

JANUARY- JUNE, 2024



DEPARTMENT OF BIOTECHNOLOGY
UNIVERSITY COLLEGE OF ENGINEERING
BIT CAMPUS, ANNA UNIVERSITY
TIRUCHIRAPPALLI - 620 024

BIT- BIOTALKS

DEPARTMENT NEWSLETTER

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01

VISION AND MISSION



THE INSTITUTION

VISION

To transform students into competent professional and responsible citizens by focusing on assimilation, analysis, synthesis and dissemination of knowledge to meet the societal needs.

MISSION

- ✿ Impart quality education to meet the needs of the profession and society.
- ✿ Attract and develop talented and committed human resource and provide an environment conducive to innovation and research.
- ✿ Facilitate effective interactions among faculty, students, premier educational Institutions, R&D laboratories, industries, alumni and other stack-holders.
- ✿ Practice and promote high standards of professional ethics, transparency and accountability and team spirit and entrepreneurial skills.

THE DEPARTMENT

VISION

To develop technical manpower in biotechnology to enhance the knowledge and skill to solve problems and challenges countenanced by the industry and academia for betterment of the society.

MISSION

- ⦿ To provide an academic environment that emphasizes critical thinking.
- ⦿ To encourage intellectual depth and creativity of the students.
- ⦿ To establish institute industry interaction through projects and training.
- ⦿ To promote the students to adhere professional ethics and safety consideration for the societal benefits.
- ⦿ To motivate the students to pursue higher studies in various spheres of technology.

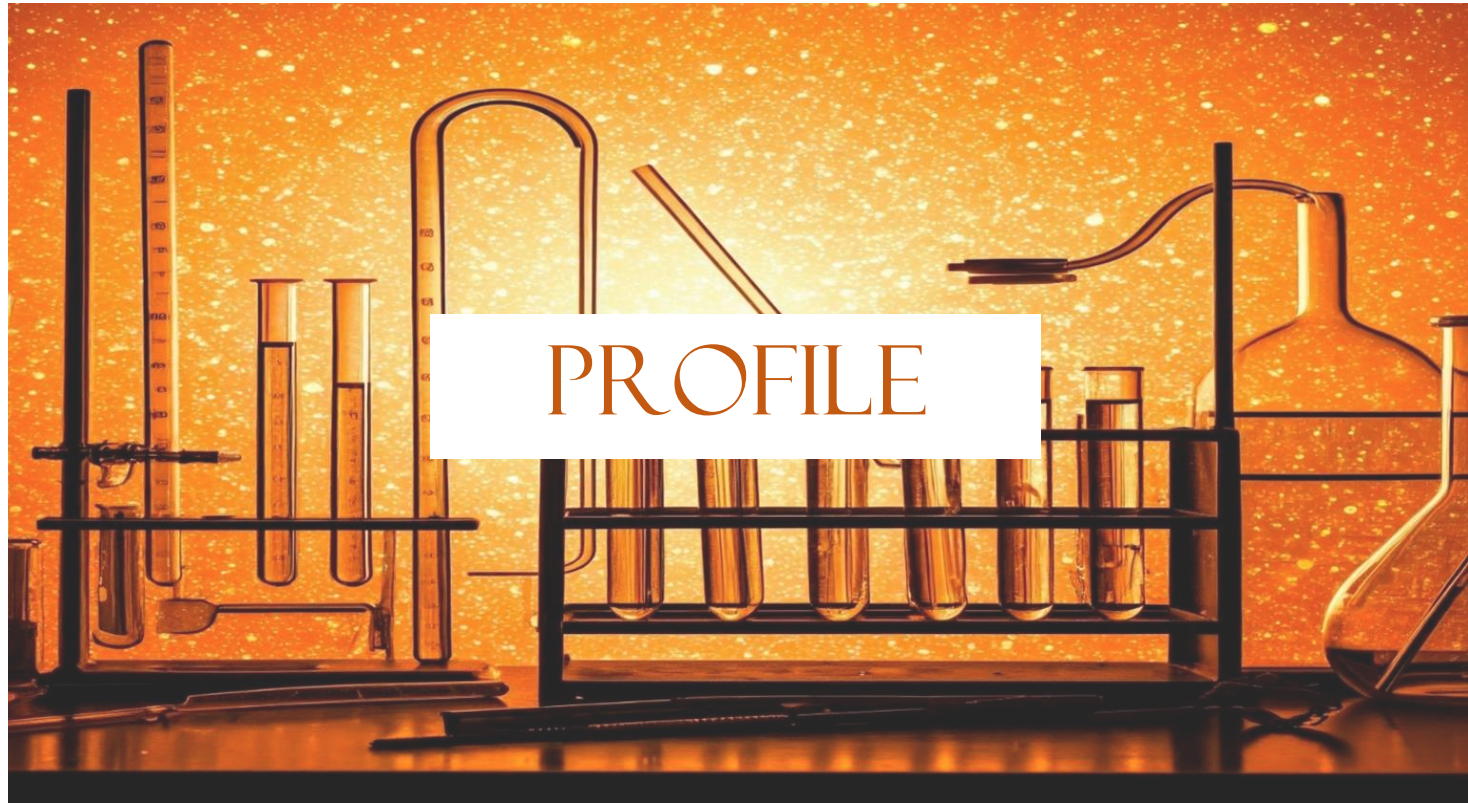
PROGRAM OUTCOMES

Upon completion of the Bachelor in Biotechnology program, graduates will be able to:

- ✿ Apply knowledge of mathematics, science and engineering to biotechnological problems. Generate hypothesis, design and conduct experiments, interpret and analyse data, and report results.
- ✿ Design systems and process to find solutions for biotechnological problems to meet the needs of society.
- ✿ Employ research skills to investigate, design, conduct experiments and interpret the data to arrive valid conclusions.
- ✿ Use of biological concepts and appropriate techniques to find solution for the problems. Recognize the moral and social values to appreciate the need for ethical standards and professional codes of conduct.
- ✿ Appreciate the contribution of biotechnology to maintain the quality of environment and sustainability of life.
- ✿ Demonstrate adherence to accepted standards of professional ethics and responsibilities. Work independently and function effectively as a member or leader of a team.

PROGRAM EDUCATIONAL OUTCOMES

- 🌀 To enable the students to formulate, analyse and solve issues in various areas of biotechnology.
- 🌀 To apply the acquired knowledge to cater the needs of the academia, research and industry.
- 🌀 To develop ethical quality among the students for providing constructive service to the society.
- 🌀 To emphasize the value of continuous learning to face the challenges in professional career.



PROFILE

The Department of Biotechnology was started in the year 1999 with a vision to develop technical manpower in the wide area of biotechnology. It is a DST-FIST Sponsored Department and is offering B. Tech., M. Tech., and Ph. D. degree programmes in Biotechnology. The department attracts meritorious students for both B.Tech. and M.Tech. Degree programmes. The UG and PG programmes are designed to train the students to become masters who can identify a problem and to solve it through the biotechnological approaches.

Towards this goal, training is given in the wide areas of biotechnology such as tissue culture (animal and plant), fermentation technology and enzyme engineering for chemicals, antibiotics and other product development; utilization of agricultural and forest residues and industrial wastes; genetic engineering, immunology, molecular biology and nanobiotechnology. The department has many laboratories equipped with advanced instruments like Quantitative Real Time PCR, Multimode Detector, G-PCRs, HPLC, GC, UV-Visible spectrophotometers, Fermenter, CO₂ and Multi - gas incubators, Gel Documentation system, Fluorescent Microscopes, DNA Sequencer, Electroporator, Plant Growth Chamber, Rotary Evaporator, Bio-safety Cabinet (Class II) and facility for plant tissue culture.

Currently, our department is strengthened by 12 well qualified faculty members from diverse fields and specializations. Several research projects funded by various national funding agencies like DBT, DST, DRDO, ICMR, and UGC have been carried out by our faculty members. Our department had been funded by AICTE for the establishment of Computational Biology and Bioinformatics laboratory under MODROB scheme.

02

PUBLICATIONS

ACADEMIC
ACTIVITIES

Anandaraj B, A Scientific Version of Understanding ‘Why Did the Chickens Cross the Road?’ — A Guided Journey Through *Bacillus spp.* Towards Sustainable Agriculture, Circular Economy, and Biofortification, Environmental Research, 2024.

Sudhakar Gandhi PS, Ravi Shankar K, Yeswanth R, A Review of Connecting Bioinformatic Techniques to Rheumatoid Arthritis and Its Associated Comorbidities, Bentham Science, 2024.

Brindha R, Jennet Debora, Antibiotic Resistance Genes: An Emerging Genetic Pollutant of LFL, Water, Air, and Soil Pollution, May 2024.

Ravi Shankar K, Next-Generation Hybrid Technologies for the Treatment of Pharmaceutical Industry Effluents, Journal of Environmental Management, 2024.

Ravi Shankar K, Characterisation of Prepared Cefixime and Metronidazole with Chitosan Nanoparticle for Pharmaceutical Application, Oxidation Communications, 2024.

Ravi Shankar K, Tamil Elakkiya V, Environmentally Sustainable Production of Cellulose-Based Super Absorbing Hydrogel from *Bacillus velezensis*, IJRAR, 2024.





STAFF MEMBERS

Dr. Dr. Anandaraj B participated the Faculty Development Program (FDP) on “Host-Pathogen Interaction (Immunology)” conducted by NPTEL-AICTE from January to April 2024.

Dr. Anandaraj B participated the online training program on “Product Development of Polymeric Materials in Engineering and Biomedical Applications” conducted by CIPET in January 2024.

Sudhakar Gandhi P S delivered a guest lecture on “Cloning Strategies for Controlled Protein Expression” at Bharathiar University, Coimbatore in February 2024.

Dr. Ravi Shankar K completed the course on “Water Quality Management Practices” offered by NPTEL from January to April 2024.

Dr. Ravi Shankar K completed the "Eight Modules" course of the National Initiative for Technical Teachers Training conducted by AICTE in February 2024.

Dr. Tamil Elakkiya V served as a keynote speaker at the

“International Conference on Biomedical Virtualization, Prosthetics & Robotic Science (ICBVPR'24)” in 2024.

STUDENTS

Aadhithiya A A (810021214001) **B. Tech. (IV Year)** completed the courses on ‘Medical Biomaterials’ and ‘Bioengineering: An Interface with Biology and Medicine’ offered by NPTEL from January to March 2024. He also completed the courses on ‘Algae’ offered by Coursera on 16th February 2024, ‘Introduction to Seaweeds’ offered by Coursera on 3rd February 2024 and ‘Genomic Data Science’ offered by Coursera on 1st March 2024.

Abdul Haleeq H (810021214002), **B. Tech., (IV year)** attended a conference on Sustainable Trends in Energy and Environmental Resources (STEER-2024) At SSN College of Engineering in March 2024.

Abdul Haleeq H (810021214002), **B. Tech., (IV year)** participated the in-silico fragment-based approaches to design/screen novel chemotypes against validated drug targets workshop at biocogniz on 23rd March 2024.

Abdul Haleeq H (810021214002), **Prasanna Devi B** (810021214021) & **Shruthi V A** (810021214032), **B. Tech., (IV year)** Third Position on PAPER PITCH at SSN College of Engineering on 25th & 26th March 2024.

Abdul Haleeq H (810021214002), **Prasanna Devi B** (810021214021) & **Shruthi V A** (810021214032), **B. Tech., (IV year)** Second Position on POSTER PLAZOO at SSN College of Engineering on 25th & 26th March - 2024.

Anusuya K (810021214005), **B. Tech., (IV year)** completed a course on ‘Food and health’ offered by Coursera in Jan 2024 and ‘Medical software’ offered by Coursera in May 2024.

Anusuya K (810021214005), **B. Tech., (IV year)** attended a conference on Vivekananda College of engineering Thiruchengode in Feb 2024.

Abdul Haleeq H (810021214002) **Arun Kumar K** (810021214006), **Sridevi J** (810021214033), **B. Tech., (IV year)** achieved the second place in Schrodinger hackathon organised by DAKSH, Sastra University in March 2024 and participated the Schrodinger workshop organized by DAKSH Sastra University on 8th March 2024.

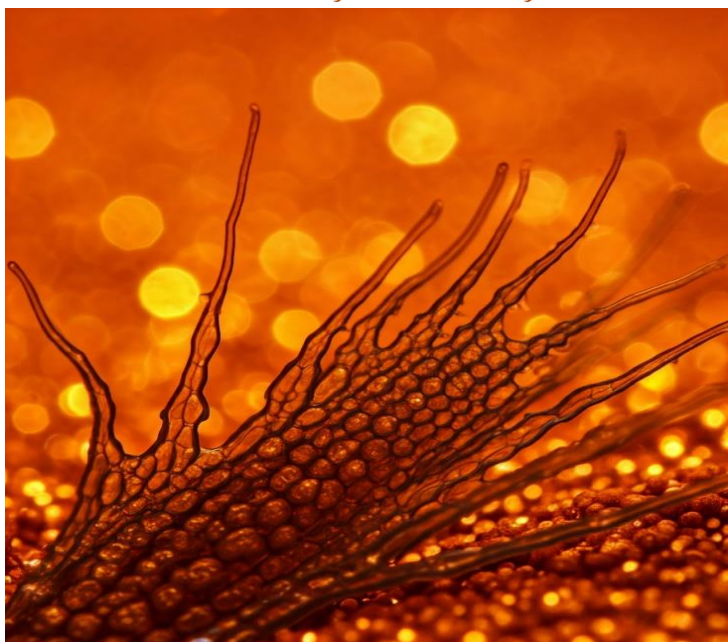
Bhavadharani S (810021214008) **B.Tech., (IV Year)** completed National Service Scheme State Level Workshop on Employability soft skill Training for youth at University College of Engineering-BIT Campus, Anna University, Trichy from 18th March 2024 to 19th March 2024.

Devadharshini S (810021214012), **B. Tech., (IV year)** attended a conference on National level technical symposium on future advancements and strategies towards sustainable society at (CSIR-CECRI, Karaikudi) in March- 2024.

Lingesh S M (810021214018), **B. Tech., (IV year)** participated the 3rd Subhash Mukhopadhyay Symposium on Epigenetic inheritance, Embryogenesis, Stem cell and Germ cell biology at Indian Institute of Science, Bangalore on 13th - 15th Jan- 2024.

Prasanna Devi B (810021214021), **B. Tech., (IV year)** attended a conference on Sustainable Trends in Energy and Environmental Resources (STEER-2024) at SSN College of Engineering in March 2024.

PriyaDharshini V (810021214023), **B. Tech., (IV year)** Participated the Paper presentation at Vivekananda College of engineering, Thiruchengode in February 2024.



Saayaa N (810021214027), **B. Tech., (IV year)** participated the Next Generation Sequencing Training – CIF training workshop at ICMR-National Institute of Research for Tribal Health in July 2024.

Shreya S R (810021214031), **B. Tech., (IV Year)** completed an NPTEL course on “Classics in neuroscience”.

Shruthi V A (810021214032), **B. Tech., (IV year)** completed conference on Sustainable Trends in Energy and Environmental Resources (STEER-2024) At SSN College of engineering in March 2024.

Subanu K R (810021214035), **Srilekha R V** (810021214034) **B. Tech., (III year)** participated the conference on Recent trends in Environment, Energy and Sustainability at Vivekananda college of engineering for women in February 2024.

Yeswanth R (810021213041), **B. Tech., (IV year)** participated the 3rd Subhash Mukhopadhyay Symposium on Epigenetic inheritance, Embryogenesis, Stem cell and Germ cell biology at Indian Institute of Science, Bangalore on 13th - 15th Jan- 2024.

Viswa A (810022214033), **B.Tech., (III year)** attended webinar in Unlocking Life's Secrets: Ethology, Viruses, and Bio-printed Solutions



organized by IIT Madras Biotech Club in 2024.

Sivashri K (810022214031), **B.Tech., (III year)** attended a journey through the Protein Data Bank with a focus on PDBe resources" Webinar organized by ISCB-SC RSG-India in 2024.

Sivashri K (810022214031), **B.Tech., (III year)** attended the Unlocking Life's Secrets: Ethology, Viruses, and Bio-printed Solutions organized by IIT Madras Biotech Club in 2024.

Sivashri K (810022214031), **B.Tech., (III year)** attended the Internship program hands on training at TNSRO Tamil Nadu. national scientific research organization Hands on training in Phytochemicals studies and tissue culture techniques in 2024.

Hazel Andrea J (810022214046), **B.Tech., (III year)** attended the National Symposium on "Functional Genomics and Systems Biology" conducted by PSG College of Technology in March 2024.

Hazel Andrea J (810022214046), **B.Tech., (III year)** attended a webinar on "Harnessing Traditional Knowledge and Emerging Food

Processing Technologies for Viksit Bharat" conducted by NIFTEM-T in March 2024.

Hazel Andrea J (810022214046), **B.Tech., (III year)** Completed an online course "Algae Specialisation" Offered by University of California San Diego Through Coursera in May 2024.

Abishek S (810023214002), **B.Tech., (II year)** Completed the Biotech Club Summer School at IIT Madras June-July 2024.

Dhanush J U (810023214028), **B.Tech., (II year)** completed the Biotech Club Summer School at IIT Madras June-July 2024.

Florence Hinrika B (810023214027), **B.Tech., (II year)** completed the Biotech Club Summer School at IIT Madras June-July 2024.

Sowmiya S (810023214029), **B.Tech., (II year)** completed the Biotech Club Summer School at IIT Madras June-July 2024.

Shilviya R (810023214042), **B.Tech., (II year)** completed the Biotech Club Summer School at IIT Madras June-July 2024.

Abarna P S (810023214046), **B.Tech., (II year)** completed the Biotech Club Summer School at IIT Madras on June-July 2024.

Venkateshwari S (810023214008), **B.Tech., (II year)** completed the Young Professional Course organised by TCS ION Career Edge on June-July 2024.

Sanchitha R S (810023214031), **B.Tech., (II year)** attended a webinar on 'Harnessing Traditional Knowledge and Emerging Food Processing Technologies for Viksit Bharat', NIFTEM-T on March 2024.

Janani S (810023214051), **B.Tech., (II year)** attended a webinar on 'Harnessing Traditional Knowledge and Emerging Food Processing Technologies for Viksit Bharat', NIFTEM-T on March 2024.



INTERNSHIP TRAINING

The details of B. Tech. (IV Year) students who completed their interns:

NAME	TITLE	INSTITUTE/INDUSTRY	DATE
AADHITHYA A A	Microalgae & Plant Tissue Culture	Central University of Tamil Nadu	01/07/2024-09/08/2024
ABDUL HALEEQ H	Microbial Nano-technology	Bharathidasan University	01/07/2024-30/07/2024
AKSHAYA S	Molecular Biology	VJ Biotech	25/06/2024-25/07/2024
AKSHAYA V	Bioinformatics	Bharathidasan University	24/06/2024-24/07/2024
ANUSUYA K	Molecular Biology	Yaazh Xenomics	24/06/2024-24/07/2024
ARUN KUMAR K	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024-24/07/2024
BARATH M	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024-24/07/2024
BHAVADHARANI S	Surface modification of Titanium for medical applications	CSIR - CECRI	24/06/2024-23/07/2024
CHELLA CHITRA M	Biotechnology Techniques	TRI Biotech	24/06/2024-24/07/2024
CHITRA C	Nano-technology	NRICMI- Mahatma Gandhi University	24/06/2024-24/07/2024
DEVADHARSHINI S	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024-24/07/2024
DHARSHINI G	Phytopharmaceuticals	TRI Biotech	02/07/2024-02/08/2024

HARINI S	Plant Tissue Culture	Bharathidasan University	24/06/2024- 24/07/2024
INSUVAI S	Environmental Biotechnology	Central University of Tamil Nadu	24/06/2024- 24/07/2024
JAYSREE SHAKTHI	Bioinformatics	Bharathidasan University	24/06/2024- 24/07/2024
JOVISHA N	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024- 24/07/2024
LINGESH S M	Immunology	The Tamil Nadu Dr. M. G. R. Medical University	01/07/2024- 31/07/2024
LOKESH S	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024- 24/07/2024
MARAN S	Bio-nano-technology	CSIR - CSIO Madras complex	24/06/2024- 23/07/2024
PRASANNA DEVI B	Bio-nano-technology	CSIR - CSIO Madras complex	24/06/2024- 23/07/2024
PREETHI V	Mycology and Molecular Biology	PAR Life Science and Research Pvt. Ltd	25/06/2024- 25/07/2024
PRIYADHARSHINI V	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024- 24/07/2024
RAJANANDHINI S V	Microalgae & Plant Tissue Culture	Central University of Tamil Nadu	01/07/2024- 09/08/2024
REETEHA E	Mycology and Molecular Biology	PAR Life Science and Research Pvt. Ltd	25/06/2024- 25/07/2024
SAAYAA N	Zoonotic diseases	ICMR - NIRTH	22/06/2024- 31/07/2024
SABARINATHAN S	Bio – nano-technology	CSIR - CSIO Madras complex	24/06/2024- 23/07/2024
SANKAR SRIDHAR A	Mycology and Molecular Biology	PAR Life Science and Research Pvt. Ltd	25/06/2024- 25/07/2024
SANTHOSH KUMARI S	Molecular Biology	Yaazh Xenomics	24/06/2024- 24/07/2024
SHREYA S R	Biopolymers	NIT	26/06/2024- 30/07/2024
SHRUTHI V A	Immunology	ICMR-NIRT	24/06/2024- 24/07/2024
SRIDEVI J	Bioinformatics	Scinicorn Labs Private Limited	24/06/2024- 24/07/2024
SRILEKHA R V	Molecular Biology	VJ Biotech	25/06/2024- 25/07/2024
SUBANU K R	Vector Biology	Central University of Tamil Nadu	24/06/2024- 24/07/2024
SUBASHINI M	Phyto- pharmaceuticals	TRI Biotech	02/07/2024- 02/08/2024

THANGA SMIRTHI D	Molecular Biology	VJ Biotech	25/06/2024- 25/07/2024
UMAMAGESWARI E	Biotechnology Techniques	TRI Biotech	24/06/2024- 24/07/2024
VARSHINI S	Nanotechnology	NRICMI- Mahatma Gandhi University	24/06/2024- 24/07/2024
VENNI D	Bio- nanotechnology	CSIR - CSIO Madras complex	24/06/2024- 23/07/2024
YESWANTH R	Zoonotic diseases	ICMR - NIRTH	22/06/2024- 31/07/2024
INDHUMATHI J R	Microbiology	Stabicon Life Sciences Pvt Ltd	24/06/2024- 23/07/2024

The details of B. Tech. (III Year) students who completed their interns:

NAME	TITLE	INSTITUTE/INDUSTRY	DATE
ANUSIYA M	Preparation of starch - based biodegradable insulating materials.	National institute of technology	07/08/2024 – 27/08/2024
ASWIN DHANDAPANI M	Phyco-Remediation and carbohydrates extraction for Microalgae Cultivation	National institute of technology	26/07/2024 – 27/08/2024
ANANTHI A	Molecular biology techniques	TRI-Biotech	12/08/2024- 27/08/2024
ARULVANI S	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	07/08/2024 - 27/08/2024
ARULMURUGAN I	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	25/07/2024 - 22/08/2024
ABIRAMI R	Food additives	Scinicorn Labs Private Limited	12/08/2024- 26/08/2024
ABITHA D	Computational biology	Scinicorn Labs Private Limited	12/08/2024- 26/08/2024
BARVIKA DEVI B	Water and Solid waste processing	Bharathidasan University	07/08/2024 – 24/08/2024
EZHILARASI V	Biotechnology techniques	TRI-Biotech	12/08/2024- 26/08/2024
ENBATHAMIZHAN D	Molecular system and Techniques	Bharathidasan University	12/08/2024- 27/08/2024

HARINI S	Biotechnology techniques	Trichy research institute of biotechnology (TRI-BIOTECH)	12/08/2024 – 27/08/2024
HAZEL ANDREA J	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	25/07/2024 – 22/08/2024
INDIRA PRIYADHARSHINI T	Food additives	Scinicorn Labs Private Limited	12/08/2024 – 26/08/2024
JAYADEVI S	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	07/08/2024 – 27/08/2024
JAYASRI B	Biotechnology techniques	TRI-Biotech	12/08/2024- 27/08/2024
JAGADEESH KUMAR J	Molecular system and Techniques	Bharathidasan University	12/08/2024 – 27/08/2024
JAGADEESWAR P Y	Phyco-Remediation and carbohydrates extraction for Microalgae Cultivation	National Institute of Technology	26/07/2024- 27/08/2024
KAVIYANAYAKI Y	Food additives	Scinicorn Labs Private Limited	12/08/2024 – 26/08/2024
KANNIKA K	Biotechnology techniques	TRI-Biotech	12/08/2024 – 27/08/2024
KEERTHANA A	Molecular biology techniques	TRI-Biotech	12/08/2024 – 27/08/2024
LAKSHMI NARAYANI S U	Molecular system and Techniques	Bharathidasan University	12/08/2024 – 27/08/2024
MADHUBALA A	Microalgal Techniques	Bharathidasan University	25/07/2024 – 22/08/2024
MUTHUMALAR B	Molecular system and Techniques	Bharathidasan University	12/08/2024 - 27/08/2024
MAHFEERA MUBEEN N	Water and Solid waste processing	Bharathidasan University	07/08/2024 – 24/08/2024
MAGESWARI P	Biotechnology techniques	TRI-Biotech	12/08/2024- 27/08/2024
MALA K	Biotechnology Techniques	TRI-Biotech	12/08/2024 – 27/08/2024
MOHAMED SHAHUL HAMID S	Microalgal Techniques	Bharathidasan University, Trichy	13/08/24- 27/08/24
NIVETHA B	Microalgal Techniques	Bharathidasan University	07/08/2024 – 27/08/2024
PONNI A	Biotechnology Techniques	TRI-Biotech	12/08/2024- 27/08/2024
PRIYADHARSHINI	Biotechnology techniques	TRI-Biotech	12/08/2024 – 27/08/2024

PREETHI N	Biotechnology techniques	TRI-Biotech	12/08/2024 – 27/08/2024
RISHAA HARINI E	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	03/08/2024 – 27/08/2024
RITTHIGA V	Computational biology	Scinicorn Labs Private Limited	12/08/2024 - 26/08/2024
RAKHUL GANDHI T	Adsorption of Microplastic from water using Mosambi peels	National Institute of Technology	07/08/2024- 27/08/2024
RETHIK N	Quality control and Production of dairy products	Milky mist Dairy Food Pvt Ltd	12/08/2024- 28/08/2024
SANJAY V	Molecular system and Techniques	Bharathidasan University	12/08/2024 - 27/08/2024
SANTHOSH A	Phyco-Remediation and carbohydrates extraction for Microalgae Cultivation	National Institute of Technology	26/07/2024 – 27/08/2024
SUBASRI S	Measurement of water vapour permeability and antimicrobial properties of edible films	National institute of technology	07/08/2024- 27/08/2024
SUVETHA M	Molecular system and Techniques	TRI-Biotech	12/08/2024 – 27/08/2024
SIVASHRI K	phytochemical tissue culture technique	Tamil Nadu Scientific Research Organization	07/08/2024- 27/08/2024
SUKIRTHA ANNALAKSHMI R	AI side of AMR	CISAI-INNSPARK Solutions Pvt Ltd	03/08/2024- 27/08/2024
SHANMUGAPRIYA	Biotechnology Techniques	TRI-Biotech	12/08/2024 – 27/08/2024
SWATHI B	Food additives	Scinicorn labs Pvt Ltd	12/08/2024 – 27/08/2024
TAMILARASAN K	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	13/08/2024 - 27/08/2024
TANUSIYA K	Microalgal Culturing, Handling and Instrumentation Techniques	Bharathidasan University	03/08/2024 – 27/08/2024
VISWA A	Molecular system and Techniques	Bharathidasan University	12/08/2024 – 27/08/2024
YAAZHPUGAZHI K	Biotechnology techniques	TRI- Biotech	12/08/2024 – 27/08/2024

03

SCIENCE EVERYWHERE



EMERGING TECHNOLOGIES IN BIOTECHNOLOGY SINGLE-CELL RNA SEQUENCING (SCRNA- SEQ)

- Reeteha E, B. Tech., IV Year

INTRODUCTION:

Recent advancements in biotechnology have given rise to powerful tools that are transforming how we study biology at the most fundamental level. One such technology is single-cell RNA sequencing (scRNA- seq), which allows scientists to explore gene expression in individual cells, offering insights into cellular diversity that traditional methods, which average the gene activity of many cells, cannot provide. By revealing the molecular fingerprints of individual cells, scRNA- seq has become instrumental in research areas ranging from cancer biology to neuroscience. This article delves into the basics of scRNA- seq, its applications, and its impact on biotechnology, while also examining some of the challenges and ethical concerns involved.

THE BASICS OF SCRNA- SEQ:

scRNA- seq involves isolating and analysing RNA from individual cells to understand what genes are active in each one. This method has revolutionized how we think about cells because, previously, most techniques could only tell us about the average gene expression across a large number of cells, masking important details about cell-to-cell variation. The process generally follows a few key steps.

First, cells are isolated from the tissue sample, often using techniques like microfluidics or fluorescence-activated cell sorting (FACS). Once the cells are separated, RNA is extracted from each one, converted into complementary DNA (cDNA), and amplified to create a sequencing



library. The library is then sequenced, and the resulting data is analysed using computational tools to determine which genes are active in each cell. This gives researchers a detailed view of the gene expression patterns across all the cells in a sample, allowing them to identify different cell types or states.

APPLICATIONS IN BIOTECHNOLOGY:

1. CANCER RESEARCH:

Cancer is a complex disease, characterized by significant variability among the cells that make up a tumor. Some of these cells might be resistant to treatment, while others might be more aggressive. scRNA-seq provides an unprecedented look at this heterogeneity, helping researchers identify and characterize the different cell populations within a tumor. This deeper understanding can lead to more effective therapies, as treatments can be tailored to target the specific cell types responsible for tumor growth and resistance to drugs.

2. DEVELOPMENTAL BIOLOGY:

scRNA-seq has been particularly valuable in developmental biology, where researchers use it to track how individual cells change as an embryo develops. By profiling cells at different stages of differentiation, scientists can map out the genetic programs that guide cells to become specialized tissues like muscle, nerve, or blood cells. These insights are crucial for regenerative medicine, where the goal is often to guide stem cells to develop into specific cell types for therapy.

3. IMMUNE SYSTEM STUDIES:

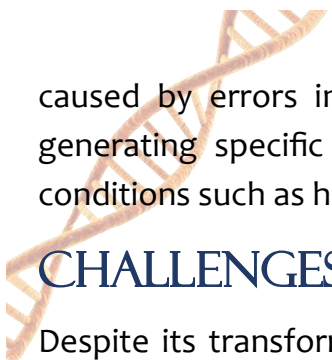
The immune system relies on a diverse array of cells that each have distinct functions in defending the body against pathogens. scRNA-seq enables researchers to examine these immune cells in detail, revealing how they respond to infections, vaccines, or immune-related diseases like autoimmune disorders. This is especially important for developing new immunotherapies, as it helps identify the exact cell types and molecular mechanisms involved in the immune response.

4. NEUROSCIENCE:

In the brain, where many different types of neurons and supporting cells work together, scRNA-seq has allowed scientists to distinguish these cell types based on their unique gene expression profiles. This is critical for understanding the complexities of brain function and for investigating diseases like Alzheimer's, Parkinson's, and schizophrenia, where changes in specific cell populations play key roles in disease progression.

5. STEM CELL RESEARCH:

In stem cell biology, scRNA-seq is used to track how undifferentiated stem cells evolve into specialized cells. This is crucial for developing stem cell therapies and for understanding diseases



caused by errors in cell differentiation. It also holds promise for improving protocols for generating specific cell types in the lab, which could lead to advances in treatments for conditions such as heart disease, diabetes, and neurodegenerative diseases.

CHALLENGES AND LIMITATIONS:

Despite its transformative potential, scRNA-seq is not without its challenges. One significant issue is the technical difficulty of isolating single cells without damaging them, especially when dealing with delicate or rare cell types. Furthermore, the amount of RNA in a single cell is typically quite small, which can lead to technical noise in the data and make it harder to capture a complete picture of gene expression. Another major hurdle is the complexity of analysing the massive amounts of data generated by scRNA-seq experiments.

Unlike bulk RNA sequencing, where data is aggregated, single-cell data must be interpreted for each individual cell, which requires sophisticated computational tools. Bioinformatics plays a central role in this analysis, but the sheer scale of the data can be overwhelming, especially for large-scale studies involving thousands of cells.

The cost of performing scRNA-seq is also higher compared to traditional bulk RNA sequencing, particularly when large numbers of cells need to be analysed. As the technology continues to improve and become more accessible, these costs are expected to decrease, but they remain a limiting factor for many labs.

ETHICAL CONSIDERATIONS:

The advent of scRNA-seq has opened up exciting new possibilities for studying human biology, but it has also raised important ethical questions. For instance, when applied to human tissue samples, there are privacy concerns around the use of single-cell data, as individual genetic information can potentially be linked back to specific donors. Safeguarding patient data and ensuring informed consent for its use in research are key considerations for projects using this technology.

In developmental biology and stem cell research, the ability to track and manipulate cells at very early stages of development raises ethical questions about the limits of scientific intervention. As researchers push the boundaries of what we can do with stem cells, including creating tissues or even whole organs, ethical guidelines must evolve to address these new challenges.

FUTURE DIRECTIONS:

scRNA-seq is still a relatively young technology, and it continues to evolve rapidly. Improvements in cell isolation techniques, RNA capture, and sequencing technologies are making it possible to process larger numbers of cells more quickly and accurately.

In the near future, we can expect to see more widespread use of scRNA-seq in clinical settings, where it could be used to profile patient samples for precision medicine applications, such as identifying the best therapies for individual patients based on the gene expression patterns of their cells.

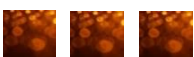
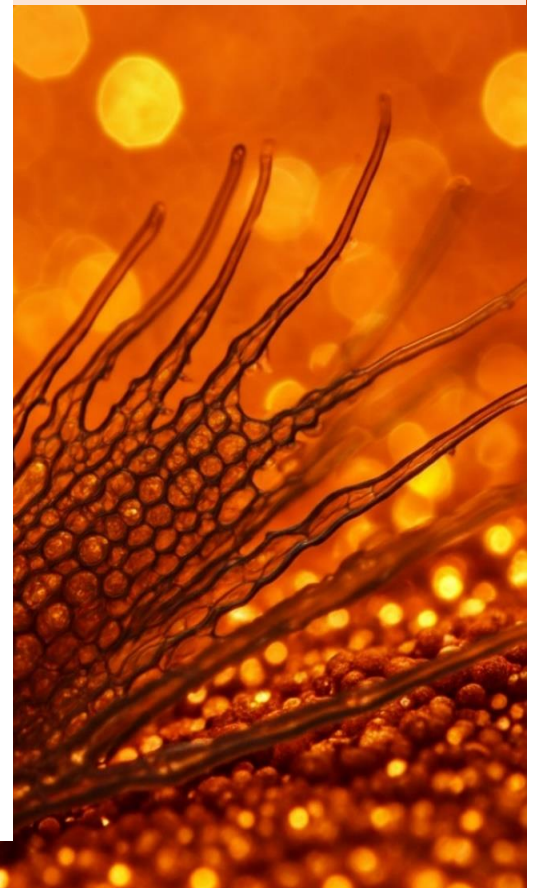


CONCLUSION:

Single-cell RNA sequencing is a game-changing technology that is reshaping our understanding of biology. By enabling researchers to study the gene expression of individual cells, scRNA-seq is revealing the hidden complexity of tissues and organs, uncovering new insights into development, disease, and therapy. While there are still technical and ethical challenges to address, the potential of this technology to drive breakthroughs in medicine and biotechnology is immense. As scRNA-seq continues to mature, it will undoubtedly become an even more powerful tool for exploring the frontiers of biology and advancing human health.

REFERENCES

1. Svensson, V., Vento-Tormo, R., & Teichmann, S. A. (2018). Exponential scaling of single-cell RNA-seq in the past decade. *Nature Protocols*, 13(4), 599-604.
2. Zheng, G. X., Terry, J. M., Belgrader, P., Ryvkin, P., Bent, Z. W., et al. (2017). Massively parallel digital transcriptional profiling of single cells. *Nature Communications*, 8(1), 14049.
3. Regev, A., Teichmann, S. A., Lander, E. S., Amit, I., Benoist, C., et al. (2017). Science forum: The human cell atlas. *eLife*, 6, e27041.
4. Tang, F., Barbacioru, C., Wang, Y., Nordman, E., Lee, C., et al. (2009). mRNA-Seq whole-transcriptome analysis of a single cell. *Nature Methods*, 6(5), 377-382.



04

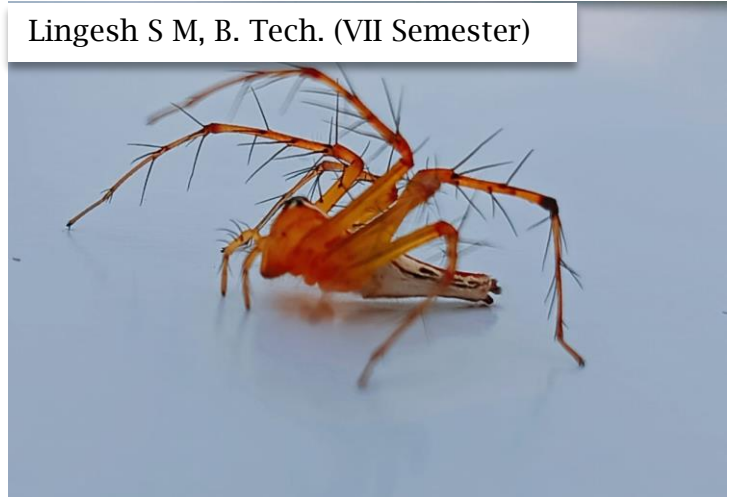
ART GALLERY



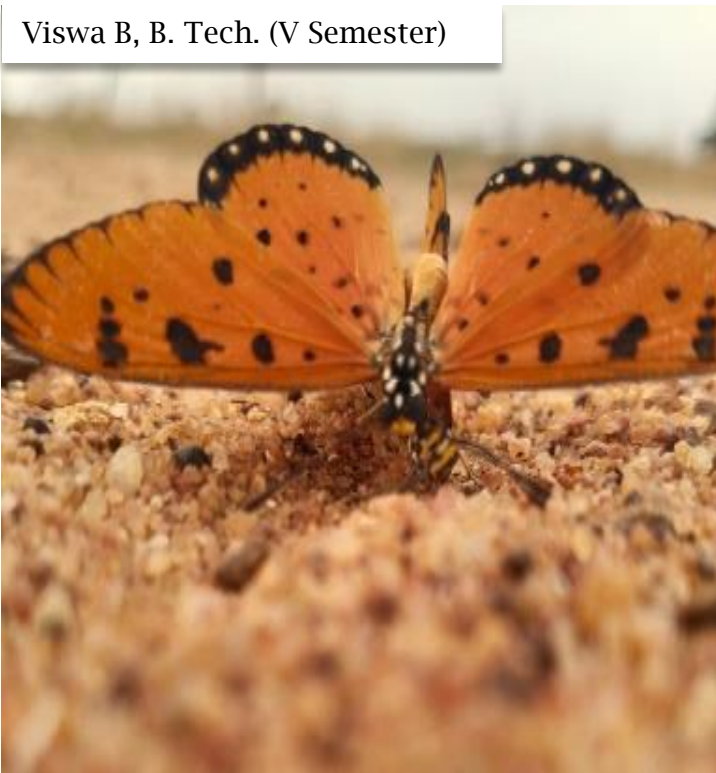
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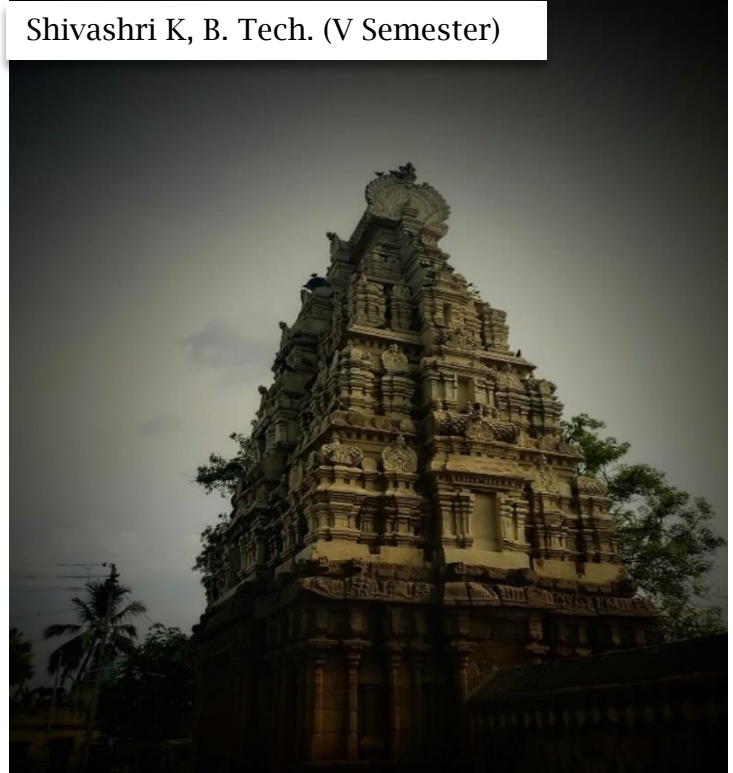
Lingesh S M, B. Tech. (VII Semester)



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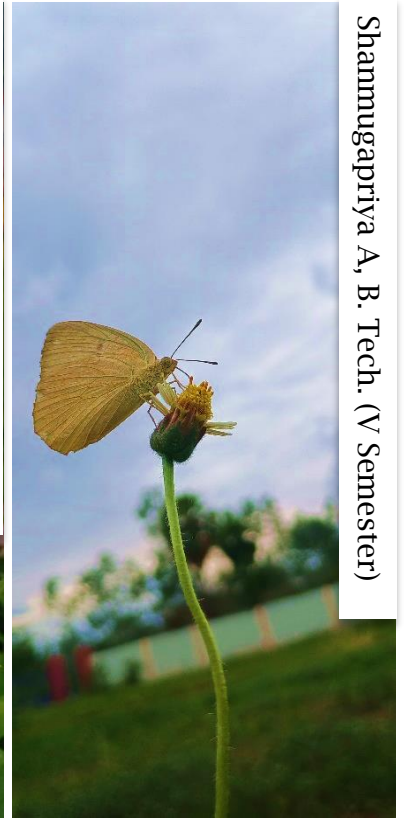
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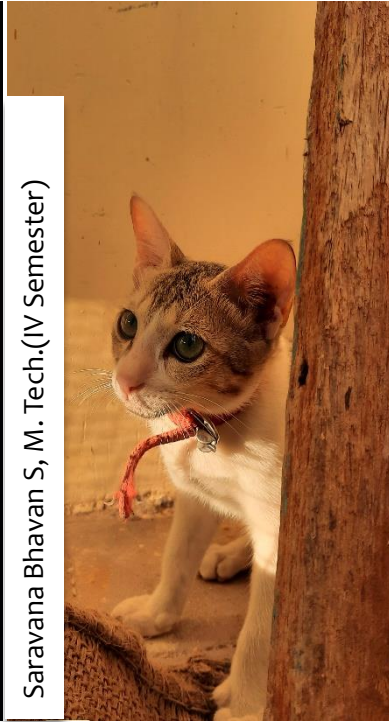
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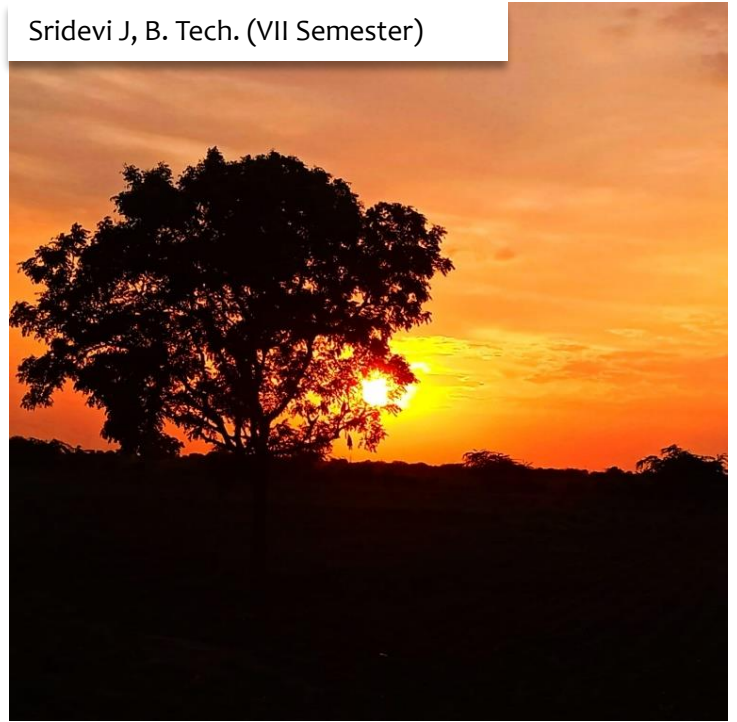
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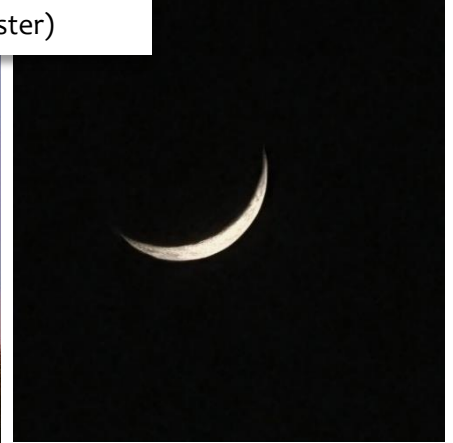
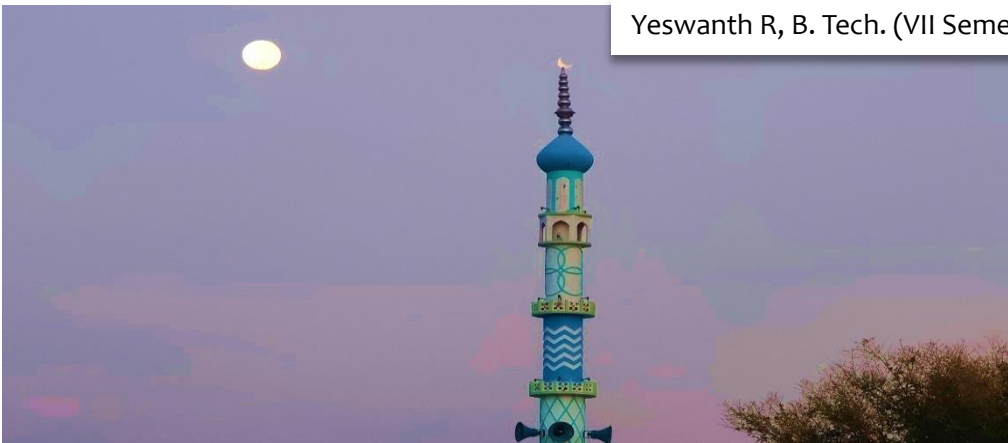
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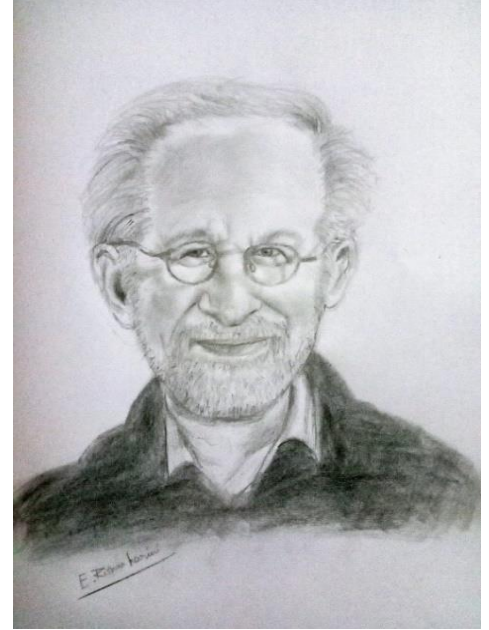


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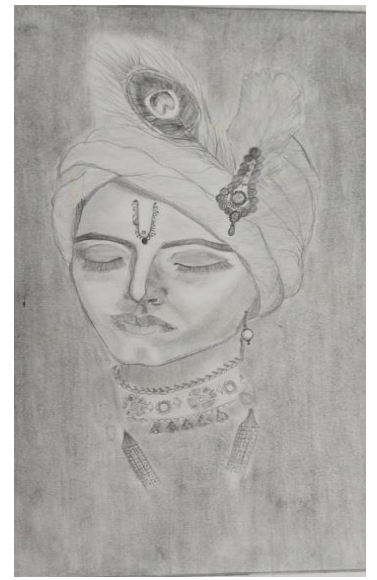
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(VII Semester)



05

POETRY



MONOTONOUS CYCLE

If not for the cycle we endure,
What dream world would we dream?
What paths would we have walked,
If we knew strange things,
Evading the shadows of our choice?

Could we fight against it,
Find peace in a world endangering itself,
Or would we surrender,
To the life we wake up to,
Striving for nothing but a broken hope?

What would we steal back,
From the time we've lost?
Fighting demons inside,
Carrying weights all this time-
How did we not drown?

If we lived fully,
And stopped holding our breath,
Would we reach the shore before sunset?

The soul within questions,
"What is the meaning behind today,
Where I lay down,
Breathing in, breathing out,
Exhausted but simple?
What's the reason behind this breath,
This very breath I take right now?
I don't know...

- Ms. Roja Malar S, B. Tech., I year

பக்தி

பக்தி என்பது கடவுள் பற்றி அல்ல
உங்கள் அனுபவங்கள் அழகாக
ஆகுமளவிற்கு
உங்கள் உணர்வுகளை இனிப்பாக
மாற்றுவது தான் பக்தி.

கருணை

கம்பீரம் என்பது உடல் அல்ல செயல்
கண்ணியம் என்பது பேச்சல்ல நடத்தை
கருணை என்பது உதவியல்ல அன்பு
கடவுள் இருப்பது வெளியே இல்லை உள்ளே!

-Mrs. M. Rajeshwari, Clerical Assistant

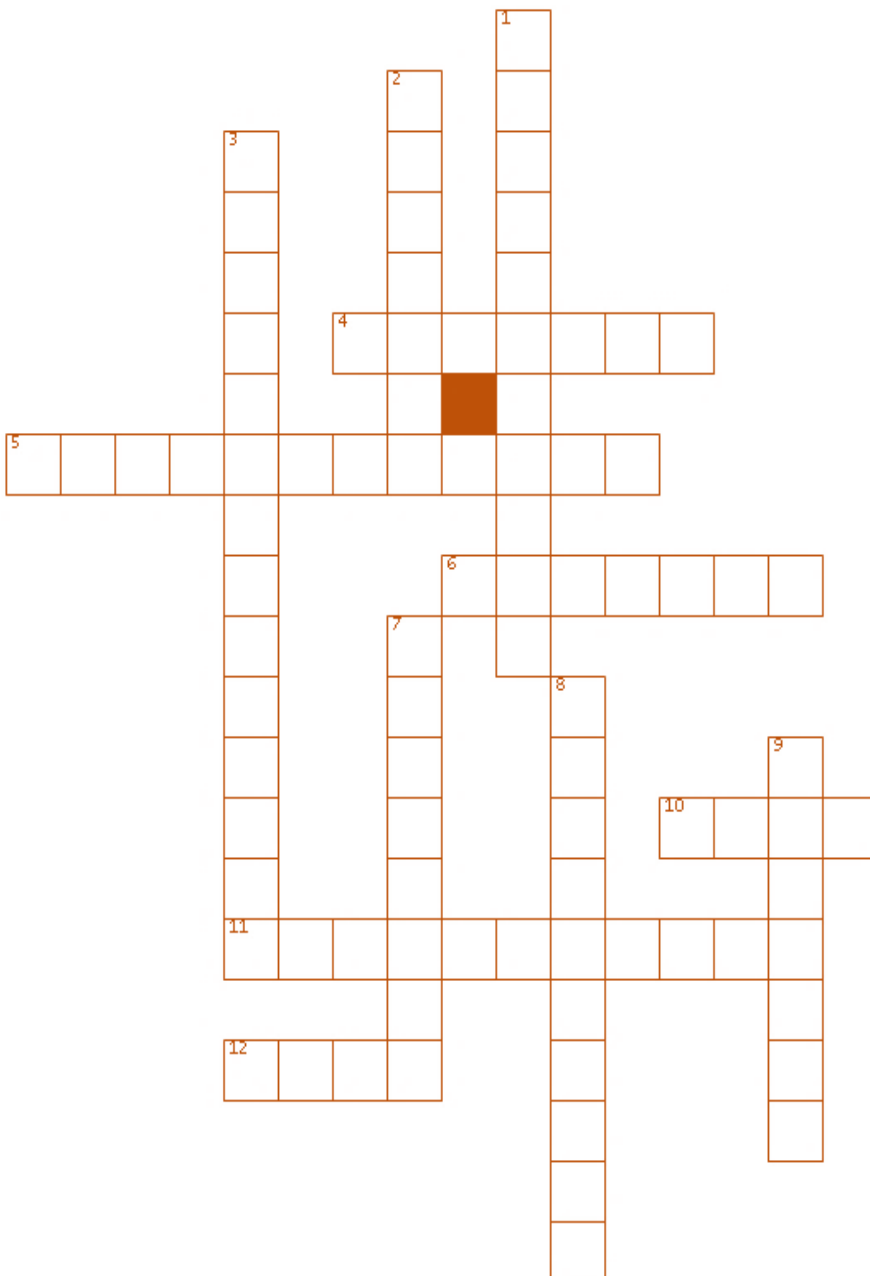
இயற்கை அன்னை

இறைவன் தந்த வரம் அவள்
கவிஞர்களின் காதலி
எழில் கொஞ்சும் மடந்தை
விழிகளுக்கு விருந்தளிப்பவள்
தனிமையை நீக்குபவள்
புரிந்து கொள்ள முடியாத புதிர்
இசைகளின் இளவரசி
சினத்தால் சீற்றம் தருபவள்
பல கோடி உயிர்களின் அன்னை
அவளே இயற்கை அன்னை!

-Ms. Anusuya K, B. Tech., IV Year

06

BIO- CROSSWORD



ACROSS

4. Compare two sequences in a visual approach.
5. The fumigation of operation theatres, wards, sick rooms and laboratories.
6. Primary database for nucleotide sequences
10. Culture method, maintaining stock cultures.
11. A type of mobile DNA can transfer DNA from one site of the bacterial chromosome to another site or to a plasmid.
12. Unit of heredity.

DOWN

1. Free-living microorganisms that live on dead or decaying organic matter.
2. Important source of nutrition for bacteria to grow in media.
3. Waterman- Smith Algorithm.
7. Type of mutation in which the base substitution produces a terminal codon.
8. Beta -lactam antibiotic, used most widely against Clostridium spp. and Staphylococcus spp. Infections.
9. Immunity is conferred by transfer of serum or lymphocytes from a specifically immunized individual.

Answers:

Across : 4. Dotplot 5. Formaldehyde 6. Genbank 10. Stab 11. Transposons 12. Gene

Down : 1. Saprophytes 2. Peptones 3. Local Alignment 7. Nonsense 8. Vancomycin 9. Passive

07

OPPORTUNITIES



1. Exciting winter internship program 2024 at NISER's School of Biological Sciences

Short-term Internship: 1st December- 31st December 2024

Long-term Internship: January 2025- June 2025

2. Applications are invited from candidates who are interested in doing short term projects at the Centre for Stem Cell Research (a unit of inStem, Bengaluru) a collaboration between DBT and CMC, Vellore.

Duration: a minimum of 4 months to a maximum of 6 months

3. Highly motivated individuals with good academic credentials and a keen desire to pursue research in frontier areas of Infectious Disease on tuberculosis are invited to apply for an Internship/Dissertation at ICMR - National Institute for Research in Tuberculosis, Chennai.
4. ICMR- NIE, Chennai offers internship in Public Health & Epidemiology, Biostatistics, Public Health Data Management, Social & Behavioural Sciences, Health System Research.
5. RGCB, Trivandrum offers short term and long-term training programs in various disciplines of biotechnology for MSc, B. Tech., M. Phil. and M. Tech. students. Applicants can submit online through official website.

With Thanks...

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