equitable funding and technology transfer. India emphasized the need for rich nations to fulfill their climate finance promises of \$100 billion annually and proposed creating green development pacts. The summit's final declaration reinforced commitments to net-zero targets and promoted clean energy collaborations like biofuels alliance and solar partnerships. India's successful digital ecosystem, especially platforms like Aadhaar, UPI, and CoWIN, was showcased as a model for the world. The summit endorsed building inclusive digital public infrastructure (DPI) globally, especially for the Global South. This reflects India's role as a tech-democracy pioneer, offering open-source digital tools to other developing countries.

Women-Led Development: A First in G20 History

For the first time, the G20 presidency included a distinct focus on "Women-led development" rather than just women's participation. India promoted female entrepreneurship, digital inclusion for rural women, and equal access to health and education. The launch of the Women Entrepreneurship

Platform (WEP) and discussions on closing gender gaps in STEM and leadership were standout achievements.

Voice of the Global South: Inclusion and Unity

India used its presidency to amplify the voice of the Global South—the least represented yet most vulnerable regions in the global economy. A historic moment was the inclusion of the African Union as a permanent member of the G20, turning it into the G21 and symbolizing true global representation. The move was widely praised as a diplomatic masterstroke by India.

Conclusion: A Defining Moment in India's Global Leadership

The 2023 G20 Summit in New Delhi wasn't just an international meeting—it was a declaration of India's evolving role as a responsible, inclusive, and visionary global leader. By addressing climate equity, digital inclusivity, women's leadership, and multilateral unity, India's G20 presidency paved the way for a more sustainable and equitable future.

For students and youth, the summit serves as an inspiration to think globally and act responsibly, embracing technology, sustainability, and empathy in everything we do.

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Current affairs

Sakshi Malik & Vinesh Phogat Lead

#MeTooInIndianSports

Amiya Konar (4th year)

In early 2023, a wave of courage swept through Indian sports when Olympic bronze-medallist Sakshi Malik and Commonwealth/Asian Games champion Vinesh Phogat led a powerful **#MeToo-style** protest against alleged sexual harassment in wrestling by Brij Bhushan Sharan Singh, the then-president of the Wrestling Federation of India (WFI) and a sitting Member of Parliament.

What Sparked the Protest?

In January 2023, over 30 national-level wrestlers—notably Malik, Phogat, and Bajrang Punia—began a sit-in at Delhi’s iconic Jantar Mantar. They accused Brij Bhushan of groping, stalking, intimidation, and demanding sexual favours from wrestlers, some dating back to 2012. Sakshi Malik later revealed in her autobiography *Witness* that he had attempted to molest her during a competition in 2012.

Raising Their Voices

The athletes issued a firm ultimatum: file FIRs or they would escalate their protest. Malik boldly stated: “This fight is no longer only for India’s female wrestlers ... it is for the daughters of India whose voices have been silenced time and again.” Vinesh Phogat, breaking down emotionally, declared that victimized wrestlers would formally file complaints if authorities didn’t act.

Impact & Evidence

Following Supreme Court direction, Delhi Police registered two FIRs on April 28, 2023—including one under the POCSO Act—ushering Brij Bhushan into a legal probe. The Sports Ministry suspended WFI’s executive body in May 2023 and appointed an ad hoc committee to oversee its operations.

Global Resonance

The protests drew attention beyond India’s borders. Time magazine, The Guardian, BBC, and **Al Jazeera** covered the events extensively, framing the movement as a critical inflection point in combating sexual harassment within Indian sports.

Demands & Outcomes

The wrestlers demanded:

- Brij Bhushan's removal from WFI
- Legal action and accountability
- Systemic reforms to ensure athlete safety

Today, although investigations continue and WFI leadership remains in flux, the movement has resulted in:

- Real FIRs filed under severe charges
- Increased public and governmental scrutiny of sports administration
- A broader national conversation on safeguarding athlete rights

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Current affairs

Union Budget 2022-23: India's Blueprint for Growth and Sustainability

Jasim Mondal (3rd year)

On 1st February 2022, Finance Minister Nirmala Sitharaman presented the Union Budget 2022–23 in Parliament. This budget was built around the theme of “Amrit Kaal”—a 25-year vision towards India’s 100th year of independence in 2047. It focused on four key priorities: inclusive development, productivity enhancement, energy transition, and climate action. Designed in the backdrop of the COVID-19 pandemic, the budget sought to accelerate India’s economic recovery while laying a strong foundation for long-term growth.

Economic Growth and Capital Investment

The Indian economy was projected to grow at 9.2%, positioning it as one of the fastest-growing major economies globally. A major highlight was the increase in capital expenditure by 35.4%, bringing it to ₹7.5 lakh crore. This investment targeted infrastructure sectors like roads, highways, logistics, railways, housing, and energy, aiming to create jobs and boost demand. The PM Gati Shakti Master Plan was also expanded to integrate various modes of transport and improve connectivity.

Digital India and Technological Advancements

A strong push for digital transformation was a defining feature of this budget. It included the launch of:

- A Digital University to promote quality education in regional languages,
- Expansion of PM eVIDYA and virtual learning platforms,
- Introduction of e-passports with embedded chips for secure and faster international travel,
- Announcement of a Digital Rupee, to be issued by the Reserve Bank of India (RBI) using blockchain technology—making India one of the few countries to experiment with central bank digital currencies.

Climate Action and Sustainability

In line with global climate goals, the government introduced several green initiatives:

- Sovereign Green Bonds for financing eco-friendly infrastructure,

- Increased support for solar energy and clean mobility,
- Focus on promoting battery swapping technology and special zones for climate-resilient development.

These moves were intended to help India progress toward its net-zero carbon emission target by 2070.

Health, Education, and Mental Well-being

Post-pandemic recovery also required attention to mental health and education: The National Tele Mental Health Programme was launched with 23 centers of excellence. Skill development and reskilling programs were emphasized under the Skill India Mission. Efforts to bridge the digital divide in education were expanded through online platforms and TV-based learning.

Support for Startups and MSMEs

To encourage entrepreneurship, the government extended tax benefits for startups till March 2023. The Emergency Credit Line Guarantee Scheme (ECLGS) for MSMEs was expanded by ₹50,000 crore to support post-pandemic revival in sectors like hospitality and tourism.

Conclusion

The Union Budget 2022–23 was forward-looking, inclusive, and ambitious. By balancing infrastructure growth with digital innovation and environmental responsibility, it laid down a blueprint for India's future. For students and young citizens, this budget

reflected the opportunities of a rapidly transforming nation—one that is investing in knowledge, sustainability, and inclusive prosperity.

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Current affairs

iNCOVACC – India’s Intranasal COVID Vaccine: A Milestone in Innovation

Tanmoy Bez (2nd year)

In a landmark achievement for Indian science and healthcare, Bharat Biotech’s iNCOVACC became the world’s first intranasal COVID-19 vaccine to be approved for primary immunisation. Cleared by the Drugs Controller General of India (DCGI) in January 2023, this nasal vaccine marked a new chapter in India’s fight against the COVID-19 pandemic, showcasing indigenous innovation and technological progress.

What is iNCOVACC?

iNCOVACC (BBV154) is a needle-free, intranasal vaccine developed by Bharat Biotech in collaboration with Washington University School of

Medicine. Unlike traditional vaccines administered through the arm, iNCOVACC is sprayed into the nostrils, delivering immunity where the virus first enters—the respiratory tract.

This method not only makes the vaccination process painless and simpler, but it also stimulates a strong mucosal immune response, which plays a crucial role in blocking infection at the entry point, potentially reducing transmission.

Made in India: Mission COVID Suraksha

iNCOVACC is a proud outcome of “Mission COVID Suraksha”, the Government of India’s flagship mission to support the development of safe, effective, affordable vaccines by Indian manufacturers. Backed by the Department of Biotechnology (DBT) and implemented by BIRAC, this mission gave momentum to India’s vaccine ecosystem during the pandemic.

This vaccine joins other Indian innovations like:

ZyCoV-D – the world’s first DNA-based COVID vaccine, developed by Zydus Cadila.

GEMCOVAC™-19 – another needle-free COVID vaccine using a jet injector.

Together, these innovations highlight India’s growing capabilities in biotechnology and vaccine research.

Global Significance

iNCOVACC was also approved as a booster dose, making it an accessible, non-invasive option for mass vaccination campaigns. Bharat Biotech noted that the intranasal platform could be rapidly adapted for future variants or even other respiratory viruses like flu.

This development attracted global attention and demonstrated that India could not only produce vaccines at scale but also lead in cutting-edge biomedical research.

Anusandhan National Research Foundation (ANRF) Act 2023: Pioneering India's R&D Leap

On 15 August 2023, the Indian Parliament passed the Anusandhan National Research Foundation Act, 2023 (ANRF Act), marking a historic shift in the country's approach to research and innovation. This landmark legislation replaces the Science and Engineering Research Board (SERB)—established in 2008—with a more powerful and far-reaching body that aligns with the goals of the National Education Policy (NEP) 2020.

Apex R&D Body: Objectives and Structure

Purpose: To strategically steer research, innovation, and entrepreneurship across natural sciences, engineering, environment, agriculture, health, and interdisciplinary areas involving social sciences and humanities

Governance:

Headed by the Prime Minister, with key ministers (Science & Technology, Education) as Vice-Chairs.

Guided by an Executive Council, led by the Principal Scientific Adviser.

Functions:

- Build roadmaps for short-, medium-, and long-term R&D.
- Fund universities and colleges, including those with nascent research culture.
- Provide peer-reviewed grants, set up research infrastructure, and support tech translation.
- Promote international collaborations and private-sector research investment

Funding & Financial Vision

The Act allocates ₹50,000 crore over five years (2023–28)—about 80% from industry, philanthropy, and non-governmental sources, creating a dynamic “financial research ecosystem”. This marks a paradigm shift from government-dominated funding under SERB to a collaborative funding model involving the private sector and foundations, also ensuring grants to state universities and institutions.

Revised Scope & Strategic Impact

With SERB now subsumed into ANRF, the new body carries a broader mandate—not only to fund basic research but to foster innovation, entrepreneurship, and technology transfer

- ANRF is modelled after global research bodies (e.g., NSF), aiming to:

- Cultivate research culture in understaffed colleges.
- Bridge the research–industry gap.
- Maintain accountability through annual audits filed to Parliament

Challenges & Forward Path

The reliance on non-government sources has sparked debates on autonomy, equity, and prioritization of public-interest research. Experts caution that academic–govt–industry synergy requires robust governance frameworks to ensure balanced sector representation and transparency.

Conclusion

The ANRF Act 2023 marks a watershed moment in India's scientific governance. With a firm focus on strategic funding, synergy between sectors, and broad-based inclusivity, the Foundation embodies the vision of India@2047. It aims to transform research into national development, from cutting-edge technology to grassroots problem-solving. For students and young researchers, it offers unprecedented opportunities—funding, global exposure, and a chance to be part of India's journey to scientific and global leadership.

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Pharmacy Entrance Exams and Cut-offs (Academic Year 2022–23)

Exam Name	Full Form	Conducting Body	Course Offered	Cut-off (General Category)
NEET UG	National Eligibility cum Entrance Test	NTA	B.Pharm (in some states), BAMS, MBBS, BDS	715 – 117 (Out of 720)
GPAT	Graduate Pharmacy Aptitude Test	NTA	M.Pharm	
WBJEE	West Bengal Joint Entrance Examination	WBJEEB	B.Pharm, B.Tech	~5000–12000 rank (Gen) for B.Pharm
MHT-CET (Pharmacy)	Maharashtra Health & Technical CET	CET Cell Maharashtra	B.Pharm/D.Pharm	85–130 (Out of 200); 99+ percentile
TS EAMCET	Telangana State Engineering, Agriculture, Medical Common Entrance Test	JNTUH on behalf of TSCHE	B.Pharm, D.Pharm	40+ marks (Out of 160) for Gen
AP EAPCET (Pharmacy)	Andhra Pradesh Engineering, Agriculture & Pharmacy Common Entrance Test	JNTU Anantapur for APSCHE	B.Pharm, D.Pharm	40+ marks for Gen (out of 160)
OJEE (Pharmacy)	Odisha Joint Entrance Examination	OJEE Cell	B.Pharm, M.Pharm	Rank ~1000–15000 for B.Pharm Gen
UPCET (Pharmacy)	Uttar Pradesh Combined Entrance Test	NTA (until 2022)	B.Pharm, M.Pharm	~250–300+ marks (Out of 600) for B.Pharm
KEAM (Pharmacy)	Kerala Engineering Architecture Medical	CEE Kerala	B.Pharm	~120–200 marks (Out of 480)



GUJCET	Gujarat Common Entrance Test	GSEB	B.Pharm	Rank ~2000–25000 (Gen)
BITS HD (Pharmacy)	BITS Higher Degree Pharmacy	BITS Pilani	M.Pharm	160–200 marks (based on paper; varies yearly)
NIPER JEE	National Institute of Pharmaceutical Education and Research Joint Entrance Exam	NIPER Hyderabad	M.Pharm, Ph.D.	Rank < 1000 for top NIPERs
PU CET (PG)	Panjab University Common Entrance Test (PG)	Panjab University	M.Pharm	60–65% in Entrance Test
TANCET	Tamil Nadu Common Entrance Test	Anna University	M.Pharm (limited)	~35–60 marks (Out of 100)
RUHS Pharmacy	Rajasthan University of Health Sciences	RUHS	B.Pharm, D.Pharm	Rank ~2000–10000 for B.Pharm

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