



V.S.B. ENGINEERING COLLEGE

(An Autonomous Institution)

(Anna University Recognized Research Institute)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

NBA Accredited Courses, Accredited by NAAC



9001:2015

CERTIFIED

INSTITUTION

TNEA CODE

2622

DEPARTMENT OF BIOTECHNOLOGY

NEWS LETTER 2025 - 2026 (ODD SEMESTER)



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V.S.B. ENGINEERING COLLEGE, KARUR. (AN AUTONOMOUS INSTITUTION)



V.S.B. Educational Trust was founded in the year 2000 by Mr. V.S. Balsamy, the founder and correspondent of the V.S.B. Group of Institutions, with an interest in promoting, managing and administrating educational institutions with high academic standards, discipline and to take up and help other allied activities in the field of education. Under the Trust, V.S.B. Engineering College was established in the year 2002 and V.S.B College of Engineering Technical Campus in the year 2012.



CHAIRMAN'S WORDS

Our Institution, a temple of learning and a hallmark of discipline, treads towards the zenith of glory by preferring the education of global standards in the best quality and variety, and substantiates to be a benchmark among all the colleges in India.

– Mr.V.S.Balsamy, B.Sc., L.L.B.,

VISION AND MISSION OF INSTITUTE

Vision

We endeavour to impart futuristic technical education of the highest quality to the student community and to inculcate discipline in them to face the world with self-confidence and thus we prepare them for life as responsible citizens to uphold human values and to be of service at large. We strive to bring of the Institution as an Institution of academic excellence of International standard

Mission

We transform persons into personalities by the state-of the art infrastructure, time consciousness, quick response and the best academic practices through assessment and advice

VISION AND MISSION OF DEPARTMENT

Vision

To accomplish eminence in academic excellence through quality teaching with latest technology and innovations in the areas of agriculture, environment, health care and entrepreneurship for the welfare of the society.

Mission

- Equip the students to adapt to changing global and local needs through well designed curriculum and syllabus.
- Groom students to uphold professional ethics and develop leadership qualities.
- Disseminate a blending of knowledge acquisition and its application in real-life situations to the students.
- Train students on issues related to social welfare.

HoD WORDS

**Dr.M.Aniskumar, M.Tech.,Ph.D.,
Head & Professor**



It gives me immense pleasure to share that our Department of Biotechnology has been accredited by the National Board of Accreditation (NBA), a recognition that reflects our commitment to academic excellence, quality teaching, and continuous improvement. Our institution is also accredited by the National Assessment and Accreditation Council (NAAC) and recognized by the University Grants Commission (UGC), further strengthening the credibility of our academic ecosystem.

The Department is well-supported with state-of-the-art infrastructural facilities and modern laboratory equipment to cater to the needs of innovative learning and research. We are proud to mention that our Institute has also been recognized as a Centre for Research by Anna University, Chennai, enabling scholars to pursue advanced research in various domains of biotechnology.

Our laboratories are equipped with sophisticated instruments such as Heating Mantle, Magnetic Stirrer with Hot Plate, pH Meter, Soxhlet Apparatus, Reflex Condenser, Calorimeter, UV Spectrophotometer, Ice Flaking Machine, Autoclave, Incubator, Thermogravimetric Analyzer, Laminar Air Flow, Cooling Centrifuge, Microscopes, ELISA Reader, PCR, SDS-PAGE Unit, Sonicator, Chemical Fume Hood, Bioinformatics Systems, and many other essential tools and glassware. These facilities play a vital role in ensuring the successful execution of student projects, research work, and practical training.

With highly qualified faculty members, strong academic processes, and a vibrant student community, the Department of Biotechnology continues to strive towards excellence in education, research, and innovation. We remain committed to nurturing young minds and preparing them to become competent biotechnologists who contribute meaningfully to society.

Key Team Members

6



Dr. Aniskumar M., M.Tech., PhD.
Professor and Head
Expertise In:
Bioprocess Engineering
Chemical Process Calculations



Mrs. K. Keerthiga.,
M.Tech., (PhD).,
AHoD/AP
Expertise In:
Microbiology, Enzymology
Downstream Processing



Dr. Ananthakrishnan., M.Tech., PhD
Associate Professor
Expertise In:
Biochemical Thermodynamics, Fluid
Flow & Heat Transfer



Dr. D. Karthiga., M.Tech., PhD
Associate Professor
Expertise In:
NanoTechnology, Analytical
Techniques



**Dr.Palaniselvam.,PhD.,Post-Doc
AP
Expertise In:
Industrial Biotechnology**



**Dr.Sundaramahalingam
M.Tech.,PhD,
AP
Expertise In:
Bioinformatics**



**Dr.Prathap Kumar,M.Tech.,PhD
AP
Expertise In:
Tissue Engineering
Immunology**



**Dr.Niharika Singh.,
M.Phil.,PhD.,Post-Doc
AP
Expertise In:
Food Technology, Biochemistry**



**Ms.Sumaya Fathima.,M.Tech
AP
Expertise In:
Cell Biology, Bioprocess
Engineering**



**Ms.Shanmuga Priya.,M.Tech
AP
Expertise In:
Molecular Biology
Genetic Engineering**

STUDENT ACHIEVEMENT

Inter-state National level Conference



1st Prize on poster Presentation

**Ruth Bodo D,
Renitha Yavanika Sree V,
Sandhiya M**

**Selvam College of Technology,
Namakkal**



1st Prize on paper Presentation

**Sujitha S,
Mani Dharani S, Madhushree N**

Scinicorn labs private limited



2nd Prize on poster Presentation

**Deepthika K,
Madhushree N**

Scinicorn labs private limited



1st Prize on poster Presentation
**Deepana M,
Keerthiga G**
**Muthayammal Engineering College ,
Rasipuram**

S.No.	Period	Name of the course	Number of the student Completed	Area of Training
1	July-October	Human Physiology	5	IIT-Varanasi
2	July-October	Genetic Engineering: Theory and Application	10	IIT-Guwahati
3	July-October	Genome editing and engineering	8	IIT-Guwahati
4	July-October	Industrial Biotechnology	1	IIT-kharagpur
5	July-October	Mass Transfer operations	1	IIT-Guwahati
6	July-October	Artificial Intelligence in Drug Discovery and Development	1	IIT-Varanasi
7	July-October	Neurobiology	1	IIT-Kanpur
8	July-October	Dairy and Food Process and Product Technology	3	IIT- Kharagpur
9	July-October	Cell and Molecular Biology	5	IIT-Guwahati
10	July-October	Basic Environmental Engineering and Pollution	2	IIT- Roorkee
11	July-October	Experimental biotechnology	1	IIT-Guwahati
12	July-October	Introduction to proteogenomics	2	IIT-Bombay
13	July-October	Statistics for Biomedical Engineers	1	IIT-Madras



NPTEL ELITE Achievers



Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
MAGESHWARA P T
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **75 %**

Online Assignments	22.19/25	Proctored Exam	52.75/75
--------------------	----------	----------------	----------

Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology,
IIT Guwahati

Indian Institute of Technology Guwahati

swayam

Roll No: NPTEL25BT52S1060200108 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
ROSHNI K
for successfully completing the course
Cell and Molecular Biology

with a consolidated score of **81 %**

Online Assignments	22.78/25	Proctored Exam	57.75/75
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Total number of candidates certified in this course: **1001**

Jul-Oct 2025
(12 week course)

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology,
IIT Guwahati

Indian Institute of Technology Guwahati

swayam

Roll No: NPTEL25BT57S1155600188 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
BABY S
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **70 %**

Online Assignments	24.38/25	Proctored Exam	45.75/75
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Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology,
IIT Guwahati

Indian Institute of Technology Guwahati

swayam

Roll No: NPTEL25BT52S960200901 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
PRADIPIA
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **66 %**

Online Assignments	20.94/25	Proctored Exam	45/75
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Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology,
IIT Guwahati

Indian Institute of Technology Guwahati

swayam

Roll No: NPTEL25BT52S1060200099 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
KIRUTHIKADEVI
for successfully completing the course
Basic Environmental Engineering and Pollution Abatement

with a consolidated score of **69 %**

Online Assignments	24.06/25	Proctored Exam	45/75
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Total number of candidates certified in this course: **1576**

Jul-Oct 2025
(12 week course)

Prof. Kaushik Ghosh,
Professor (Chemistry),
Coordinator CEC

Prof. Ranjana Pathania,
Professor (BSSE),
Coordinator (NPTEL)

Indian Institute of Technology Roorkee

swayam

Roll No: NPTEL25CH58S370502358 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
PERIYASAMY D
for successfully completing the course
Experimental Biotechnology

with a consolidated score of **70 %**

Online Assignments	23.88/25	Proctored Exam	46.5/75
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Total number of candidates certified in this course: **971**

Jul-Oct 2025
(12 week course)

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology,
IIT Guwahati

Indian Institute of Technology Guwahati

swayam

Roll No: NPTEL25BT54S960200003 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
MANIDHARANI S
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **73 %**

Online Assignments	24.38/25	Proctored Exam	48.75/75
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Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Guwahati

Skill India
where vision - goes into vision

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology, IIT Guwahati

swayam

Roll No: NPTEL25BT5251060201003 To verify the certificate

No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
SUJITHA S
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **69 %**

Online Assignments	24.06/25	Proctored Exam	45/75
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Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Guwahati

Skill India
where vision - goes into vision

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology, IIT Guwahati

swayam

Roll No: NPTEL25BT5251060200723 To verify the certificate

No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
AMIT DAS
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **71 %**

Online Assignments	24.60/25	Proctored Exam	46.5/75
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Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Guwahati

Skill India
where vision - goes into vision

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology, IIT Guwahati

swayam

Roll No: NPTEL25BT5251060200002 To verify the certificate

No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
RAJA MERLIN E
for successfully completing the course
Genome Editing and Engineering

with a consolidated score of **64 %**

Online Assignments	24.69/25	Proctored Exam	39/75
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Total number of candidates certified in this course: **565**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Guwahati

Skill India
where vision - goes into vision

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology, IIT Guwahati

swayam

Roll No: NPTEL25BT5251060200004 To verify the certificate

No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
D RUTH BODO
for successfully completing the course
Cell and Molecular Biology

with a consolidated score of **63 %**

Online Assignments	22.94/25	Proctored Exam	39.75/75
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Total number of candidates certified in this course: **1001**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Guwahati

Skill India
where vision - goes into vision

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology, IIT Guwahati

swayam

Roll No: NPTEL25BT5751260200008 To verify the certificate

No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
ABISHEK M
for successfully completing the course
Genetic Engineering: Theory and Application

with a consolidated score of **62 %**

Online Assignments	22.94/25	Proctored Exam	38.63/75
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Total number of candidates certified in this course: **643**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Guwahati

Skill India
where vision - goes into vision

Dr. Sali Kashyap
Coordinator, Centre for Educational Technology, IIT Guwahati

swayam

Roll No: NPTEL25BT5351060200006 To verify the certificate

No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
HARENI R
for successfully completing the course
Statistics for Biomedical Engineers

with a consolidated score of **60 %**

Online Assignments	24.69/25	Proctored Exam	35/75
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Total number of candidates certified in this course: **100**

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Madras

Skill India
where vision - goes into vision

Prof. Andrew Thangaraj
Dean, Centre for Outreach and Digital Education, IITM

M. Vignesh
NPTEL Coordinator, IIT Madras

swayam

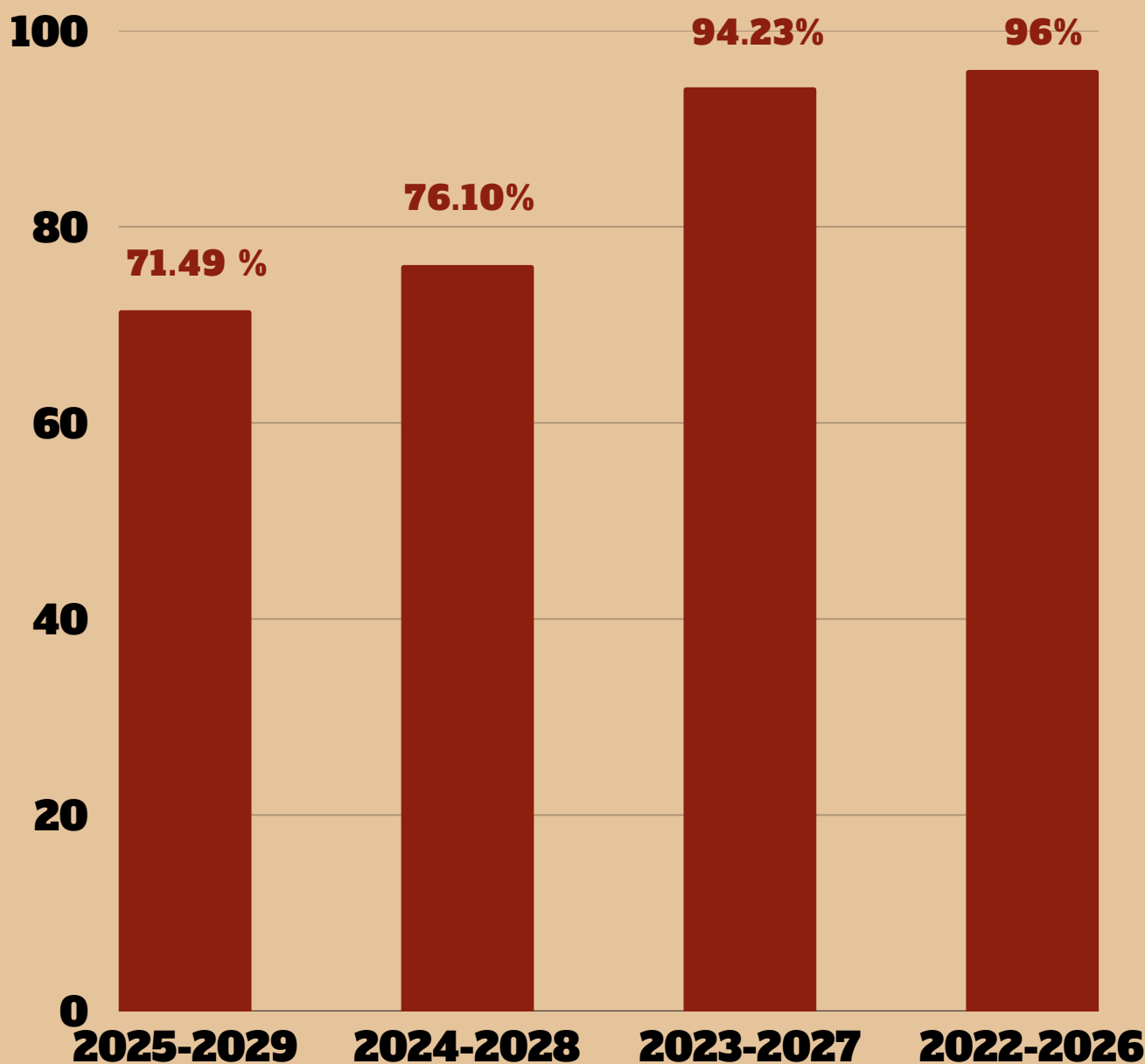
Roll No: NPTEL25BT485560200002 To verify the certificate

No. of credits recommended: 3 or 4

Result Analysis

**END SEMESTER
NOV-DEC
2025-2026**

**OVERALL
PERCENTAGE- 87.12%**



END SEMESTER TOPPERS - 2025-2026 [ODD SEMESTER]

BATCH 2022-2026

1	922522214041	PERIYASAMMY D	9.87	
2	922522214008	DHANASRI S	9.27	
3	922522214044	SAKTHI MAOESHWARI K	9.19	

BATCH 2023-2027

1	922523214036	MANI DHARANI S	9.36	
2	922523214035	MADHUSHREE N	9.3	
3	922523214050	SUGANTH.G	8.91	

END SEMESTER TOPPERS - 2025-2026 [ODD SEMESTER]

BATCH 2024-2028

1	922524214006	GAYATHRI. R. S	9.17	
2	922524214022	ROSHINI. K	9.00	
3	922524214014	MONICA SREE. V	8.8	

BATCH 2025-2029

1	922525214024	PRIYADHARSHINI D	9.19	
2	922525214023	POOVTHAS	9.10	
3	922525214016	MATHU SRI AJ	9.00	

FACULTY PUBLICATIONS



DR.M. ANISKUMAR

Medicinal Applications of Hibiscus sabdariffa Anthocyanins for Real time Monitoring

D. Karthiga*, M. Aniskumar, R. Deepika, K. Deepika
V.S.B Engineering College, Karur, India

ABSTRACT
Wound healing is a dynamic and regulated physiological process that requires an appropriate environment to promote tissue regeneration and prevent microbial infection. Plant-derived bio-actives have recently gained attention in hydrogel formulations due to their natural bioactive properties and antimicrobial properties. Among these, anthocyanins are of particular interest because of their potent antioxidant and anti-inflammatory activities, in addition to functioning as natural pH indicators that allow real-time monitoring of wound healing. This review highlights anthocyanins extracted from Hibiscus sabdariffa were incorporated into a biocompatible hydrogel matrix and assessed for physicochemical characteristics, stability, and biological activities under in-vitro conditions. Hydrogels are considered ideal candidates for wound healing applications due to their three-dimensional architecture, high water content, and similarity to the extracellular matrix, which together promote cell migration and tissue repair. Furthermore, wound sites typically exhibit pH variations, with regenerating tissues trending acidic and infected wounds more alkaline. This makes anthocyanin-based hydrogels multifunctional, as they not only support healing but also provide visible monitoring of wound status. Overall, the integration of Hibiscus sabdariffa-derived anthocyanins into polymeric hydrogels offers a promising, safe, and effective strategy for advanced wound care applications.

Keywords: Hibiscus sabdariffa, Anthocyanins, Hydrogels, Wound healing, Antioxidant activity, Anti-microbial activity, Real-time wound monitoring, Plant-derived bioactives, Controlled drug delivery.

INTRODUCTION

Wound healing is a complex and highly regulated physiological process, involving hemostasis, inflammation, proliferation, and remodeling, which collectively restore tissue integrity and function [1]. Despite advances in conventional wound care, chronic and infected wounds remain a significant healthcare challenge, necessitating the development of novel therapeutic strategies that not only promote tissue regeneration but also allow real-time monitoring of wound progression [2,3]. Plant-derived bio-actives have gained increasing attention in advanced wound care due to their intrinsic antioxidant, anti-inflammatory, and antimicrobial properties. Among these, anthocyanins from Hibiscus sabdariffa (rosehips) are particularly promising, owing to their potent bioactive and natural pH-sensitive chromatic properties that enable colorimetric sensing for wound monitoring [4]. Hibiscus sabdariffa, a

tropical plant native to the Sudan-West African region, has been traditionally employed in folk medicine for managing infections, liver disorders, and hypertension, reflecting its diverse therapeutic potential. Its cytolysates are rich in anthocyanins, flavonoids, and phenolic acids, which synergistically enhance antioxidant and anti-inflammatory effects, critical for accelerating wound repair [5,6]. Incorporation of Hibiscus sabdariffa-derived anthocyanins into hydrogel matrices combines the advantages of biocompatible, moisture-retentive scaffolds with the bioactivity of natural compounds, providing a multifunctional platform for wound care [7]. Moreover, anthocyanin-loaded hydrogels serve as smart dressings, where visible color changes reflect local pH variations, allowing non-invasive, real-time assessment of wound status and infection risk [8,9]. This integration of therapeutic and diagnostic functionality underscores the potential of Hibiscus sabdariffa anthocyanin-enchained hydrogels as anti-

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Biosynthesis of Zinc Oxide nanoparticles using Nymphaea arbor-orientis: Degradation of Struvite crystals in ureters

Mrs. Keerthiga K, Ms. Premanee Priyad, Ms. Siddhanta Anthony Raj

Mrs. Kaviya Manikandan & Dr. Anis Kumar Muni

Corresponding Author: Department of Biotechnology, VSB Engineering College, Karur, Tamil Nadu, India-639111

ABSTRACT

An efficient method for the eco-friendly biosynthesis of ZnO nanoparticles from struvite crystals, associated with urinary infections affecting the majority of the population (about 8-10%), is discussed. This study focuses on the inhibitory action of zinc oxide nanoparticles from *Nymphaea arbor-orientis* on gel-forming struvite crystals, as well as their antimicrobial activity against urinary infection-causing pathogens. Additionally, the antioxidant and anti-inflammatory activities are explored. The synthesized zinc oxide nanoparticles were characterized using UV-Vis spectroscopy, Fourier Transform Infrared Spectroscopy (FT-IR), X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), and Energy Dispersive X-ray (EDX). The synthesized particles show an inhibitory zone at a concentration of 100 µg/ml against bacteria like *Bacillus subtilis* (9 mm), *Escherichia coli* (7 mm), *Enterococcus faecalis* (6 mm), *Pseudomonas aeruginosa* (5 mm), and antifungal activity against *Candida albicans* (4 mm) and *Candida rugosa* (6 mm). It also shows antioxidant activity recorded as an IC50 value in the range of 36.40% using the DPPH assay. This indicates that the synthesized ZnO nanoparticles from *Nymphaea arbor-orientis* have antimicrobial, antioxidant, and anti-inflammatory activities.

Keywords: Nanotechnology, Zinc oxide nanoparticles, Antioxidant activity, DPPH assay, Struvite crystal, Kidney stone.

1. Introduction

Nanotechnology is a multidisciplinary field where the surface area and quantum mechanical effects become crucial in determining the properties of materials [41]. It involves manipulating matter within the dimensional range of 1 to 100 [1]. Nanotechnology branches are being developed that could impact the global market for minerals, non-fuel commodities, and agriculture [2]. Nanotechnology is a tool for molecular imaging to target molecules with quantum dots or artificial chromophores [3], distinguishing and accurately detecting cancer cells, as well as aiding in bone replacement [4]. It encompasses a broad spectrum of scientific fields, including surface science, organic chemistry, molecular biology, semiconductor physics,

UTILIZATION OF PUNICAGRAEUM PEEI WASTE AS AN ALTERNATIVE FOR THE PRODUCTION OF BIODEGRADABLE PAPER

Vinayachandran L¹, Dr. G. Prasad Kumar² and Dr. M. Anis Kumar³

¹Department of Biotechnology, V.S.B Engineering College, Karur, 639111

ABSTRACT

The rising demand for paper has accelerated deforestation, water consumption, and energy use, urging the need for eco-friendly alternatives. Agro-waste materials have emerged as promising substitutes for wood pulp in sustainable papermaking. Among these, *Punica granatum* (pomegranate) peel waste is rich in cellulose, lignin, and bioactive compounds, making it a suitable raw material for biodegradable paper. This review explores the valorization of pomegranate peel waste for paper production, emphasizing its chemical composition, biodegradability, and potential applications. The conversion of fruit peel residues into handmade paper not only addresses waste management issues but also supports circular economy practices and zero-waste initiatives. Compared to conventional paper, biodegradable paper derived from agro-waste is recyclable, compostable, and suitable for decorative, packaging, and craft industries. Challenges such as fiber quality variability, scalability, and processing costs remain, but advances in green technology and policy interventions offer solutions. The review concludes that integrating agro-waste valorization into papermaking can reduce environmental pressures, promote resource efficiency, and contribute to global sustainability goals.

Keywords: *Punica granatum* peel, agro-waste, biodegradable paper, cellulose fibers, sustainable papermaking.

Sustainable Biosorption Using Plant Roots: From Mechanistic Insights To Practical Applications

Keerthiga K*, Dr. Shanmugasubramanian S, Dr. M. Aniskumar

*Corresponding Author: Department of Biotechnology, V.S.B Engineering College, Karur, Tamil Nadu, India-639111

The increasing contamination of water bodies due to industrial effluents and chemical pollutants necessitates the development of sustainable and cost-effective remediation strategies. This study explores the potential of plant root bioisobers as a green and eco-friendly solution for the removal of pollutants from aqueous solutions. Various plant roots were investigated for their adsorption efficiency in sequestering contaminants such as heavy metals and organic dyes. Batch adsorption experiments were conducted to evaluate the effects of parameters like pH, contact time, adsorbent dosage, and initial pollutant concentration. The adsorption kinetics were analyzed using pseudo-first-order and pseudo-second-order models, while equilibrium data were fitted to Langmuir and Freundlich isotherms to understand the sorption mechanism. Results demonstrated that plant root bioisobers exhibit high adsorption capacities, rapid uptake rates, and favorable sorption characteristics, making them viable candidates for wastewater treatment. The study highlights the relevance of bioisobers as a low-cost and sustainable approach to environmental pollution control, contributing to the advancement of green technologies in water purification.

Keywords: Green remediation, Adsorption efficiency, Heavy metal removal, Langmuir isotherm, Pseudo-first-order kinetics

Introduction

The increasing contamination of freshwater resources due to industrial discharge, agricultural runoff, and urban effluents has emerged as a major global concern, posing serious threats to both aquatic ecosystems and public health. Conventional wastewater treatment methods such as chemical precipitation, ion exchange, membrane filtration, and activated carbon adsorption are commonly employed for pollutant removal. However, these technologies are often cost-

DEVELOPMENT OF A DUAL-PURPOSE ECO-FRIENDLY FILTRATION SYSTEM USING ZITIGUUM CUMIN AND MORINGA SEED FOR HOUSEHOLD AND TEXTILE WASTEWATER PURIFICATION

Keerthiga K*, Bharanika Annadurai, Deepana Manikaran, Dr. M. Aniskumar

*Corresponding Author: Department of Biotechnology, V.S.B Engineering College, Karur, Tamil Nadu, India-639111

ABSTRACT:

The demand for clean and safe drinking water is growing worldwide as pollution from industrial effluents, toxic metals, synthetic dyes, and microbial contamination continues to escalate. Conventional purification technologies, while reliable, often face limitations such as high cost, energy dependence, and restricted applicability in rural and low-resource regions. In response, recent advances have explored sustainable and low-cost alternatives that combine natural adsorbents, antimicrobial modifications, and hybrid purification systems. *Zitiguum cumin* bark has attracted particular attention as a bio-based material with notable adsorption capacity for heavy metals and textile dyes, presenting an eco-friendly solution for wastewater treatment. Complementary innovations, such as antimicrobial surface coatings using silver and nanostructured polymers, provide effective barriers against microbial regrowth during storage and distribution. Meanwhile, cartridge-based dual-purpose systems, which integrate both microbial and chemical purification functions, offer a practical, scalable approach for decentralized applications. Together, these strategies illustrate a shift toward holistic and resource-efficient purification methods. The review underscores the importance of bridging traditional bioisobers with modern nanotechnology and design innovations to deliver affordable, effective, and sustainable water treatment solutions. Future



MRS KEERTHIGA K



MRS KARTHIGA D

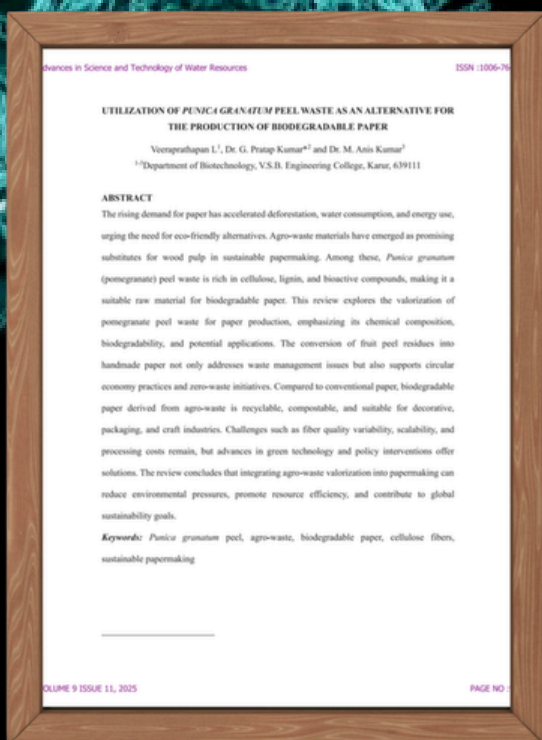




DR. PRATAP KUMAR



MS SHANMUGA PRIYA



DR. NIHARIKA SINGH





FACULTY NPTEL



Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
K KEERTHIGA
for successfully completing the course

Basic Environmental Engineering and Pollution Abatement

with a consolidated score of **67** %

Online Assignments	23.13/25	Proctored Exam	43.5/75
--------------------	----------	----------------	---------

Total number of candidates certified in this course: **1576**

Prof. Kashish Ghosh,
Professor (Chemistry),
Coordinator CEC

Jul-Oct 2025
(12 week course)

Prof. Rajana Pathania,
Professor (BSSE),
Coordinator (NPTEL)

Indian Institute of Technology Roorkee

swayam

Roll No: NPTEL25CH58S360200354 To verify the certificate No. of credits recommended: 3 or 4

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
DR NIHARIKA SINGH
for successfully completing the course

Dairy and Food Process and Products Technology

with a consolidated score of **63** %

Online Assignments	24.06/25	Proctored Exam	39/75
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Total number of candidates certified in this course: **1688**

Prof. Haimanti Banerji,
Coordinator, NPTEL
IIT Kharagpur

Jul-Oct 2025
(12 week course)

Indian Institute of Technology Kharagpur

swayam

Roll No: NPTEL25AG22S1060200098 To verify the certificate No. of credits recommended: 3 or 4



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(Funded by the MoE, Govt. of India)

This certificate is awarded to
DR M A SUNDARAMAHALINGAM
for successfully completing the course

Making Learning Engaging through Interactive Games

with a consolidated score of **88** %

Online Assignments	23.58/25	Proctored Exam	64.5/75
--------------------	----------	----------------	---------

Total number of candidates certified in this course: **396**

Prof. Andrew Thangaraj,
Chair,
Centre for Outreach and Digital Education, IITM

Jul-Aug 2025
(4 week course)

Prof. Vignesh Murthuvijayan,
NPTEL Coordinator
IIT Madras

Indian Institute of Technology Madras

swayam

Roll No: NPTEL25GE67S339000042 To verify the certificate No. of credits recommended: 1 or 2

Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
DR M A SUNDARAMAHALINGAM
for successfully completing the course

Energy Conversion Technologies (Biomass and Coal)

with a consolidated score of **71** %

Online Assignments	23.33/25	Proctored Exam	47.73/75
--------------------	----------	----------------	----------

Total number of candidates certified in this course: **221**

Dr. Sali Kashyap,
Coordinator, Centre for Educational Technology,
IIT Guwahati

Jul-Sep 2025
(8 week course)

Indian Institute of Technology Guwahati

swayam

Roll No: NPTEL25CH79S539000202 To verify the certificate No. of credits recommended: 2 or 3

FACULTY DEVELOPMENT PROGRAMME



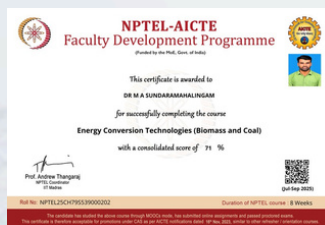
DR.M.ANISKUMAR



MRS.K.KEERTHIGA



DR.SUNDHARAMAHALINGAM





DR.NIHARIKA SIGHN



DR.D.KARTHIGA



MS.SUMAYA
FATHIMA



MS.SHANMUGAPRIYA





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Instrumentations for
Industry 4.0 and SDG Achievement
During
JULY 17, 2025 (Thursday)
MODE: DIRECT
VENUE:
Seminar Hall,
V.S.B. ENGINEERING COLLEGE, KARUR

KEY THEMES

Environmental Applications:
Biosensors
Bioremediation tools
Pollutant monitoring systems

Healthcare Innovations:
Wearable devices
Imaging technologies
Point-of-care diagnostics

Biotechnology Tools:
High-throughput screening
Microfluidics
CRISPR-based instruments

Sustainable Development:
Green technologies
Renewable energy integration
AI-driven systems

Omics and Bioinformatics:
Genomics
Proteomics
Computational tools for omics studies

Agriculture and Food Technology:
Precision agriculture devices
Food safety tools
Fermentation systems

Neurobiology Instruments:
Brain-computer interfaces
Neural diagnostics
Cognitive research tools

Public Health Monitoring:
Epidemiology devices
Health informatics
Pandemic response tools

MEET OUR EMINENT SPEAKER
Dr. S A Gokula Krishnan
Postdoctoral Fellow (NARNA-ULAM)
Centre for Organic and Nanohybrid Electronics
Silesian University of Technology,
Gliwice, Poland.
<https://shorturl.at/CdIPR>

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FOR REGISTRATION & ABSTRACT SUBMISSION SCAN



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Department of Biotechnology,
V.S.B. Engineering College,
Karur, Tamilnadu - 639111.
e-Mail: biotech@vsbec.com

Shri V S BALSAMY
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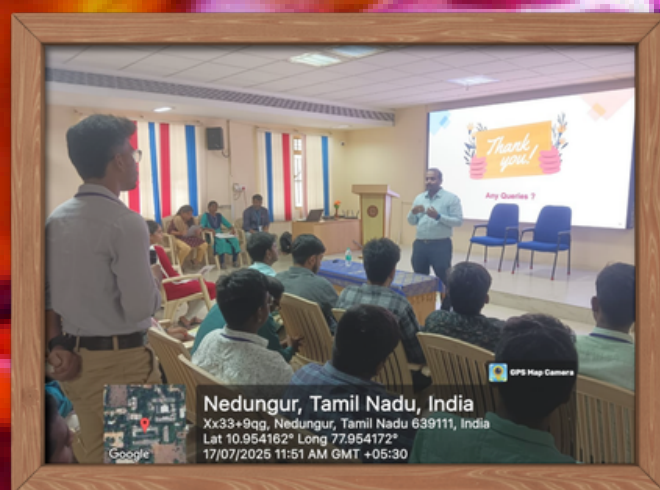
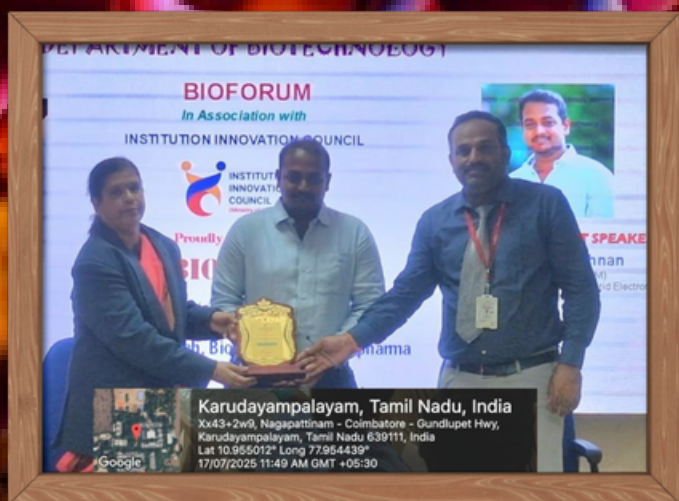
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RESOURCE PERSON
Mrs. S.AMREEN NISA, M.TECH.(PHD)
TECHNICAL ASSISTANT, MEAT AND MARINE DEPARTMENT,
CENTRAL FOOD TECHNOLOGY RESEARCH INSTITUTE (CSIR),
MYSORE.

For Registration



DATE : 09-08-2025 | TIME : 09:30 AM | VENUE : DR. VCK AUDITORIUM

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Overview of
Pharmacovigilance and
Career Opportunities for
Biotechnologist
in Pharma industry

Date : 11-09-2025
Time : 11:00 AM - 12:30 PM
Venue : Seminar Hall

For Registration





RESOURCE PERSON
Mrs. M. MEENA NARMADHA, M.PHIL., MBA
SENIOR MANAGER, AGGREGATE REPORTING,
WORLDWIDE SAFETY & REGULATORY SERVICES,
PFIZER, CHENNAI. INDIA.



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Curiosity to Cancer Drug Discovery,
a Research Innovator Success Story"*



RESOURCE PERSON :
Dr. THIRUKUMARAN KANDASAMY
Post Doctoral Fellow
The University of Texas MD Anderson Cancer Center,
Houston, Texas USA.

DATE : 25/10/2025
TIME : 10:00 AM IST ONWARDS
VENUE : SEMINAR HALL, VSBEC.

E-CERTIFICATES PROVIDED



SCAN ME

SHRI. V.S. BALSAMY
CHAIRMAN

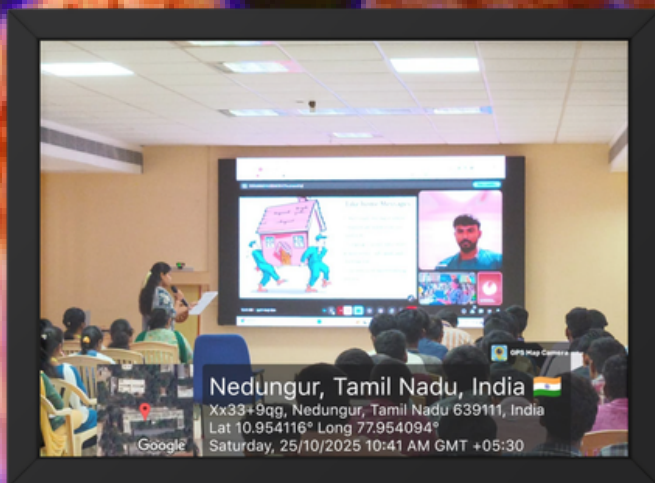
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**KIRUTHIKA DEVI M
IV-YEAR**



**RENITHA YAVANIKA
SHREE
II-YEAR**



**MADHUSHREE
III-YEAR**



**DHILIP ANAND
III-YEAR**



Students words

Santhosh IV YEAR

BIOTECHNOLOGY, ESPECIALLY IN THE FIELD OF BIOPROCESS ENGINEERING, INSPIRES US TO EXPLORE HOW LIVING SYSTEMS CAN BE HARNESSSED TO PRODUCE VALUABLE PRODUCTS FOR SOCIETY. THROUGH OUR BIOPROCESS COURSEWORK AND PRACTICAL SESSIONS, WE LEARN HOW MICROORGANISMS CAN BE CULTIVATED, OPTIMIZED, AND SCALED UP IN BIOREACTORS TO MANUFACTURE BIOPHARMACEUTICALS, ENZYMES, VACCINES, BIOFUELS, AND OTHER ESSENTIAL BIOMOLECULES. THE HANDS-ON EXPERIENCE WE GAIN IN FERMENTATION TECHNOLOGY AND DOWNSTREAM PROCESSING STRENGTHENS OUR CONFIDENCE IN USING SCIENTIFIC METHODS AND MODERN EQUIPMENT. EACH EXPERIMENT TEACHES US THE IMPORTANCE OF PRECISION, SAFETY, AND PROBLEM-SOLVING. BIOPROCESS ENGINEERING ALSO SHOWS US THE VITAL ROLE BIOTECHNOLOGY PLAYS IN HEALTHCARE, AGRICULTURE, ENVIRONMENTAL MANAGEMENT, AND INDUSTRIAL PRODUCTION. AS STUDENTS, WE FEEL MOTIVATED TO CONTRIBUTE TO SUSTAINABLE TECHNOLOGIES AND INNOVATIVE SOLUTIONS THAT CAN POSITIVELY IMPACT SOCIETY. THIS FIELD NURTURES OUR CURIOSITY AND PREPARES US FOR REWARDING CAREERS IN THE GROWING BIOTECHNOLOGY AND BIOPROCESS INDUSTRIES.

Deepthika III YEAR

TISSUE ENGINEERING IS ONE OF THE MOST INSPIRING AREAS OF BIOTECHNOLOGY, AND AS STUDENTS, IT MOTIVATES US TO LOOK AT SCIENCE WITH A MEANINGFUL PURPOSE. THIS FIELD TEACHES US HOW CELLS, BIOMATERIALS, AND GROWTH FACTORS CAN BE COMBINED TO CREATE ARTIFICIAL TISSUES THAT SUPPORT HEALING AND REGENERATION. THROUGH OUR COURSEWORK, WE LEARN HOW ENGINEERED TISSUES CAN HELP PATIENTS WITH BURNS, ORGAN DAMAGE, OR DEGENERATIVE DISEASES BY PROVIDING SAFER AND MORE EFFECTIVE TREATMENT OPTIONS. LABORATORY SESSIONS ALLOW US TO UNDERSTAND CELL CULTURE TECHNIQUES, SCAFFOLD DESIGN, AND THE FASCINATING PROCESS OF HOW LIVING TISSUES DEVELOP OUTSIDE THE BODY. TISSUE ENGINEERING SHOWS US THE POTENTIAL TO REDUCE ORGAN SHORTAGES AND IMPROVE THE QUALITY OF LIFE FOR MILLIONS OF PEOPLE. AS BUDDING BIOTECHNOLOGISTS, WE FEEL INSPIRED TO CONTRIBUTE TO INNOVATIONS THAT BLEND BIOLOGY AND ENGINEERING TO CREATE SUSTAINABLE, LIFE-SAVING MEDICAL SOLUTIONS. THIS FIELD TRULY STRENGTHENS OUR PASSION FOR RESEARCH AND COMPASSIONATE SCIENCE.

Roshini II YEAR

BIOCHEMICAL THERMODYNAMICS HELPS US UNDERSTAND HOW ENERGY DRIVES THE REACTIONS THAT SUSTAIN LIFE. AS BIOTECHNOLOGY STUDENTS, LEARNING THIS SUBJECT GIVES US CLARITY ON CONCEPTS SUCH AS FREE ENERGY, EQUILIBRIUM, AND ENZYME ACTIVITY, WHICH ARE ESSENTIAL FOR DESIGNING AND OPTIMIZING BIOPROCESSES. IT SHOWS US HOW METABOLIC PATHWAYS FUNCTION AND HOW REACTIONS CAN BE MADE MORE EFFICIENT IN INDUSTRIAL AND MEDICAL APPLICATIONS. STUDYING THERMODYNAMICS IMPROVES OUR ANALYTICAL THINKING AND HELPS US CONNECT THEORY WITH REAL-WORLD BIOTECHNOLOGY SOLUTIONS. THIS SUBJECT MOTIVATES US TO APPRECIATE THE SCIENTIFIC PRINCIPLES THAT SUPPORT INNOVATIONS IN METABOLIC ENGINEERING, DRUG DEVELOPMENT, AND CELLULAR RESEARCH.





THANK YOU

FACULTY EDITORIAL TEAM:
DR.M.ANISKUMAR
MRS.K.KEERTHIGA

STUDENT EDITORIAL TEAM:
DHARANIKA ANNADURAI
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