NEWSLETTER

BIOFOCUS

DEPARTMENT OF BIOTECHNOLOGY

VOLUME 02

2023 - 2024

"LIFE BEGINS IN THE BIOTECH LAB – WHERE INNOVATION MEETS DISCOVERY!"

KUMARAGURU
college of technology
character is life

"Biology enables, Culture forbids."

– Yuval Noah Harari,
SAPIENS: A BRIEF HISTORY OF HUMANKIND

In this Issue

1 Message

1.1 Vision, Mission, HOD's Message & From the Editorial Desk

1.1.1 About the Department

The Department of Biotechnology is a pioneering department, which harnesses and nurtures specific skill sets that integrates life science and technology, and the curriculum is constantly upgraded to suit the demands of the industry. Faculty members are trained both in reputed institutes and industries periodically in a constantly evolving field of engineering relevant to biotechnology. Currently, the Department of Biotechnology offers B.Tech.(Biotechnology), M.Tech.(Biotechnology) and Ph.D.(Full/Part-time) with a well-structured and balanced curriculum focusing on the major areas viz., Healthcare, Nutrition, Bioprocess Technology and Environmental Biotechnology.

1.1.2 From the HOD's Desk

The Department of Biotechnology commenced its academic and scientific journey in the year 2002, and built up ambience and infrastructural facilities for effective academic and research activities over the period. Our students have excelled in curricular, co-curricular and extra-curricular activities. The faculty members engage in effective curriculum delivery and research on socially relevant projects. Most of our graduates get placed in life science related companies and the rest pursue higher studies in reputed institutes in India and abroad. Our graduates, spread all over the world, are the dynamic ambassadors of our performance.

Dr. ***Vinohar Stephen Rapheal***, Associate Professor & Head

1.1.3 Vision

Strong teaching and research foundation in the area of biotechnology and allied fields through knowledge dissemination to students and the public and to scale new heights in the frontier areas of health and environment and ethics for welfare of humankind globally.

1.1.4 Mission

1. Develop dynamic curriculum and syllabus to promote innovative and create practices.
2. Encourage students for innovation and setting start-ups and equip leadership an entrepreneurial skills
3. Train students on issues related to social welfare.

1.1.5 From the Editorial Desk

Post the success of the previous issue the Biofocus Newsletter [2022-23] is back with much more interesting stories and happenings in the department. In this issue, key events and inside story of the event is also elaborated. Write-ups and special pages from students are been compiled together.

Dr. ***Ram K*** , Assistant Professor-III & Editor-Biofocus

Paper Publication by Faculty

2

September 2023

- Srisugamathi, G., **Thirumurugan, A.,** Samrot, A. V., Sengupta, P., Dutta, S., & Remya, R. R. (2023). Development of nanocellulose-based composite derived from wood waste of Azadirachta indica for food packaging application. *Biomass Conversion and Biorefinery*, 1-9.
- Govindarajan, D. K., & **Kandaswamy, K.** (2023). Antimicrobial peptides: A small molecule for sustainable healthcare applications. *Medicine in Microecology*, 100090.
- Veerichetty, V. V., & **Veerabhuvaneshwari, I. S**. (2023). Molecular docking study of nuciferine as a tyrosinase inhibitor and its therapeutic potential for hyperpigmentation. *Genomics & Informatics*, 21(3), e43, 1-13.
- Muruganandam, A. R., Venkatasubramanian, S., Jagmag, S. A., & **Veerichetty, V**. (2023). Antityrosinase activity of phycocyanin and cream formulation for hyperpigmentation. *IOP Conference Series: Materials Science and Engineering*, 1291(1), 012039.

November 2023

- Rymbai, E., Sugumar, D., Chakkittukandiyil, A., **Kothandan, R.,** Selvaraj, J., & Selvaraj, D. (2023). The identification of cianidanol as a selective estrogen receptor beta agonist and evaluation of its neuroprotective effects on Parkinson's disease models. *Life Sciences*, 333, 122144.
- Forona, B., Ramakrishnan, S., Keerthieswar, V., Sowmiya, S., Swetha, S., & **Ram, K.** (2022, November). Taxonomic and functional metagenomic profiling of microbial communities in urine sample. In *AIP Conference Proceedings* (Vol. 2446, No. 1). AIP Publishing.
- Neelakumar, U. D., Gurusamy, S., & **Kothandan, R.** (2022, November). Techno-economic analysis of low-cost recombinant beta-glucosidase enzyme using Escherichia coli. In *AIP Conference Proceedings* (Vol. 2446, No. 1). AIP Publishing.

December 2024

- Chakkittukandiyil, A., Chakraborty, S., **Kothandan, R.,** Rymbai, E., Muthu, S. K., Vasu, S., & Selvaraj, D. (2023). Side effects based network construction and drug repositioning of ropinirole as a potential molecule for Alzheimer's disease: an in-silico, in-vitro, and in-vivo study. *Journal of Biomolecular Structure and Dynamics*, 1-15.

3 Faculty Participation

3.1 Faculty Participation in FTP, STTP, Workshop and Other Training Programs

September 2023

- Dr. N. Saraswathy attended training on "Use of Online Tools for Teaching and Research" by Teaching Learning Centre, Ramanujan College University of Delhi on **Sep-12 to Sep-18, 2023**.

October 2023

- Dr. N. Saraswathy attended FDP on "Innovation and Startup in Higher Education Institutions" by NITTTR, Kolkata on **Oct-30 to Nov-03, 2023**.
- Mr. P. Muthukumaran attended an online FDP on "Sustainable Development in Chemical, Environmental and Life Science" by Department of Chemical Engineering, Coimbatore on **Oct-30 to Nov-03, 2023**.
- Dr. D. R. Manimaran attended FDP on "Sustainable Development in Chemical, Environmental and Life Science Applications" by Department of Chemical Engineering, Coimbatore on **Oct-30 to Nov-03, 2023**.

November 2023

- Dr. N. Saraswathy attended training on "Innovation by Design Thinking & Product Design and Development" by KCT on **Nov-08 to Nov-10, 2023**.
- Dr. D. R. Manimaran attended PDP on "Environmental Remediation Tools" by NITTTR, Chennai on **Nov-20 to Nov-24, 2023**.
- Dr. D. R. Manimaran attended ATAL FDP "Nutraceuticals & Food Science" by Sri Shakthi Institute of Engineering and Technology, Coimbatore on **Nov-27 to Dec-02, 2023**.

December 2023

- Dr. M. Shanmugaprakash attended FDP on "Empowering Digital Learning through AI Powered Tools" by NITTTR on **Dec-18 to Dec-22, 2023**.
- Dr. Padmanand Sudhakar attended FDP on "UHV-I" on **Dec-18 to Dec-22, 2023**.

4 Notable Events

4.1 Bridging Academia and Industry Through Knowledge Exchange

The Department of Biotechnology at Kumaraguru College of Technology has been actively organizing insightful and engaging events to enhance students' knowledge and industry readiness. Here's a glimpse of the recent and upcoming activities:

4.1.1 National-Level Technical Symposium - CBSSI' 23

Date: October 13, 2023
Coordinator: Dr. T. Sathish Kumar
Theme: Contemporary Biotechnical Solutions for Societal Issues
Participants: 50 students and faculty members
This one-day national symposium provided a platform for students to explore innovative biotechnological solutions for real-world challenges.

Photo. 4.1: CBSSI'23 Inauguration

4.1.2 Value-Added Course on Fruit and Vegetable Processing Technology

Dates: December 15-16, 2023
Instructor: Dr. S. Nithya Priya, AP III, Kumaraguru College of Technology
Participants: 20 students
This hands-on course provided students with practical exposure to food processing technologies.

Photo. 4.2: Fun-filled Session with Dr. Nithyapriya on Fruit and Vegetable Processing. Skilling up as your eat.

4.1.3 Expert Talk Sessions in Collaboration with IIC, KCT

Next Best Version (NBV)
Date: April 27, 2024
Speaker: Dr. Chella Pandian Pitchai, Global Head (DEI, Culture, Values & Belongingness), Biocon Biologics, Bengaluru

Participants: 40 students and faculty members
A thought-provoking session on personal and professional growth in the biotech industry.

Photo. 4.3: Dr. Chella Pandian interacting with the students

4.1.4 Employability Skills in Pharma and Biotech

Date: February 17, 2024
Speaker: Mr. Sengadhir, AGM, Symbio Pvt Ltd, Bangalore
Participants: 45 students and faculty members
A career-building session focused on industry expectations and skillsets required for biotech graduates.

Photo. 4.4: Focussing on the Industrial Requirement - a session by Dr. Sengathir

4.1.5 Bioindustry Conclave

Dates: April 26-27, 2024
Coordinator: Ms. Veerabhuvaneshwari & Dr. Sathish Kumar T
Industry Representation: Biocon, Affigenics, Spincos, Genomatics Pvt. Ltd.
Participants: 250 students and faculty members
A landmark event bringing together CEOs, global heads, and founders from top biotech firms to discuss industry trends.

4.1.6 AI in Scientific Publishing – Empowering Researchers

Date: March 23, 2024
Speaker: Dr. Deepa Jaganathan, Founder, Deebiotech Academic Research Services
Participants: 50 faculty members
This session explored AI-powered tools for enhancing scientific writing and research publication efficiency.

Photo. 4.5: Kickstart your research skills with AI- session by Dr. Deepa

Academia Industry Dialogues 5

The Bio-Industry Conclave 2024, held at Kumaraguru College of Technology (KCT) on **April 26-27**, served as a vibrant platform for fostering academia-industry collaboration in the biotechnology sector. The event, hosted at the Swami Vivekananda Seminar Hall, brought together thought leaders, industry experts, and academia to engage in insightful discussions on emerging trends, challenges, and opportunities in bioeconomy, healthcare innovation, and biomanufacturing.

The conclave commenced with an inaugural address, setting the stage for thematic sessions covering pivotal topics such as *BioEconomy: Pioneering the Future of Healthcare and Bioindustry*, *Compliance Unveiled: Decoding Regulatory Challenges*, and *Smart Health Revolution: AI-Enabled Devices and Genomics in Precision Care*. Distinguished speakers, including Dr. Vijay Venkatraman (MD & CEO, Oviya Medsafe), Dr. Ashish Mandlik (Sakthi Sugars Ltd.), and Dr. Saranya Nithyanandan (Pfizer), provided key insights into regulatory frameworks, emerging biotechnologies, and market-driven innovations.

The event further explored *Molecular Diagnostics, Product Innovation, and Clinical Research*, with speakers such as Dr. Arumugam Muruganandam (Affigenix) and Dr. Anurag Varshney (Patanjali Research Foundation), emphasizing translational research and commercial viability. Engaging panel discussions on *Innovation-driven Biodiscovery* and *Academia - Industry Synergy* provided a platform for experts to deliberate on strategies for bridging academic research with industrial applications.

The second day focused on *Upskilling and Professional Growth*, featuring industry stalwarts like Dr. Easwaran (Biocon Academy) and Dr. Chella Pandian Pitchai (Biocon Biologics). The session *From Lab to Market: Navigating Biomanufacturing and Biosimilar Landscapes* delved into pathways for bioproduct commercialization, with speakers such as Dr. Sivanandam K (Biocon Biologics Ltd.) and Dr. Maneesh Paul (Microvioma Pvt. Ltd.).

The conclave concluded with an engaging discussion on *Healthcare 4.0: Biomanufacturing*

and Data-driven Healthcare for New India, where experts like Dr. Premkumar (Pasteur Institute) and Mr. Arun Sathyaseelan (Innovaccer) shared their perspectives on digital transformation in the healthcare sector.

With an extensive exchange of ideas, networking opportunities, and insightful deliberations, Bio - Industry Conclave 2024 proved to be a significant step towards strengthening academia - industry collaboration and empowering students and professionals to drive the future of biotechnology.

Photo. 5.1: Bridging Academia and Industry: The Bioindustry Conclave 2024 brought together experts and students for insightful dialogues on industry-relevant skills, shaping the future of biotechnology.

Photo. 5.2: Inaguration - Bridging Academia and Industry: The Bioindustry Conclave 2024.

Photo. 5.3: A Network Dinner was arranged along with the speakers of Bioconclave 2024 - Dr. Arumugam Murugannthamm, Founder, Affigenix and Dr. Sivanandam K , Global Head, Program and Alliance Management, Biocon Biologics Ltd interacting with the students.

5.1 Student's Review on the Event

PERAGATHIS I 22BBT036

The Bio-Industry Conclave 2024 was a transformative experience that challenged my understanding of how cutting-edge biotechnologies are reshaping healthcare and industry. The discussions on AI-driven diagnostics, regulatory frameworks, and translational research highlighted the importance of interdisciplinary collaboration in addressing real-world challenges. It left me pondering how we, as students, can contribute to bridging the gap between innovative ideas and their practical implementation.

SANTHOSHI NAMBI N 22BBT045

Attending the Bio-Industry Conclave 2024 opened my eyes to the immense potential of biotechnology in revolutionizing global health and sustainability. The session on "From Lab to Market" particularly struck a chord, making me reflect on the complexities of commercializing scientific breakthroughs. I left the event inspired to think beyond traditional academic boundaries and consider how innovation can be translated into impactful solutions for society.

TANUJA K T 22BBT061

This conclave redefined my perspective on the symbiotic relationship between academia and industry. While sessions like "Innovation-Driven Biodiscovery" showcased the power of collaborative research, they also underscored the need for systemic changes to foster such partnerships. As a student, I'm now more motivated than ever to explore career paths that merge science, technology, and entrepreneurship.

VINU MADAVAN P S 22BBT066

The Bio-Industry Conclave 2024 wasn't just an event; it was a call to action. Listening to experts discuss molecular diagnostics, genomics, and biosimilar landscapes made me realize the critical role of precision medicine in shaping personalized healthcare. However, it also raised important ethical questions about accessibility and equity-issues that will define the true success of these advancements.

SARANYADEVI S 22BBT068

What stood out at the Bio-Industry Conclave 2024 was its focus on actionable insights rather than theoretical concepts. Hearing from pioneers like Dr. Arumugam Muruganandam and Dr. Maneesh Paul pushed me to think critically about the scalability of lab-based discoveries. The event left me questioning: Are we doing enough to ensure that scientific progress benefits everyone, not just a privileged few?

AARUSHI PRADEEP 21BBT001

The conclave ignited a spark within me to reimagine the possibilities of biotechnology in solving some of humanity's greatest challenges. From decoding regulatory hurdles to exploring AI-enabled devices, every session emphasized the need for holistic thinking. Yet, it also provoked deeper questions: How do we align profit-driven motives with the greater good? And what role does ethics play in this equation?

KARTHIKRAJA S 21BBT014

The Bio-Industry Conclave 2024 was a thought-provoking journey into the intersection of biology, technology, and business. One key takeaway was the recurring theme of compliance and regulation-how even the most groundbreaking innovations must navigate complex legal frameworks. This made me reflect on the balance between fostering creativity and ensuring safety in biotech advancements.

6 Student's Scribbles

6.1 Biowar Starts Here

6.2 The Threat of Biological Weapons

Biological weapons, or bioweapons, have long been a hidden but formidable threat to humanity. Unlike conventional weapons that cause immediate destruction, bioweapons work silently, spreading deadly diseases through bacteria, viruses, or toxins. They are unpredictable and difficult to control, making them one of the most dangerous tools of warfare and terrorism. The fear of an outbreak, the inability to detect them easily, and their potential to cause large-scale devastation have led to international efforts to prevent their use.

6.2.1 History of Bioweapons

The history of bioweapons stretches back centuries. In ancient times, armies would poison water supplies with decaying animal carcasses, hoping to weaken their enemies with disease. During the Middle Ages, besieging forces would hurl plague-infected bodies over castle walls to spread infection among their enemies. In more recent history, countries have developed and experimented with bioweapons on a large scale. One of the most infamous examples was Japan's **Unit 731** during World War II, where prisoners were subjected to

horrifying experiments involving deadly pathogens. The Cold War further escalated the development of bioweapons, with the **United States** and the **Soviet Union** stockpiling biological agents despite growing international opposition.

6.2.2 How Bioweapons Work

Bioweapons operate by infecting large populations with deadly diseases. Some of the most feared biological agents include **anthrax**, which can cause fatal respiratory failure, and **smallpox**, a disease that once wiped out millions before its eradication. **Botulinum toxin**, one of the most potent natural poisons, can paralyze and kill within hours. **The plague**, responsible for the Black Death, can be manipulated to spread rapidly, causing mass casualties. These agents can be released into the air, contaminated water, or even spread through infected individuals, making containment a massive challenge. Unlike bombs or bullets, bioweapons do not stop killing once deployedâĂŤthey can spread and mutate, making them even deadlier.

6.2.3 The Rise of Bioterrorism

The rise of **bioterrorism** has intensified concerns over the use of bioweapons. Unlike nation-states that may fear international repercussions, terrorist organizations have little restraint in using biological agents to cause destruction. The **2001 anthrax attacks** in the United States, where spores were mailed to government offices and media outlets, highlighted how even small-scale bioterrorism could incite mass panic and disrupt societies. Given the rapid advancement of genetic engineering, it is now easier than ever for individuals or groups with scientific knowledge to develop dangerous biological agents in small laboratories, increasing the threat of their use.

6.2.4 Defending Against Bioweapons

Defending against bioweapons is challenging due to their unpredictable nature. Many biological agents take time to show symptoms, making early detection difficult. By the time authorities recognize an outbreak, it may already be too late to contain it. Medical countermeasures such as **vaccines and antibiotics** exist for some threats, but many deadly pathogens still lack effective treatments. Ensuring that biological research is not misused

is another major challenge, as scientific advancements can be repurposed for dangerous means.

6.2.5 The Biological Weapons Convention (BWC) and Global Security

To counter the threat of bioweapons, the **Biological Weapons Convention (BWC)** was established in 1972, banning the production and stockpiling of such weapons. However, enforcing these regulations remains difficult, as verification mechanisms are weak. While many countries claim to follow these restrictions, secret programs may still exist. Stronger international cooperation, enhanced surveillance systems, and rapid response strategies are essential to preventing bioweapon attacks.

Bioweapons remain a serious and evolving threat. The rapid progress of biotechnology brings both benefits and risks, making it more critical than ever to regulate and monitor biological research. While treaties and monitoring systems provide some protection, constant vigilance is necessary to prevent future bioweapon attacks and safeguard global health.

– Cybernetic Scribe X-46

Read More : Carlson, C. J., Kracalik, I. T., Ross, N., Alexander, K. A., Hugh-Jones, M. E., Fegan, M., ... & Blackburn, J. K. (2019). The global distribution of Bacillus anthracis and associated anthrax risk to humans, livestock and wildlife. Nature microbiology, 4(8), 1337-1343. `https://www.nature.com/articles/s41564-019-0435-4`

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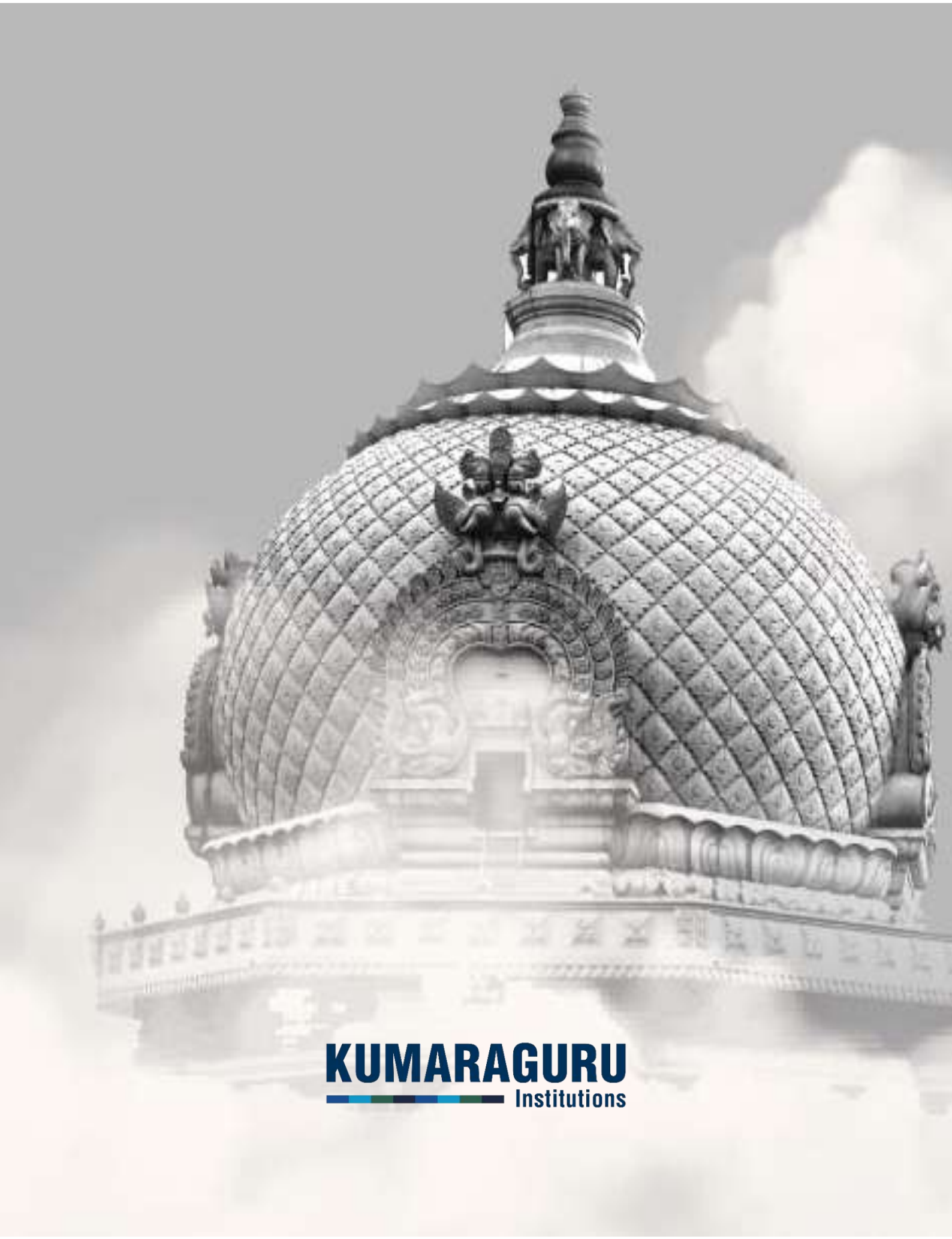
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