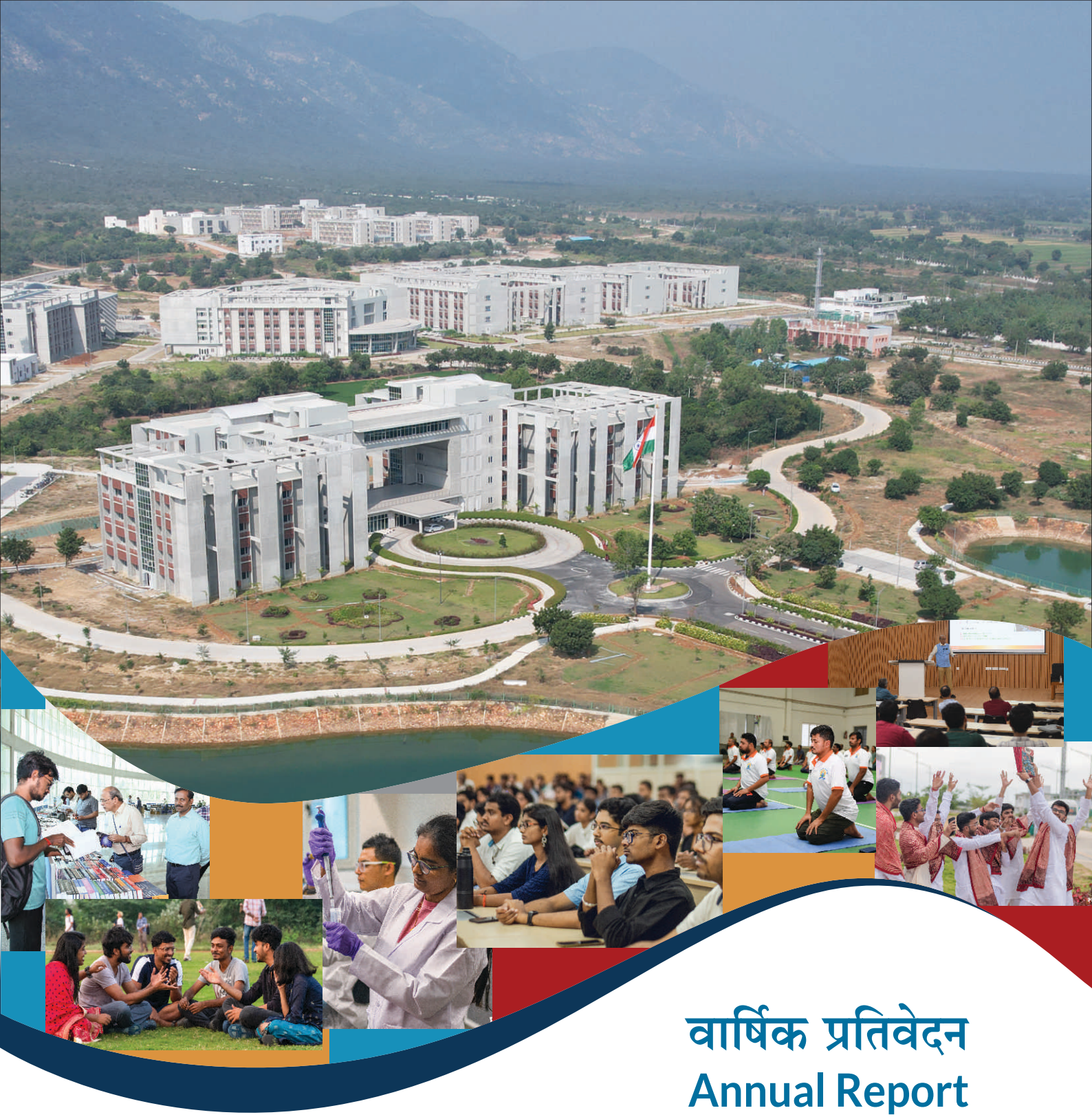

वार्षिक प्रतिवेदन
Annual Report
2023-24

भारतीय प्रौद्योगिकी संस्थान तिरुपति

भारतीय प्रौद्योगिकी संस्थान तिरूपति

Indian Institute of Technology Tirupati

आओ संवाद से सह सृष्टि करें!

Come, Converse and Cocreate!

वार्षिक प्रतिवेदन
Annual Report
2023-24

भारतीय प्रौद्योगिकी संस्थान तिरुपति

TIRUPATI

भारतीय प्रौद्योगिकी संस्थान तिरूपति

Indian Institute of Technology Tirupati


IIT TIRUPATI

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CONTENTS


ACADEMIC BUILDING-II

DIRECTOR'S REPORT

It is extremely heartening for me to present the 9th progress report of our Institute. The Institute secured 59th rank in the National Institutional Ranking Framework (NIRF) Rankings - 2023 in the Engineering category in its second year of ranking after attaining the eligibility for the same in 2022. During this year, the Institute started M. Tech programme in Chemical Engineering, and in the area of Thermal Engineering and Energy Systems in Mechanical Engineering, which is a welcome addition to the existing nine M.Tech and three M.Sc. programmes being offered in the Institute. Further, IIT Tirupati graduated its first batch of MPP (Master's in Public Policy) students this year subsequent to becoming only the third IIT after Delhi and Bombay to start a master's programme in this field in 2022. The Institute is gearing up to add B. Tech programme in Engineering Physics to the existing list of branches, namely, Chemical Engineering, Civil Engineering, Computer Science & Engineering, Electrical Engineering and Mechanical Engineering, from the academic year 2024-25.

The enrolled student strength of the year 2023-2024 has been 1531 that includes 905 B. Tech students, 181 M. Tech students, 90 M. Sc. students, 36 MPP students, 38 MS (by research), and 281 PhD scholars. The overall percentage of female students registered under various programmes of the Institute remains above 22% even this year.

Research and teaching are the two core strengths of any academic institution. With a team of 114 faculty members, IIT Tirupati has been constantly engaged in cutting-edge research and teaching at the Institute. The continued efforts have yielded many promising results in the form of research publications, grants, international collaborations etc. In the past one year, 208 research articles, and 15 book chapters

were published; the faculty members presented 201 research papers and delivered a total of 83 lectures in India and abroad. A total of 46 sponsored research projects worth Rs. 17.54 crores and 51 industrial consultancy projects worth Rs. 8.21 crores (total worth around Rs. 25.75 crores) were received by the Institute faculty members during this year. Our Institute has undertaken many intiatives under various national missions including National Mission on Interdisciplinary Cyber Physcial Systems (NMICPS), National Quantum Mission, India Semiconductor Mission, National Green Hydrogen Mission etc.

IIT Tirupati has been organising national and international level seminars, conferences, and workshops to facilitate the interaction of the faculty members and students within the Institute through their active engagement with scholars from across the world. During the period, the Institute organised four international conferences/seminars, one symposium, fourteen workshops, and one GIAN course. For the benefit of its faculty and students, it invites scholars from across the world to deliver special talks on various topics. It hosted 41 invited special talks during the period under discussion.

In the past, the Institute signed Memorandums of Understanding (MoU) with multiple national and international educational institutions, Govt. research and development agencies, Public Sector Undertakings, Government bodies, and Industry associates. The following bodies signed MoUs with us in 2023-2024: Deutsher Akademischer Austauschdienst (DAAD), Institute of Indian Foundrymen Centre for Education and Training, IIITDM Kancheepuram, Rajiv Gandhi University of Knowledge Technologies (Andhra Pradesh), Indian Institute of Science Education and Research Tirupati (IISER Tirupati), and AARVEE Associates Architects Engineers and Consultants Pvt. Ltd. These associations have contributed substantially to the multidimensional growth of the Institute in the past few years.

In addition to the academic rigor, students at IIT Tirupati are encouraged to actively participate in the extra-curricular activities by engaging with their peers in social science activities, club activities, and cultural programmes et cetera. Participation in NSS activities offers students a unique and wonderful opportunity to come into close contact with society which, in turn, teaches them some invaluable and priceless lessons in humility and gratitude. The NSS activities during the year included interaction with HIV/AIDS-Affected Children, Old Age Home Visits, Gandhi Punyaha, Poster Making Competition, Swachchhata Pakhwada - 2023, and Blood Donation Camps. A SPIC MACAY Heritage Club is actively engaged in providing the students an opportunity to engage with the Indian classical music and arts promoting it among the Institute fraternity. Events like Kalamkari Workshop, Veena Concert, Kalaripayattu, and Hindustani Concert were organised by this Heritage Club. The students run about 14 clubs and societies under which they organise various extra-mural activities, like The Pitchers, Memthon, Intra IIT Tournament, and International Yoga Day on the campus. There has been a very active participation from the students in the annual Inter-IIT Sports and Inter-IIT Technical Meets facilitated by the different student clubs of the Institute.

IIT Tirupati's Career Development Centre (CDC) has successfully tackled the placement challenges for the graduating batch of 2024. The Centre facilitated robust hiring across diverse global companies. The CDC implemented year-round career development initiatives along with extensive guidance activities, resulting in outstanding placement and internship opportunities for students. In total, over 113 companies participated in the recruitment process, offering diverse roles.

Since its inception, the Institute has been striving to create suitable academic infrastructure to meet global standards and the expectations of the students. Despite the challenges posed by the pandemic, proper planning and coordination between IIT Tirupati, architectural consultants (SGA and ADPL), CPWD, and the main contractor (Kalpataru Projects International Ltd) led to the completion of the Phase A part of the campus in October 2023. We were first among the third generation IITs to reach this milestone. In the initial years, the Institute operated from its temporary campus situated on the Tirupati-Renigunta Road in the premises of Krishna Theja Group of Institutions. The institute vacated the temporary campus in June 2022 and became fully operational from its permanent campus in July 2022. The construction of the permanent campus is underway in two Phases to cater to 2,500 students, 250 faculty members and 275 staff members. Besides, a Kendriya Vidyalaya (up to Class V) has been started to make lives more comfortable for the on-campus residents. In front of the Administrative Block, two man-made lakes spanning 10 acres, with a capacity of capturing 80 million litres of water through water harvesting, add to the scenic beauty and sustainability of the campus premises. Recognising the sustainable construction, health and safety practices adopted at the site, our construction projects have received 17 awards from national and international agencies. In addition, the construction project of the Institute recently received the Achievement Awards for Best Construction Projects - 2023, from Construction Industry Development Council (CIDC), in recognition of the excellence maintained in the project that contributes to the built environment.

On behalf of the IIT Tirupati fraternity, I would like to place on record our sincere thanks to the Ministry of Education, Government of India for the encouraging efforts and continued support. We are grateful to the Ministers, Officials, and Staff of MoE for their invaluable help and guidance. We are also thankful to the Andhra Pradesh Government for the much-needed assistance that they have provided us at every step of the way to allow us to reach this milestone. We sincerely thank the Chairman and all the members of the Board of Governors for their wise counsel, unstinting support and guidance, and for enabling us to scale new heights.

Jai Hind!

Prof. K. N. Satyanarayana

Director

1. ORGANISATION

IITs are autonomous statutory institutions of national importance for higher education and research in engineering, science and technology. There are 23 such Institutes of distinction across the country today. IIT Tirupati (IITT), established in 2015 and situated near the temple town of Tirupati, aspires to be a leading institute in imparting technical, scientific, and humanistic education that serves humanity at large. The academic policies of the Institute are decided by the Senate, while the Board of Governors is responsible for the overall administration and governance. Various affairs related to finance are counselled and administered by the Finance Committee and Building and Works Committee advises the Institute on the matters related to the construction of all the major capital works. This Chapter of the report gives details about the organizational structure of the Institute including the names of the involved personnel as well as the details of the faculty and staff members of the Institute.

1.1 GOVERNANCE

Board of Governors

Chairman	**Shri K. Sanjay Murthy,** IAS Secretary, Higher Education (up to September 2023)
	Shri Sajjan Jindal Chairman & Managing Director, JSW Group (from September 2023)
Members	**Prof. K. N. Satyanarayana**, (Ex-officio) Director, IIT Tirupati
	Shri J Syamala Rao, IAS Special Chief Secretary to Govt. of Andhra Pradesh Higher Education Department/ Principal Secretary (HE), Govt of Andhra Pradesh
	Shri G. Yoganand Chairman & Managing Director, Manjeera Constructions Ltd, Hyderabad
	Prof. K. Srinivasa Reddy, Professor, Dept. of Mechanical Engineering, IIT Madras
	Shri M. Raja Mahender Reddy Managing Director, M/s. Venkateswara Pesticides & Allied Chemicals Pvt Ltd, Hyderabad
	Smt. Soumya Gupta, Joint Secretary, TE Dept. of Higher Education, Ministry of Education, Govt. of India
	Prof. KSMS Raghavarao, Professor, Dept. of Chemical Engineering, IIT Tirupati
	Prof. Sashidar Gumma, Professor, Dept. of Chemical Engineering, IIT Tirupati

Special Invitee	**Prof. Santanu Bhattacharya** Director, IISER Tirupati
Member Secretary	**Prof. KSMS Raghavarao**, Registrar In-charge, Professor Dept. of Chemical Engineering, IIT Tirupati, (01.04.2023 to 27.08.2023)
	Shri. Sumit Kumar Biswas Registrar, IIT Tirupati, (28.08.2023 to 31.03.2024)

Finance Committee

Chairman	**Shri K Sanjay Murthy,** IAS Secretary, Higher Education (up to September 2023)
	Shri Sajjan Jindal Chairman & Managing Director**,** JSW Group (from September 2023)
Members	**Prof. K. N. Satyanarayana** (Ex-officio) Director, IIT Tirupati
	Smt. Soumya Gupta Joint Secretary, TE, Dept. of Higher Education, Ministry of Education, Govt. of India
	Joint Secretary & FA, Ministry of Education, Government of India, or his/her representative
	Prof. Adapa Murali Krishna, Dean, Planning & Infrastructure, IIT Tirupati
	Prof. David Koilpillai, Professor, Dept. of Electrical Engineering, IIT Madras
Member Secretary	**Prof. KSMS Raghavarao**, Registrar In-charge, Professor Dept. of Chemical Engineering, IIT Tirupati, (01.04.2023 to 27.08.2023)
	Shri. Sumit Kumar Biswas Registrar, IIT Tirupati, (28.08.2023 to 31.03.2024)

Institute Deans

	Prof. Sasidhar Gumma, Dean, International and Alumni Affairs
	Prof. Adapa Murali Krishna, Dean, Planning & Infrastructure
	Prof. Anilkumar Emadabathuni, Dean, Sponsored Research and Consultancy
	Prof. Muthukumar P, Dean, Faculty Affairs
	Prof. KSMS Raghavarao, Dean, Administration & Finance
	Prof. Sasidhar Gumma, Dean, Academic Affairs, (01.04.2023 – 02.08.2023)
	Prof. Gorthi VRMS Subrahmanyam, Dean, Academic Affairs (03.08.2023 – 31.03.2024)
	Dr. N. Venkaiah, Dean, Student Affairs, (01.04.2023 – 02.08.2023)
	Prof. Neti VL Narasimha Murty, Dean, Student Affairs, (03.08.2023 – 31.03.2024)

Senate

Chairman	**Prof. K. N. Satyanarayana,** Director, IIT Tirupati
Secretary	**Prof. KSMS Raghavarao**, Registrar In-charge, Professor Dept. of Chemical Engineering, IIT Tirupati, (01.04.2023 to 27.08.2023)
	Shri. Sumit Kumar Biswas Registrar, IIT Tirupati, (28.08.2023 to 31.03.2024)
Members (Institute Deans)	**Prof. Sasidhar Gumma,** Dean, International and Alumni Affairs
	Prof. Adapa Murali Krishna, Dean, Planning & Infrastructure
	Prof. Anilkumar Emadabathuni, Dean, Sponsored Research and Consultancy
	Prof. Muthukumar P, Dean, Faculty Affairs
	Prof. KSMS Raghavarao, Dean, Administration & Finance
	Prof. Sasidhar Gumma, Dean, Academic Affairs, (01.04.2023 – 02.08.2023)
	Prof. Gorthi VRMS Subrahmanyam, Dean, Academic Affairs, (03.08.2023 – 31.03.2024)
	Dr. N. Venkaiah, Dean, Student Affairs, (01.04.2023 – 02.08.2023)
	Prof. Neti VL Narasimha Murty, Dean, Student Affairs, (03.08.2023 – 31.03.2024)
All Heads of the Department	**Dr. Sunil Kumar Thamida,** Chemical Engineering
	Dr. Gouri Prasanna Roy, Chemistry
	Dr. B. Krishna Prapoorna, Civil and Environmental Engineering
	Dr. Venkata Ramana Badarla, Computer Science and Engineering
	Dr. N. N. Murthy, Electrical Engineering (01.04.2023 to 04.10.2023)
	Dr. Naveen K P, Electrical Engineering (05.10.2023 to 31.03.2024)
	Dr. Rahul Sirohi, Humanities and Social Sciences (01.04.2023 to 30.04.2023)
	Dr. Prabha Shankar Dwivedi, Humanities and Social Sciences (01.05.2023 to 31.03.2024)
	Dr. M. Panchatcharam, Mathematics & Statistics
	Dr. Ravi Sankar M, Mechanical Engineering
	Dr. Reetesh Kumar Gangwar, Physics
All Professors of the Institute	**Prof. Suresh Jain,** Civil and Environmental Engineering
	Prof. C. P. Rao, Chemistry (01.04.2023 to 30.06.2023)
Educationists of Repute and not Employees of the Institute	**Prof. N. Venkata Reddy,** Dept. of Mechanical Engineering, IIT Hyderabad
	Prof. K. Sethupathi, Dept. of Physics, IIT Madras
	Prof. Pramod K. Nayar, Dept. of English, University of Hyderabad

Persons from Industry, R&D	**Mr. Daiva Prakash Geddam,** Senior General Manager, Head-Product Development-New Energy, Amara Raja Batteries Ltd, Tirupati
	Dr. M Durga Rao, Scientist, National Atmospheric Research Laboratory, ISRO, Gadanki, A. P.
Faculty Members from the Institute	**Dr. M. Nabil,** Chemical Engineering
	Dr. Debasish Mondal, Chemistry (from 03.02.2024)
	Dr. Gowri Asaithambi, Civil and Environmental Engineering
	Dr. Gadhamsetty Ramakrishna, Computer Science and Engineering
	Dr. Pooja Vyavahare, Electrical Engineering
	Dr. Vaneet Kashyap, Humanities and Social Sciences
	Dr. Ishapathik Das, Mathematics and Statistics
	Dr. Girish Kumar Rajan, Mechanical Engineering
	Dr. Shaon Sahoo, Physics
Invitees	**Dr. Durga Prasad Challa,** Chairman, Admissions
	Dr. Avulapati Madan Mohan, Advisor, Academic Courses
	Dr. Rajesh Viswanathan, Associate Dean, Academic Affairs, IISER Tirupati
	Dr. Degala Venkata Kiran, Workshop In-charge
	Dr. S Prasanna Venkatesh, Chairperson, Council of Wardens
	Shri. Prashanta Kumar Behera, Deputy Librarian (Since December 2023)
Special Invitees (Student Members from the Institute)	**Student General Secretary**
	Academic Affairs Secretary
	Research Affairs Secretary

Building and Works Committee

Chairman	**Prof. K. N. Satyanarayana,** Director, IIT Tirupati
Members	**Sri. Kanaka Raju,** Chief Engineer, CPWD, Zone-VI, Vijayawada
	Dr. Janmejoy Gupta, Dean, Research, SPA, Vijayawada
	Sri S. Ramanujam, Rtd. Director, DCSEM, DAE
	Prof. Adapa Murali Krishna, Dean, Planning & Infrastructure, IIT Tirupati
	Sri. K Nanda Kumar, Chief General Manager, P&M, APSPDCL, Tirupati
Member Secretary	**Prof. KSMS Raghavarao,** Registrar In-charge, Professor, Dept. of Chemical Engineering, IIT Tirupati, (01.04.2023 to 27.08.2023)
	Shri. Sumit Kumar Biswas, Registrar, IIT Tirupati, (28.08.2023 to 31.03.2024)

1.2 NEW FACULTY AND STAFF ENTRANTS

The following is the list of faculty members who joined the Institute in the year 2023-2024:

SN	Name	Designation and Department	PhD from	Previous Employment
1.	Narasamma Nippatlapalli	Assistant Professor Grade-II, Civil and Environmental Engineering	IIT Madras	IIT Dharwad
2.	Brindha Moorthy	Assistant Professor Grade-I, Chemical Engineering	KAIST, South Korea	Ecopro BM, South Korea
3.	Prasenjit Mondal	Assistant Professor Grade-I, Chemistry	Indian Institute of Technology Bombay	Jadhavpur University, Kolkatta
4.	Angshuman Roy	Assistant Professor Grade-II, Mathematics and Statistics	Indian Statistical Institute, Kolkata	Ahmedabad University
5.	Govind Narayan Sahu	Assistant Professor Grade-II, Mechanical Engineering	Indian Institute of Technology Kanpur	Fraunhofer Institute for Machine Tools and Forming Technology (IWU), Germany
6.	Vishnu C R	Assistant Professor Grade-II, Humanities and Social Sciences	NIT Calicut	VIT Chennai
7.	Kaushik Pal	Assistant Professor Grade-I, Chemistry	IISER Bhopal	Broad Institute of MIT and Harvard, USA
8.	Sarvendranath Rimalapudi	Assistant Professor Grade-II, Electrical Engineering	Indian Institute of Science, Bangalore	Indian Institute of Technology Guwahati
9.	Bivas Dutta	Assistant Professor Grade – II, Physics	Institute Neel, CNRS, Univeriste Grenoble Alps, Grenoble, France	Weizmann Institute of Science, Israel.
10.	Ramesh Patel	Assistant Professor Grade-II, Electrical Engineering	Ulsan National Institute of Science and Technology (UNIST), South Korea.	Ericsson Antenna Technology Germany GmbH, Rosenheim, Germany
11.	Jashnav Pancheti	Assistant Professor Grade-II, Civil and Environmental Engineering	Queensland University of Technology, Brisbane, Australia	Scottsdale Construction Systems, Australia
12.	Chalavadi Vishnu	Assistant Professor Grade-II, Computer Science and Engineering	IIT Hyderabad	University of Agder, Norway

The following is the list of staff members who joined in 2023-2024:

SN	Name	Designation	Department/Section
1.	Keerthi Veera Venkata Satya Sai	Junior Technician	Mechanical Engineering
2.	Nallam Manoj	Junior Engineer	Engineering Unit
3.	Alok Prakash Tripathi	Junior Superintendent	Recruitment
4.	Gattu Aravind	Junior Engineer	Engineering Unit
5.	M Venkat Ramana	Assistant Registrar	General Administration1
6.	Srinivasulu K V	Junior Superintendent	Academic Research
7.	Lavanuru Kishore Reddy	Junior Assistant	Mathematics and Statistics
8.	Sumit Kumar Biswas	Registrar	Registrar Office
9.	Thammi Reddy Sreedhar Reddy	Physical Training Instructor	Student Affairs
10.	Naveen Kumar	Junior Technician	Central Workshop
11.	Bodele Shubham Sanjay	Junior Technician	Central Workshop
12.	Pelluru Bharath Kumar	Junior Technician	Physics
13.	Gummuluri Sai Raj	Junior Technical Superintendent	Computer Science and Engineering
14.	Badavath Rambabu	Junior Technician	Chemistry
15.	B M Naveen Kumar	Junior Technician	Civil and Environmental Engineering
16.	Prashanta Kumar Behera	Deputy Librarian	Library
17.	Janga Ananda Babu	Junior Technician	Computer Centre
18.	Akhil A Chacko	Junior Technical Superintendent	Computer Centre
19.	Ravula Chandrashekar	Junior Superintendent	Material Management - Inventory
20.	Vemuru Sree Varun Tej	Junior Assistant	Mechanical Engineering
21.	Akalamkam Venkata Krishna Sravanthi	Junior Assistant	Electrical Engineering
22.	M Anitha Krishna Naik	Junior Assistant	General Administration
23.	Mohammed Omar Abdul Aziz	Junior Assistant	Establishment
24.	Avva Venkatesh	Junior Assistant	Humanities and Social Sciences

SN	Name	Designation	Department/Section
25.	Ithih Joy	Junior Assistant	Finance and Accounts
26.	Basila Ali	Junior Assistant	Academic Research
27.	Manukonda Syambabu	Junior Assistant	Chemistry
28.	Bandi Nandini	Junior Assistant	International Affairs
29.	Maharasi E	Junior Assistant	Chemical Engineering
30.	Avala Mohan Krishna	Junior Assistant	Purchase and Stores

1.3 FACULTY PROFILE

IIT Tirupati has been actively involved in multiple recruitment drives to fill faculty and staff positions. A Special Recruitment Drive was conducted to address vacancies in the SC/ST/OBC/EWS/PwD categories, with an advertisement released on December 7, 2022, and the process concluded in May 2023, resulting in 12 candidates joining out of the 14 offered positions. The Merit-Based Selection (MBS) process, advertised on August 3, 2023, led to the recruitment of 26 Associate Professors and 8 Professors. Additionally, the Institute advertised faculty recruitment for its 10 departments on January 24, 2024, with the selection process expected to conclude by July 2024.

Department of Chemical Engineering

The Department of Chemical Engineering at IIT Tirupati, established in 2018, offers both undergraduate and postgraduate courses. The department focuses its research on key areas such as process systems engineering, biomolecular and biomedical engineering, energy and environment, food science and technology, and soft matter and nanoscale materials. Faculty members actively collaborate with industry partners and other academic institutions to apply their research to various practical applications.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Professor	
Dr. Sasidhar Gumma Ph.D. (Cleveland State University, USA)	Metal-organic frameworks, Adsorption
Dr. KSMS Raghavarao Ph.D. (Institute of Chemical Technology, Mumbai)	Food Process Engineering, Separation Processes
Dr. T. Sunil Kumar Ph.D. (University of Notre Dame, USA) Head of the Dept.	Microfluidics and Corrosion Simulation
Dr. Anki Reddy Katha Ph.D. (Indian Institute of Science, Bangalore, India)	Energy and Environmental Sciences, Granular Physics

Name and Qualifications	Major Areas of Specialisation
Assistant Professor	
Dr. Anil B. Vir Ph.D. (Indian Institute of Technology Madras)	Microreactor and Multiphase Reaction
Dr. Brindha Moorthy Ph.D. (KAIST, South Korea)	Materials Science and Engineering, Functional Materials for Energy Storage Applications
Dr. M. Nabil Ph.D. (Indian Institute of Technology Madras)	Process Optimization & Control, Machine Learning for Process System
Dr. Narendra Singh Ph.D. (Indian Institute of Technology Kanpur)	Photocatalysis, Surface Engineering of Polymer
Dr. Nilesh Choudhary Ph.D. {Academy of Scientific and Innovative Research (CSIR-NCL)}	Multi-scale Molecular Simulation for Applied Materials and Complex Systems
Dr. Shamik Mishra Ph.D. (Indian Institute of Technology Bombay)	Process Systems Engineering, Renewable Energy and Sustainability
Dr. Trivikram Nallamilli Ph.D. (Indian Institute of Technology Madras)	Colloid and Interfacial Phenomena, Soft Matter and Food Physics
Dr. S. Uday Kumar Ph.D. (Indian Institute of Technology Roorkee)	Nanobiotechnology and Biomaterials

Department of Chemistry

The Chemistry department at IIT Tirupati, established in 2015, offers PhD and MSc programs in Chemistry and provides core and elective courses for both science and engineering students. The department is focused on creating a top tier learning and research environment, covering major areas of chemical sciences. With eleven faculty members specializing in diverse fields, the department initiated its MSc program in 2020. The first batch of eight MSc students graduated in 2023, and the department currently has 31 master's and 28 doctoral students. This year, three students earned their PhDs. The department has developed advanced research facilities and is continually enhancing its laboratory capabilities for experimental research, aiming to build an international reputation through consistent publication.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Professor	
Dr. Gouriprasanna Roy Ph.D. (Indian Institute of Science, Bangalore) Head of the Dept.	Chemical Biology, Bioinorganic Chemistry

Name and Qualifications	Major Areas of Specialisation
Associate Professor	
Dr. Arun Kumar Manna Ph.D. (JNCASR, Bangalore)	Theoretical and Computational Chemistry
Dr. Debasish Mandal Ph.D. (IACS, Kolkata)	Theoretical Chemistry
Dr. P. Gandeepan Ph.D. (National Tsing Hua University, Hsinchu, Taiwan)	Transition Metal Catalysis, Sustainable Organic Synthesis
Dr. Rajib Biswas Ph.D. (Indian Institute of Science, Bangalore)	Theoretical and Computational Chemistry
Assistant Professor	
Dr. Kaushik Pal Ph.D. (IISER Bhopal)	Biophysical Chemistry, Chemical Biology
Dr. Prasenjit Mondal Ph.D. (Indian Institute of Technology Bombay)	Coordination Chemistry and Bioinorganic Chemistry
Dr. Someswara Rao Sanapala Ph.D. (Indian Institute of Technology Bombay)	Organic Chemistry
Dr. Sourav Chakraborty Ph.D. (IACS, Kolkata)	Supramolecular Chemistry, Material Science
Dr. Srikrishna Bera Ph.D. (Westfälische Wilhelms-Universität, Münster, Germany)	Reaction Development, Asymmetric Synthesis
Dr. Venkaiah Chintalapudi Ph.D. (University of Hyderabad)	Total Synthesis of Bioactive Natural Products, Asymmetric Catalysis

Department of Civil and Environmental Engineering

The Department of Civil and Environmental Engineering (CEE) at IIT Tirupati, established in 2015, offers a range of undergraduate and postgraduate programs, including B.Tech, M.Tech, MS by Research, and Ph.D. degrees. The courses are designed with a problem-solving and design-based approach, reflecting industry demands. CEE offers M.Tech degrees in four specializations and encourages undergraduate research by allowing B.Tech students to work on projects with faculty. With over 270 students, including about 150 postgraduates, CEE focuses on excellence in education and research related to sustainable infrastructure and quality-of-life initiatives. The department also engages in capacity-building through short-term courses, workshops, and other outreach activities, and plans to introduce new curricula in emerging areas like sustainability, big data, machine learning, and innovation to address 21st-century challenges.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Professor	
Dr. K. N. Satyanarayana Ph.D. (Clemson University, USA), Director, IIT Tirupati	Construction Engineering & Project Management
Dr. B. Krishna Prapoorna Ph.D. (Arizona State University, USA), Head of the Dept.	Transportation Engineering & Pavement Systems
Dr. Adapa Murali Krishna Ph.D. (Indian Institute of Science, Bangalore)	Earthquake Geotechnics
Dr. Suresh Jain Ph.D. (Indian Institute of Technology Delhi)	Air Quality Modelling and Management; Environmental Risk Assessment
Associate Professor	
Dr. Gowri Asaithambi Ph.D. (Indian Institute of Technology Madras)	Transportation Engineering
Dr. M. Nithyadharan Ph.D. (Indian Institute of Technology Madras)	Metal Structures and Earthquake Resistant Design
Dr. Prasanna V. Sampath Ph.D. (Michigan State University, East Lansing, USA)	Environmental Engineering
Dr. Roshan Srivastav Ph.D. (Indian Institute of Technology Madras)	Water Resources Management, Climate Change, Remote Sensing
Dr. Shihabudheen M. M. Ph.D. (Indian Institute of Technology Madras)	Environmental Engineering
Assistant Professor	
Dr. Avadh Bihari Narayan Ph.D. (Indian Institute of Technology Kanpur)	Remote Sensing, Geodesy
Dr. A. V. Rahul Ph.D. (Indian Institute of Technology Madras)	Concrete 3D Printing, Rheology of Cement-Based Material
Dr. Bijily Balakrishnan Ph.D. (Indian Institute of Technology Madras)	Reinforced Concrete Design, Prestressed Concrete Design
Dr. B. Janaki Ramaiah Ph.D. (Indian Institute of Technology Delhi)	Geotechnical and Geoenvironmental Engineering
Dr. Jashnav Pancheti Ph.D. (Queensland University of Technology, Brisbane, Australia)	Structural Fire Engineering, Building Fire Safety

Name and Qualifications	Major Areas of Specialisation
Dr. Narasamma Nippatlapalli Ph.D. (Indian Institute of Technology Madras)	Industrial Wastewater Management, Solid Waste Management
Dr. Prasanna Kumar Behera Ph.D. (Indian Institute of Technology Kanpur)	Durability of Concrete Structures, Corrosion of Reinforcing Steel

Department of Computer Science & Engineering

The Department of Computer Science and Engineering at IIT Tirupati, founded in 2015, offers B.Tech and M.Tech programs in CSE, as well as research-focused MS and Ph.D. programs. The undergraduate curriculum emphasizes foundational courses and cutting-edge technologies, with offerings in areas like Machine Learning, Deep Learning, Parallel Computing, and Distributed Systems. The curriculum is designed to foster innovation, ethics, and societal engagement, with a strong focus on laboratory courses that expose students to the design and development of comprehensive systems. Each program features a rigorous and diverse curriculum that balances fundamental knowledge with project-driven and industry-relevant courses. The M.Tech program in CSE includes a broad range of courses in Data Science and Systems. The department is actively involved in research across various domains, including algorithms, machine learning, reinforcement learning, computer networks, software engineering, parallel computing, computer organization and architecture, theoretical computer science, and mathematical modeling.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Professor	
Dr. Venkata Ramana Badarla Ph.D. (Indian Institute of Technology Madras) Head of the Dept.	Wireless Networks, Cloud Computing, IOT
Associate Professor	
Dr. Kalidas Yeturu Ph.D. (Indian Institute of Science, Bangalore)	Machine Learning, Big Data Technologies
Dr. Sridhar Chimalakonda Ph.D. (Indian Institute of Information Technology Hyderabad)	Software Engineering, Computing for Education
Assistant Professor	
Dr. Ajin George Joseph Ph.D. (Indian Institute of Science, Bangalore)	Reinforcement Learning, Stochastic Approximation Algorithms
Dr. G. Ramakrishna Ph.D. (Indian Institute of Technology Madras)	Algorithmic Engineering

Name and Qualifications	Major Areas of Specialisation
Dr. Jaynarayan Tudu Ph.D. (Indian Institute of Science, Bangalore)	Power-Aware Computer Architecture, Digital VLSI Test and Verification
Dr. Raghavendra Kanakagiri Ph.D. (Indian Institute of Technology Madras)	Parallel Computing
Dr. S. Raja Ph.D. (Institute of Mathematical Sciences, Chennai)	Theoretical Computer Science, Algorithms and Complexity
Dr. V. Mahendran Ph.D. (Indian Institute of Technology Madras)	Delay-Tolerant Networks, Software Defined Networks and IOT
Adjunct Faculty	
Dr. B. Yagnanarayana Ph.D. (Indian Institute of Science, Bangalore)	Digital Signal Processing, Speech, Computer Vision and Neural Networks

Department of Electrical Engineering

The Department of Electrical Engineering at IIT Tirupati offers BTech, MTech, MS, and PhD programs. The department engages in research across key sub-disciplines of Electrical Engineering, including signal processing, machine learning, medical imaging, nanoelectronics, semiconductor devices, power electronics, power systems, and more. Since 2015, the department has offered a four-year BTech program, and in July 2018, it introduced a two-year MTech program in Signal Processing & Communication, admitting students through the GATE exam. This program combines advanced theoretical courses with practical sessions. The department is equipped with specialized labs for signal processing, communication, power electronics, and other areas, and offers MS and PhD programs in all major research fields of Electrical Engineering.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Professor	
Dr. N. N. Murty Ph.D. (Institute of Technology BHU, Varanasi)	Defect Identification and Characterisation in Semiconductors (Diamond, SiC)
Dr. Rama Krishna Sai Gorthi Ph.D. (Indian Institute of Technology Madras)	Signal/Image Processing, Computer Vision and Pattern Recognition & Machine Learning
Associate Professor	
Dr. K. P. Naveen Ph.D. (Indian Institute of Science, Bangalore) Head of the Dept.	Performance Analysis of Wireless Networks

Name and Qualifications	Major Areas of Specialisation
Dr. Parthajit Mohapatra Ph.D. (Indian Institute of Science, Bangalore)	Advanced Communication Techniques for Future Wireless Networks, Physical Layer Secrecy
Dr. Subrahmanyam Gorthi Ph.D. (Swiss Federal Institute of Technology, Switzerland)	Medical Image Analysis

Assistant Professor

Dr. Abhishek Kumar Jha Ph.D. (Indian Institute of Technology Kanpur)	RF and Microwaves, Applied Electromagnetics
Dr. Pooja Vyavahare Ph.D. (Indian Institute of Technology Bombay)	Distributed Function Computation and Optimisation, Analysis of Communication Networks
Dr. Prashanth Vooka Ph.D. (Indian Institute of Technology Madras)	Measurements and Instrumentation, Capacitive Sensors and Signal-Conditioning Circuits
Dr. P. S. Saikrishna Ph.D. (Indian Institute of Technology Madras)	Industrial Automation, Robust & Optimal Control and Cloud Computing QoS Management
Dr. Ramesh Patel Ph.D. (Ulsan National Institute of Science and Technology, South Korea)	Antenna System Architecture for Wireless Communication and Sensing
Dr. Sarvendranath Rimalapudi Ph.D. (Indian Institute of Science, Bangalore)	Physical Layer Wireless Communication
Dr. Srujana Kagita Ph.D. (Indian Institute of Technology Delhi)	RF and Microwave Components and Antennas
Dr. Swapnil Bhuktare Ph.D. (Indian Institute of Technology Bombay)	Nanoelectronics, Spintronics
Dr. Vignesh V Ph.D. (Indian Institute of Technology Kanpur)	Power System Dynamics, Smart Grids
Dr. Vijaya Kumar Gurugubelli Ph.D. (Indian Institute of Technology Madras)	Device Modeling, Nanoelectronics, High-Voltage Devices, Sensors
Dr. Viju Nair N Ph.D. (Indian Institute of Science, Bangalore)	Power Electronics
Dr. Vikramkumar Pudi Ph.D. (Indian Institute of Technology Madras)	Digital Design, Cyber Security and Cryptography

Professor of Practice

Lt. Gen Dr. Anil Kapoor (Retd.) Ph.D. (Punjabi University, Patiala)	Design Thinking, Asset Management, Industrial Engineering & Automation

Department of Humanities and Social Sciences

The Department of Humanities and Social Sciences at IIT Tirupati, established in 2015, offers elective courses in Economics, English, Philosophy, Finance, and Organisational Behaviour for all undergraduate engineering disciplines. Additionally, the department provides compulsory course in English and Professional Ethics. First year B.Tech students can also take proficiency courses in foreign languages like Spanish, German, Sanskrit, and Japanese. In 2022, the department introduced its first postgraduate program, the Master of Public Policy (MPP). It also offers Ph.D. programmes in various fields, including Economics, English, Philosophy, Finance, and Organisational Behaviour. Faculty members are actively engaged in research across a wide range of topics, such as Social and Political Philosophy, Development Economics, Climate Change, Economics, Indian Theories of Language and Literature, Gender Studies, Financial Engineering, Organisational Leadership, and more. The department also organises numerous workshops, seminars, and conferences.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Associate Professor	
Dr. Prabha Shankar Dwivedi Ph.D. (Dr. H. S. Gour Central University, Sagar) Head of the Dept.	Comparative Literary Studies, Indian Theories of Language and Literature, and Indic Religions
Dr. Bharath Kumar Ph.D. (University of Hyderabad)	Social and Political Philosophy, Contemporary Indian Thought
Dr. Chandra Sekhar Bahinipati Ph.D. (Madras Institute of Development Studies, Chennai)	Economics of Climate Change, Environmental Economics, Natural Resource Management, Development Economics
Dr. Rahul A. Sirohi Ph.D. (University of Illinois at Urbana Champaign)	Development Economics, Comparative Political Economy of Asia and Latin America, Applied Microeconomics
Assistant Professor	
Dr. Bibhuti Mary Kachhap Ph.D. (Indian Institute of Technology (ISM) Dhanbad)	South Asian Literature and Cultural Studies
Dr. Sanchayan Nath Ph.D. (Indiana University Bloomington, USA)	Sustainability, Public Policy and Governance
Dr. Shailendra Singh Ph.D. (Jamia Millia Islamia, New Delhi)	South Asian Narratives, Gender Studies
Dr. Vaneet Kashyap Ph.D. (Indian Institute of Technology Roorkee)	Industrial and Organisational Psychology, Organisational Behaviour
Dr. Vishnu C Rajan Ph.D. (National Institute of Technology Calicut)	Operations Management, Industrial Engineering
Visiting Professor	
Dr. A. Raghuramaraju Ph.D. (Indian Institute of Technology Kanpur)	Social and Political Philosophy

Department of Mathematics and Statistics

The Department of Mathematics and Statistics at IIT Tirupati, established in 2015, offers courses in mathematics, statistics, and computing for undergraduate, postgraduate, and research students across all disciplines at the institute. The department focuses on pure and applied mathematics, industrial mathematics and statistics, machine learning, and data science. Faculty members are engaged in research areas such as Representation Theory, Algebraic Groups, Ergodic Theory, Fractals, Fixed Point Theory, Partial Differential Equations, Numerical Analysis, Inverse Problems, Mathematical Modelling, Machine Learning, and Environmental Statistics. The department offers M.Sc. and Ph.D. programs and is committed to interdisciplinary research to solve real-world problems, collaborating with national and international experts from academia and industry. Weekly seminars are held for the benefit of faculty, researchers, and students, featuring global experts. Additionally, the department organizes workshops and training schools, bringing together students and researchers from across the country and around the world to discuss advancements in mathematics and statistics.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Associate Professor	
Dr. Ishapathik Das Ph.D. (Indian Institute of Technology Bombay) Head of the Dept.	Generalised Linear Models, Machine Learning
Dr. Dr. Durga Prasad Challa Ph.D. (Johannes Kepler University & RICAM, Linz, Austria)	Forward and Inverse Scattering Problems, Scientific Computing, Cloaking and Effective Medium Theories
Dr. Panchatcharam M. Ph.D. (Indian Institute of Technology Madras & TU Kaiserslautern, Germany)	Numerics for PDEs, Computational Fluid Dynamics
Assistant Professor	
Dr. Ananya Lahiri Ph.D. (Indian Institute of Technology Kanpur)	Statistics and Probability
Dr. Angshuman Roy Ph.D. (Indian Statistical Institute, Kolkata)	Multivariate Statistics, Nonparametric Statistics
Dr. B. Ravinder Ph.D. (The Institute of Mathematical Sciences, Chennai)	Representation Theory of Lie Algebras, Combinatorics
Dr. Krishna Kishore Ph.D. (Indiana University, Bloomington)	Automorphic Representations
Dr. S. Rajesh Ph.D. (Indian Institute of Technology Madras)	Fixed-Point Theory
Dr. Shilpak Banerjee Ph.D. (The Pennsylvania State University, USA)	Ergodic Theory, Dynamical Systems
Dr. Srijanani Anurag Prasad Ph.D. (Indian Institute of Technology Kanpur)	Fractals, Functional Equations

Name and Qualifications	Major Areas of Specialisation
Visiting Professor	
Prof. N. Balakrishna Ph.D. (University of Poona)	Linear and Non-Linear Time Series Analysis, Financial Time Series, Modeling of Stochastic Volatility, Analysis of Repairable Systems, Chaotic Time Series

Department of Mechanical Engineering

The Department of Mechanical Engineering at IIT Tirupati offers a range of undergraduate and postgraduate courses, including specialised courses in solid mechanics, thermal fluid engineering, and manufacturing engineering. The department is deeply involved in research across various areas, such as composite materials, fluid dynamics, energy systems, and robotics. It offers BTech, MTech in Design and Manufacturing, and PhD programs, with a new MTech in Thermal Engineering and Energy Systems starting in July 2023. The department actively organizes symposiums, seminars, and workshops to foster research collaboration and engages in partnerships with industries, research organizations, and universities to address societal and industrial challenges.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Professor	
Dr. Anil Kumar Emadabathuni Ph.D. (Indian Institute of Technology Madras)	Hydrogen Storage, Thermal Energy Storage, Adsorption Heating and Cooling Systems
Dr. Mamilla Ravi Sankar Ph.D. (Indian Institute of Technology Kanpur) Head of the Dept.	Advanced Materials and Manufacturing, Ultra-Precision Machining
Dr. Muthukumar Palanisamy Ph.D. (Indian Institute of Technology Madras)	Energy Storage Including Hydrogen and Thermal, Porous Medium Combustion, Refrigeration and Air-Conditioning, Life Cycle and Sustainability Analyses
Associate Professor	
Dr. Degala Venkata Kiran Ph.D. (Indian Institute of Technology Bombay)	Welding Science and Technology
Dr. Madan Mohan Avulapati Ph.D. (Indian Institute of Science, Bangalore)	Liquid Atomisation, Combustion, Alternative Fuels for IC Engines and Gas Turbines
Dr. N. Venkaiah Ph.D. (Indian Institute of Technology Madras)	Computational Metrology, Machining, Optimization Techniques
Dr. P. Venkataraman Ph.D. (Nanyang Technological University, Singapore.)	Hydraulic Fracturing, Multiscale Modelling

Name and Qualifications	Major Areas of Specialisation
Dr. Sriram Sundar Ph.D. (The Ohio State University, Columbus, Ohio, U.S.A)	Vibrations, Contact Mechanics, Gear and Brake Dynamics
Dr. Subbareddy Daggumati Ph.D. (Ghent University, Belgium)	Advanced Fibre Reinforced Composite Materials, Computational Solid Mechanics

Assistant Professor

Dr. Ajay Kumar Ph.D. (Indian Institute of Science, Bangalore)	Metal Casting, Metal Forming, Materials Processing and Mechanical Behaviour of Materials, Tribology
Dr. Anup Basak Ph.D. (Indian Institute of Technology Kanpur)	Solid Mechanics, Computational Mechanics
Dr. Balaji Subramanian Ph.D. (Swiss Federal Institute of Technology Zurich, Switzerland)	Wind Energy, Experimental Fluid Mechanics/Aerodynamics
Dr. Girish Kumar Rajan Ph.D. (Pennsylvania State University, USA)	Fluid Mechanics and Applied Mathematics
Dr. Govind Narayan Sahu Ph.D. (Indian Institute of Technology Kanpur)	Machining Dynamics, Smart Machine Tool System
Dr. Thiyagarajan R Ph.D. (Indian Institute of Technology Madras)	Robotics and Automation, Dynamics and Control of Field and Service Robots, Mechatronics, Additive Manufacturing
Dr. Yujendra Mitikiri Ph.D. (University of Florida, Gainesville)	Robotics, Controls, Analog Circuits

Adjunct Faculty

Dr. N. N. Kishore Ph.D. (Indian Institute of Technology Kanpur)	Composite Materials, FEM and Non-Destructive Testing
Dr. Ahmad Al-Mallahi Ph.D. (Hokkaido University) Dalhousie University, Canada	Precision Agriculture, Sensing and Automation

Professor of Practice

Mr. V. R. Ganesan M.Tech (Indian Institute of Technology Kanpur)	Automotives, New Technologies in Mechanical Engineering, Alternate Forms of Mobility

Department of Physics

The Department of Physics offers courses at the undergraduate, postgraduate and research levels. Department runs M.Sc. in Physics since 2021. The faculty members are actively involved in research in the theoretical and experimental aspects of Atomic, Molecular, Optical physics (AMOP) and Condensed Matter Physics (CMP). To facilitate the exchange of ideas and provide additional research exposure to the students, the department hosted number of invited talks during the academic year 2023-24. Different research and teaching laboratories are being set up in the department with the Institute funding and various external grants.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Associate Professor	
Dr. Koteswara Rao Bommisetti Ph.D. (Indian Institute of Technology Bombay)	Strongly Correlated Electron Systems, Geometrically Frustrated Magnets
Dr. Reetesh Kumar Gangwar Ph.D. (Indian Institute of Technology Roorkee)	Atomic and Molecular Physics, Plasma Physics
Assistant Professor	
Dr. Rudra Sekhar Manna Ph.D. (Goethe University Frankfurt, Germany) Head of the Dept.	Experimental Condensed Matter Physics
Dr. Aniket Uday Joglekar Ph.D. (University of Chicago, USA)	Astroparticle Physics, Beyond the SM Physics
Dr. Aravinda S Ph.D. (Poornaprajna Institute of Scientific Research, Bengaluru)	Quantum Information and Computation, Quantum Foundations
Dr. Arijit Sharma Ph.D. (Raman Research Institute, Bengaluru)	Experimental Atomic Physics and Quantum Optics, Precision Laser Spectroscopy
Dr. Murari Singh Ph.D. (Jawahar Lal Nehru University, Delhi)	Computational Soft Matter Physics
Dr. Ranjan Krishna Modak Ph.D. (Indian Institute of Science, Bangalore)	Theoretical Condensed Matter Physics
Dr. Shaon Sahoo Ph.D. (Indian Institute of Science, Bangalore)	Theoretical Condensed Matter Physics
Dr. Vinay Pramod Majety Ph.D. (Ludwig Maximilians University, Germany)	Theoretical Ultrafast Physics
Adjunct Faculty	
Dr. P. C. Deshmukh Ph.D. (Nagpur University)	Photo Absorption Processes in Free/Confined Atoms

2. ACADEMIC PROGRAMMES

The Institute offered admissions in 2023-24 academic year to the B. Tech programme in the following disciplines:

- Chemical Engineering
- Civil Engineering
- Computer Science & Engineering
- Electrical Engineering
- Mechanical Engineering

During the academic year 2023-24, the Institute launched M.Tech programmes in Chemical Engineering and in the areas of Thermal Engineering and Energy Systems in Mechanical Engineering. M.Tech programmes in the disciplines of Civil Engineering (Environmental and Water Resources Engineering, Geotechnical Engineering, Structural Engineering, and Transportation & Infrastructure Engineering), Computer Science & Engineering, Electrical Engineering (RF and Microwave Engineering, Microelectronics & VLSI, Signal Processing and Communications) and Mechanical Engineering (Design and Manufacturing) were started in the previous academic years. A total of 102 students were admitted to the M. Tech programme during the academic session 2023-24.

The Institute started M.Sc. programmes in Physics and Chemistry during the academic year 2020-21 and the M.Sc. in Mathematics and Statistics was launched during the academic year 2019-20. A total of 57 students have been admitted into the M. Sc. Programmes during the academic year 2023-2024.

IIT Tirupati has also started Master of Public Policy (MPP) in the academic year 2022-23 under the Department of Humanities & Social Sciences and 19 students have been admitted into the Programme during the academic year 2023-24.

IIT Tirupati has continued admitting students to its M.S. (Research) and PhD programmes in the disciplines of Engineering, Sciences, and Humanities and Social Sciences with focus on respective research areas.

The following section contains the details about the student statistics and fellowships regarding all courses in IIT Tirupati.

2.1 STUDENT STATISTICS

B. Tech Programme

In the academic year 2023-24, 236 students joined the Institute against 244 sanctioned seats. Out of a total of 236 students admitted, 188 were boys, and 48 were girls. The overall percentage of the girl students registered under various programmes of the Institute is 22.53%. The break-up of the students admitted is summarized year wise in the tables below:

Table 2.1: Details of the B. Tech students admitted to the Institute

	General		EWS		OBC		SC		ST		Total
Year	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2019	64	13	11	5	40	10	24	5	13	2	192*
2020	68	18	16	5	51	13	27	8	13	5	224**
2021	65	17	20	6	53	13	28	8	13	5	228***
2022	60	13	25	6	51	12	27	8	15	5	222****
2023	65	19	26	4	53	15	29	7	15	3	236*****

* Including 3 preparatory course students
** Including 10 preparatory course students
*** Including 8 preparatory course students
**** Including 6 preparatory course students
***** Including 6 preparatory course students
***** Including 2 preparatory course students

M. Tech Programme

Table 2.2: Details of the M.Tech students admitted to the Institute

Year	Boys	Girls	Total
2019	44	15	59
2020	63	6	69
2021	63	18	81
2022	80	13	93
2023	78	24	102

M. Sc. Programme

Table 2.3: Details of the M. Sc. students admitted to the Institute

Year	Boys	Girls	Total
2019	5	5	10
2020	27	15	42
2021	27	16	43
2022	32	8	40
2023	43	14	57

M.S. (Research) Programme

Table 2.4: Details of the M. S. (Research) Scholars admitted to the Institute

Year	Boys	Girls	Total
2019	8	2	10
2020	9	4	13
2021	8	7	15
2022	8	2	10
2023	8	1	09

Ph.D. Programme

Table 2.5: Details of the Ph.D. Scholars admitted to the Institute

Year	Boys	Girls	Total
2019	32	14	46
2020	46	17	63
2021	40	17	57
2022	39	22	61
2023	49	17	66

Master of Public Policy (MPP)

Table 2.6: Details of the MPP Students admitted to the Institute

Year	Boys	Girls	Total
2022	9	8	17
2023	11	8	19

Table 2.7: Details of the students enrolled in the Institute

Programmes	Boys	Girls	Total
B. Tech	721	184	905
M. Tech	146	35	181
M. Sc.	70	20	90
MS (Research)	30	8	38
PhD	199	82	281
MPP	20	16	36
Total	**1186**	**345**	**1531**

2.2 FINANCIAL ASSISTANCE

B.Tech Scholarship

The scholarships available to the students admitted to the B. Tech Programme of the Institute include Institute Merit-Cum-Means Scholarship, SC/ST scholarship and Institute Fee Studentship as per Government of India norms. A table is given below for the reference:

Table 2.7: Details of the scholarships offered to the B. Tech students in Academic Year 2023-24:

Sl.No.	Type of Scholarship	Details of Scholarship	No. of Students			
			2020	2021	2022	2023
1.	Merit-cum-Means scholarship for 25% of the students admitted whose parents' income is not more than Rs. 4.5 lakh per annum	▪ Exempted payment of tuition fee, Rs. 1000/- per month pocket allowance	41	44	35	35
2.	Free Studentship for 10% of the students admitted whose parents' income is not more than Rs. 4.5 lakhs per annum	▪ Exempted payment of tuition fee	0	0	0	0
3.	SC/ST Studentship for students whose parents' income is not more than Rs. 4.5 lakhs per annum	▪ Rebate in mess charges up to Rs. 8000 per semester, ▪ Free lodging ▪ Rs. 250/- per month pocket allowance	10	15	11	19
4.	Vidya Lakshmi Scheme	▪ Reimbursement of the amount of interest levied on the tuition fee component in education loan taken by the students whose family income is less than Rs. 9 lakh per annum	11	4	4	0

M.Sc. Scholarship

Sl.No.	Type of Scholarship	Details of Scholarship	No. of Students	
			2022	2023
1.	Merit Scholarship	▪ Rs. 1000/- per month and exemption of tuition fees	8	11
2.	Free Studentship	▪ Exemption of tuition fees	3	0
3.	50% Free Studentship	▪ Exemption of 50% tuition fees	2	0

MPP Scholarship

Sl.No.	Type of Scholarship	Details of Scholarship	No. of Students	
			2022	2023
1.	Merit Scholarship	▪ Rs. 1000/- per month and exemption of tuition fees	8	5
2.	Free Studentship	▪ Exemption of tuition fees	3	4
3.	50% Free Studentship	▪ Exemption of 50% tuition fees	2	1

Assistantship Available to M. Tech, M.S. (Research), and PhD Scholars

The students admitted to M. Tech get HTTA (Half Time Teaching Assistance) of Rs. 12,400/month, and scholars admitted to M.S. (Research) get HTRA (Half Time Research Assistantship) of Rs. 12,400/month.

Ph.D. scholars get a revised fellowship (HTRA) of Rs. 37,000/- per month for the first 2 years, and Rs. 42,000/- per month from the 3rd year w.e.f 01.01.2023 as per Ministry of Education letter No 12-2/2023-UI dated 11.09.2023.

3. ACADEMIC INFRASTRUCTURE

Since its inception, improving academic infrastructure has been one of the primary goals of IIT Tirupati. The Institute has constructed a number of facilities on its Permanent Campus in Stages 1A, 1B, and 1C of the first phase construction. A few engineering and science laboratories, workshops, a multipurpose building (consisting of classrooms, library, computer centre, and health centre) were constructed in the Stage 1A phase of the constructions. A classroom complex that was built under Stage 1B was made operational during the 2019-20 academic year. A large number of classrooms of different sizes and seating capacity have been constructed and made operational since August 2022 under Stage 1C. This section of the report provides a glimpse of the several academic facilities and laboratories created in the Institute particularly during the year 2023 and 2024.

3.1 CLASSROOMS

A total of fifty-two classrooms of different seating capacities have been constructed under Stage 1A, 1B, and 1C and have been operational since 2018 in various stages. The details of the classrooms that were created have been summarised in the Table below.

Sl. No	Description	Classroom seating capacity					Remarks
		40-seater	60-seater	90-seater	120-seater	240-seater	
1	South Campus	9	12	-	2	-	Constructed under Stage 1A & 1B.
2	Academic Building-1 (AB-1)	-	9	-	-	-	Constructed under Stage 1C
3	Academic Building-2 (AB-2)	4	6	-	1	-	
4	Lecture Hall Complex (LHC)	12	12	-	4	1	
5	Central Instrumentation Facility (CIF)	-	-	1	-	-	

All the classrooms are equipped with desktop computers with Internet access, projectors, screens, and audio systems. All the 120-seater classrooms is an electronic virtual classroom with video conferencing facilities with a 1 Gbps bandwidth connection and is already in use for the purpose of holding interactive classes and invited talks

3.2 COMPUTING & NETWORK FACILITIES

At IIT Tirupati, the Computer Centre (CC) serves as a vital hub supporting the technological needs of our academic community. During the year 2023-24, the CC has remained steadfast in its mission to deliver advanced IT services and infrastructure for facilitating research, teaching, and administrative operations across the institute. Operating at the nexus of technology and academia, the CC fulfils a multifaceted role, catering to the diverse needs of students, faculty, and staff. From managing network connectivity to orchestrating software procurement and maintaining cutting-edge data centres, the CC is unwavering in its commitment to enhance efficiency, security, and accessibility.

The CC offers an array of IT-related services, ranging from internet connectivity through LAN and Wi-Fi to the provision of VPN access, virtual machines, HPC resources, email services, software licenses, application development, website maintenance, and process automation. Furthermore, the CC actively promotes the adoption of free and open-source software (FOSS) within the institute, alleviating the financial strain of proprietary solutions while ensuring the fulfilment of end-user departmental needs.

3.2.1 Data Centers

The CC shoulders the responsibility of managing the central computing infrastructure at IITT

which encompasses the management of three data centres. While one data centre is located at the South Campus, Academic Building 1 accommodates two dedicated data centres, each serving distinct purposes.

- **South Campus Data Centre (SDC):** The SDC currently hosts essential infrastructure responsible for powering the computing systems at IITT, including VMware, HPC, and GPU clusters in the smart racks.
- **Project Data Centre (PDC):** With a focus on research projects, PDC spans 815 sqft and provides essential computing infrastructure related to the ongoing research projects of the faculty members. Currently, the PDC doubles as the disaster recovery site for crucial virtual machines hosted within the SDC.
- **Central Data Centre (CDC):** CDC spans 2140 sqft and hosts critical computational resources (servers, network switches, storage units, and specialized IT infrastructure) and applications of the institute.

Project Data Centre

The CDC is poised to become a cornerstone of the institute's IT infrastructure strategy for the next decade. Engineered to meet industry standards, CDC infrastructure will be designed with features such as high availability, fault tolerance, and energy efficiency. With the capacity to accommodate up to 40 smart racks, it is primed to meet the institute's computational needs for the next decade. Presently, plans are underway to deploy 10 additional Smart Racks in CDC, alongside expansions to the institute's cloud and HPC infrastructure, aligning with the burgeoning demands of research activities.

Furthermore, the SDC is earmarked for conversion into a Disaster Recovery Centre, fortifying the institute's resilience against potential disruptions.

3.2.2 Computer Laboratories

The CC's Computers and Peripherals vertical maintains cutting-edge computer labs equipped with state-of-the-art hardware and AV infrastructure. These facilities serve as vital hubs for academic activities, workshops, and events, fostering a dynamic learning environment.

The Computer Centre currently has four laboratories. Three computer labs are set up in Academic Building 1, each with capacities 56, 63, and 28, respectively, and the fourth lab situated in the south campus has a capacity of 30 and serves as a BYOD lab. The CC labs have state-of-the-art audio and video infrastructure to conduct laboratory sessions, online demonstrations, competitive exams, etc.

Moreover, the laboratories in Academic Building 1 feature podiums equipped with Wacom tablets, enabling content projection onto TVs without the need for traditional whiteboards. By leveraging technology, instructors can enhance their presentations and provide students with a more engaging learning experience.

Central Computing Facility 1 (CCF1)

3.2.3 Networking Infrastructure

The CC is responsible for providing seamless internet and campus-wide networking connectivity to all the users in the campus. With a vision of future scalability, the campus-wide network infrastructure at the campus is designed with scalability and reliability in mind. From its inception, it aims for a minimum of 10G backbone network connectivity, expandable to 25G in the future.

The campus is divided into four zones: Academic, Residential, Hostel, and South Campus. Each zone, except the South Campus, connects to the Central Data Centre (CDC) via a robust 144-core Optical Fibre Cable (OFC) ring. The South Campus zone is also linked to the Central Data Centre (CDC) through a dedicated 48-core OFC ring. The core capacity of these OFCs is engineered to meet the connectivity needs for the next 20-25 years, thereby ensuring that future expansion requirements are adequately addressed.

Internet services are provided to all users through a robust network setup featuring Cisco core switches in the south campus, a Juniper router, and a Sophos-330 XG firewall. The Institute boasts a 1 Gbps internet connection from the National Knowledge Network (NKN), supplemented by a backup 1 Gbps link via BSNL to ensure continuous connectivity for crucial IT infrastructure. The upgrade of the primary NKN link to 10 Gbps is in progress.

The networking infrastructure prioritizes fault-tolerant connectivity, incorporating High Availability (HA) functionality. Additionally, it provides cutting-edge wireless connectivity utilizing WiFi6 technology to cater to high user density and bandwidth requirements. Wired and WiFi-based wireless connectivity is available in academic, administrative buildings, and hostels, facilitated by integrated Cisco wireless routers and controllers. Each building in the campus is connected via a 12-core OFC connection, enabling seamless internet access for users. The south campus is equipped with a 10G passive network infrastructure.

Network operations are monitored and managed through advanced network management software, while perimeter-level security is maintained via a firewall solution from Sophos. Additionally, the vertical oversees analog and digital telephony services, implemented using the Openscape X8 System. A comprehensive surveillance system covers essential areas in and around the campus, ensuring safety and security, with footage recorded on the institute server.

Currently, the CC has initiated Proof of Concept (POC) activities and is focused on upgrading its firewall and IP telephony services.

Furthermore, the institute offers the Eduroam service, providing seamless internet connectivity to students, researchers, and staff, enhancing their academic and professional endeavours.

3.2.4 Software Vertical

Through proactive software procurement and maintenance, the CC's Software vertical ensures the availability of essential tools while promoting compliance with licensing standards. From Windows OS to specialized applications, the CC supports diverse academic and administrative needs.

The CC provides licenses for various software, including but not limited to Windows 10 Education, Microsoft 365 Apps, MATLAB, KASPERSKY, Mathematica, Foxit Phantom PDF, Origin Pro, Autocad, Creo Software, COMSOL Multiphysics, OrCAD Software, VIVADO, Simulia Abaqus, Ansys, Bentley, ChemDraw, GeoStudio 2018, CSI, Cadence, AspenONE for Universities, Microsoft Project Professional 2019, Converge, TCAD, etc.

Additionally, the vertical is responsible for developing and maintaining websites and portals, encompassing the institute's main website, departmental websites, intranet portal, admissions, course proposals, CSRC, feedback mechanisms, service platforms, recruitment portals, and more. Furthermore, the vertical oversees institutional email services provided to the IITT community.

3.2.5 Ticketing System

The CC uses a dedicated ticketing system, which is part of the Institute workflow system, to receive and ensure prompt resolution of the service requests and issues reported concerning its verticals - Computers, Networks, Software, Systems, and Workflow. This ensures efficient tracking of issues, thus enhancing the overall operational productivity of the staff.

3.2.6 High Performance Computing and Cloud Infrastructure

The CC's Systems vertical extends cloud computing and HPC services to institute users. A Private Cloud tailored for Infrastructure as a Service (IaaS) provisioning offers customised virtual servers/machines to various departments. Leveraging the VMware virtualisation platform on HP and Supermicro servers, alongside HP 3PAR SAN storage, the data centre epitomises reliability and performance.

The Lotus and Orchid HPC clusters bolster research initiatives and provide heavy to moderate computing infrastructure, ensuring round-the-clock operational availability.

The Lotus HPC cluster enhances research and academic pursuits. The cluster has high-end Supermicro servers, Infiniband Network along with required software components, and PBS Pro as a job scheduler. Its configuration comprises 24 CPU compute nodes, 2 GPU nodes, and ample disk space allocation, facilitating seamless execution of compute-intensive tasks.

The Orchid GPU cluster has 5 GPU nodes, Orchid boasts substantial computing power, with each node equipped with 20 CPU cores, 128 GB memory, and 3 Nvidia GeForce GTX 1080Ti 11GB GPUs. Orchid employs PBS Pro for job scheduling, ensuring efficient resource allocation.

3.2.7 Workflow and Office Automation

With an emphasis on operational efficiency and transparency, the Workflow and Office Automation vertical spearheads the implementation of IT-enabled workflows across various domains. The institute strives to streamline administrative processes and enhance service delivery by leveraging modern technologies and process documentation.

The institute has implemented a comprehensive workflow system, comprising twelve modules that cover various aspects such as Finance, Accounts, and Audit; Stores, Purchase, and Inventory Management; Human Resources; Academics; Placements, Student Affairs, and Hostel Management; Health Centre; Library Management; Engineering Unit; International and Alumni Affairs; System Administration and Integration; General Administration; and SRC-Projects and CEP.

This system is fully operational at IIT Tirupati, with the workflow vertical actively coordinating with module owners and the workflow development team to ensure the timely completion of new features and enhancements. By maintaining close communication and collaboration, this vertical ensures the smooth functioning and continuous improvement of the workflow system across the institute.

3.3 SCIENCE LABORATORIES

For the undergraduate, postgraduate and PhD students, Physics and Chemistry laboratories have been developed with the state-of-the-art facilities. During the year 2023-24, the laboratories got further equipped with added experimental setups. Following are the details of the science laboratories on the campus:

3.3.1 Chemistry Laboratory

The undergraduate chemistry laboratory was established in January 2016. First-year B.Tech. students experience well designed and concept-oriented experiments related to chemical sciences and engineering.

Some of the exciting experiments are listed below.

- Preparation of Aspirin: an analgesic drug
- Liquid-liquid extraction of caffeine from different brands of tea
- Determination of the strength of the citrus fruit juice by using conductometric titration
- Quantitative estimation of the copper content in alpha-brass by using the colorimeter
- Determining the temporary and permanent hardness of water samples collected in and around the IIT campus.
- The state-of-the-art MSc and PhD research labs are equipped with modern facilities for conducting MSc practical course, Master's project work and the PhD research.

Major equipment available in the chemistry laboratory

The Department of Chemistry is equipped with a couple of high-end workstations to cater to computational research need. In addition to this, the theoretical Chemistry Research group has established a moderate HPC 'Bose' having 8-computer nodes, one master node and adequate hard disk storage to do the computational research.

Computing Facility: 7 Workstations each having Dual Socket with 20 processors & 128 GB RAM, running at a clock-speed of 3.1 GHz.

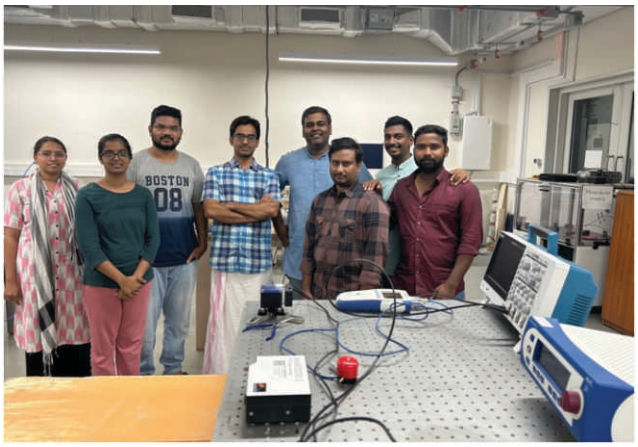
- GC-MS
- HRMS
- Glove Boxes
- Preparative HPLC
- Analytical HPLC
- UV-Vis-NIR Spectrometer
- UV-Vis Spectrometer
- FTIR-ATR
- Fluorescence Spectrometer
- Electrochemical Workstation
- Inverted Microscope
- Digital Color Camera with Accessories
- Mini-Sub Cell GT Horizontal Electrophoresis System
- UV-Photoreactor
- Table-Top Refrigerated Centrifuge
- Digital Polarimeter
- Mini Rotary Shaker
- Multimode Microplate Reader
- TGA Equipment
- Lyophilizer
- Freezer (-20 °C)
- Freezer (-80 °C)
- Industrial Refrigerator (2 nos, 0 °C)
- Syringe Infusion Pump
- Type I & III Water Purifying System
- CO2 Incubator
- HPC Cluster and Accessories
- Microprocessor Based Conductivity/TDS Meter
- Microprocessor Based pH Meter
- Digital Storage Oscilloscope
- Digital Hot Plate with Magnetic Stirrers
- Electronic Analytical Balance
- Hot Air Oven
- Ice Flacking Machines
- Rotary Evaporator
- Fume Hood to Handle Hazardous Chemicals
- Bio-Safety Cabinet
- UV-Cabinet-with UV Filter
- Benchtop Conductivity Meter
- Benchtop pH Meter
- Distilled Water Plant – 4-litre Capacity
- Digital colorimeter
- Melting Point Apparatus
- Water Baths
- Oil Free Portable Vacuum Pumps

3.3.2 Physics Laboratory

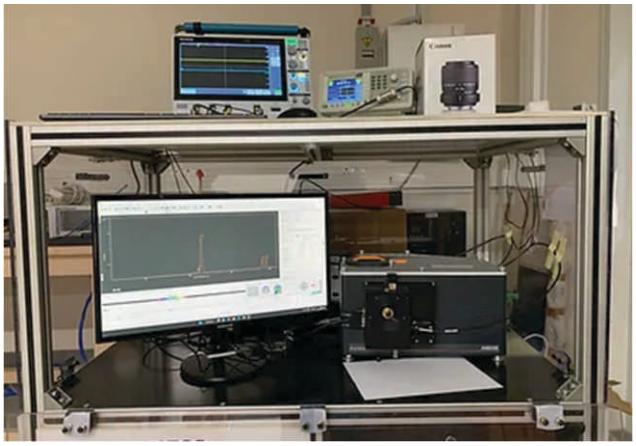
The Department of Physics has teaching laboratories for the first-year undergraduate programme and for the postgraduate programme. The undergraduate laboratory was set up with the inception of the Institute in 2015 and has been constantly upgraded since then based on the increasing intake in the B. Tech programme. The Master's level teaching laboratories have been set up during the academic year 2020-21. All the laboratories host several state-of-the-art equipment that enable students to have hands-on experience and develop a better understanding of various physics concepts. In addition, research laboratories in the areas of experimental Atomic, Molecular and Optical Physics, experimental Condensed matter physics, Quantum Optics, Cold Atoms, Plasma Physics, and computational physics are being developed with financial support from the Institute and external agencies.

3.3.2.1 Plasma Processing Laboratory

The Plasma Processing Lab is focused on carrying out fundamental and applied research involving low temperature plasmas. The lab is equipped with a comprehensive array of advanced instruments: (1) A high-resolution UV-VIS spectrometer with an ICCD camera that can perform time-resolved spectroscopy measurements in the nanosecond time range. These measurements provide insights into the time evaluation of various plasma-mediated species and are useful in optimising the plasma processing in a given application, and (2) A tunable diode laser absorption spectroscopy setup, which quantifies plasma species concentrations in real-time.



The team members of the plasma group along with tunable diode laser absorption spectroscopy setup.



High-resolution UV-VIS spectrometer with ICCD camera for time-resolved spectroscopy measurement.

3.3.2.2 Quantum Materials Laboratory

The research at Quantum Materials Laboratory involves synthesising novel quantum magnetic materials of different varieties to address a few important fundamental and application-oriented aspects in Condensed Matter Physics. The synthetic materials are in the form of polycrystalline and single crystalline nature. The methods used for the synthesis are solid-state reaction and hydrothermal methods.

For sample preparation, the lab is equipped with various box furnaces that can handle temperatures up to 1200 degrees. The structural characterisations are carried out using the bench-top XRD at the common research facility, Department of Physics.

3.3.2.3 Precision Measurement Laboratory

The Precision Measurement Lab (PML) is focused on carrying out fundamental and applied research using warm and cold atomic vapor as well as trapped ions for quantum communication and quantum sensing and metrology applications.

1. Quantum communication: In this domain, the lab is developing quantum memories and quantum repeaters for a scalable quantum network as well as for distributed quantum computing and quantum information schemes. Also, it focuses on the development of narrowband, high brightness single and entangled photon sources based on atomic platforms.

2. Quantum sensing and metrology: In this domain, the lab is working towards building portable atomic clocks using trapped ions as well as warm atomic vapor.

The lab is equipped with state-of-the-art instruments for experiments connected to quantum communication and quantum sensing and metrology. Two vibration isolation optical tables (Newport RS2000) were installed. In addition, multiple extended cavity as well as regular semiconductor diode laser systems from Toptica Photonics and Sacher Laser GmbH for trapping, cooling and precision spectroscopy of rubidium (Rb) atoms and 40Ca+ (calcium) ions have been commissioned. The lab flooring has been specially isolated using ESD (Electrostatic Discharge) flooring technology. The lab also has a dedicated three-phase in-single phase out 16kW, 20kVA UPS along with 2 dedicated chemical earthing pits for maintaining low earth resistance for sensitive instruments connected to the experiments.

Two major experimental programs each connected to the above two quantum technology verticals are underway. Currently the lab has one Chanakya Postdoctoral Fellow and 5 PhD students focusing on diverse problems connected to single and entangled photon pair generation as well the development of portable atomic clocks. A trapped ion all-optical portable atomic clock is under development as one of the flagship projects of the Technology Innovation Hub (TIH) at IIT Tirupati on the Positioning and Precision Technology Vertical.

Lab with vibration isolation table for quantum communication and quantum sensing experiments.

Extended cavity diode laser systems from Toptica Photonics GmbH.

3.3.2.4 Magnetism and Superconductivity Laboratory

The Magnetism and Superconductivity Laboratory is dedicated to the synthesis of novel magnetic materials, including geometrically frustrated lattices, quantum spin liquids, and low-dimensional magnetic ground

states with strong electronic correlations and spin-orbit coupling, and to study their magnetic, transport, and vibrational properties at ambient and hydrostatic pressure conditions. These materials are synthesised in polycrystalline form using the solid-state reaction route. Additionally, the group performs density functional theory calculations, mainly focusing the transport and magnetic properties to support and complement the experimental results. The laboratory is equipped with high-temperature furnaces: (i) Ants Box muffle furnace with T_{max} ~ 1350°C, and (ii) Nabertherm Tubular furnace with T_{max} ~ 1500°C, is equipped with gas supply system for non-flammable protective or reactive gas and water-cooled vacuum flange. The synthesised materials are characterised using the PANalytical X-ray diffractometer, available in the departmental facilities.

3.3.2.5 Undergraduate Physics Laboratory

The laboratory is equipped with a wide variety of experiments in basic and applied Physics, covering the subjects of classical mechanics, optics, electromagnetic theory, solid state physics, electronics, and computations programming such as with MATLAB, etc. The laboratory also has a dedicated partition for conducting the darkroom experiments. The experiments are designed to train the first year B. Tech students with various aspects of physical measurements. The available equipment are as follows:

- Compound pendulum
- Planck's constant apparatus
- Ultrasonic Interferometer
- Equipotential lines mapping setup
- Hall effect apparatus
- Newton rings setup
- Spectrometer
- Digital Storage Oscilloscope
- Four probe method apparatus
- LCR circuit
- Stefan constant setup

3.3.2.6 Postgraduate Physics Laboratory

The Department of Physics initiated the two-year M.Sc. program in Physics in August 2020. A robust and contemporary laboratory component has been included in the curriculum to ensure adequate hands-on experience and training. Two general laboratories christened as PG Physics LAB I and PG Physics LAB II were developed. In addition, a third Advanced Physics Laboratory is being developed that would train students on advanced experimental techniques that enable them to embark on a robust research career. A dedicated darkroom facility has also been developed that hosts classical and Quantum optics experiments.

The PG Labs I and II currently host the following experimental setups:

- Coupled Pendulum
- Millikan Oil Drop Experiment
- Franck-Hertz Experiment
- Viscosity of Newtonian and Non-Newtonian Liquids
- Zeeman Effect Experiment
- Faraday Apparatus – Verdant Constant
- Single Slit Diffraction Experiment
- Ultrasonic Waves in Solids
- Heat Capacity of Measurement for Solids
- Electron Spin Resonance Measurement
- Ferromagnetic Hysteresis Measurement
- Magnetic Susceptibility by Gouy's Method
- Hall Effect in Metals
- Experimental Setup to Find the Efficiency of a Solar Cell
- Variable Angle Laser Ellipsometer
- Digital Storage Oscilloscope

Advanced Physics Laboratory

The advanced physics lab is equipped with:

- Ferroelectric test apparatus
- Dielectric constant measurement apparatus
- Benchtop X-ray Diffraction (XRD) setup
- Pulsed NMR setup

3.4 ENGINEERING LABORATORIES

Faculty members of the different streams of Engineering at IIT Tirupati are keenly involved in developing laboratory facilities for their respective disciplines. Details of the laboratories developed or being developed during the year 2023-24 are hereunder:

3.4.1 Chemical Engineering Laboratories

The Chemical Department has 11 laboratories altogether. The following are the laboratories that facilitate the teaching and research in the Dept. of Chemical Engineering.

1. Prandtl Laboratory
2. Joule Laboratory
3. Reynolds Laboratory
4. McCabe Laboratory
5. Lavenspiel Laboratory
6. Laplace Laboratory
7. Nicolas Laboratory
8. Thiele Laboratory
9. Langmuir Laboratory
10. Gauss Laboratory
11. Brunaeur Emmett Teller (BET) Laboratory

3.4.1.1 Prandtl Laboratory

This Laboratory addresses the interdisciplinary aspect of heat and momentum transport. Especially the focus is on equipment for natural and forced convection and heat transfer equipment such as heat exchangers.

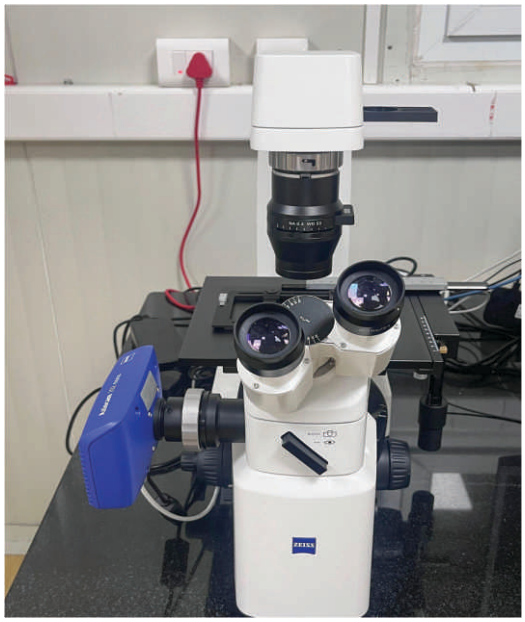
List of equipment in the Laboratory:

- Mini Spray Dryer
- Laminar flow cabinet
- Shell and Tube heat exchanger
- Double pipe heat exchanger
- Heat transfer through composite wall
- Heat transfer in extended surface area

3.4.1.2 Joule Laboratory

The Laboratory specialises in molecular biology, cell culture, and bioprocess engineering. It investigates cellular mechanisms, genetic modifications, and protein synthesis through techniques like PCR and gel electrophoresis. Additionally, it offers capabilities for studying cell-material interactions and conducting functional assays.

Images of the equipment:



Inverted Microscope

The Eppendorf Refrigerated Centrifuge

3.4.1.3 Reynolds Laboratory

The broad research theme of Reynold laboratory revolves around Microfluidics, applied to multiphase flow systems, biorefinery, polymerization, food science, and bioprocessing areas. Presently, the lab is working towards harnessing the combined potential of aqueous two-phase system (ATPS) and microfluidics for food processing and food quality applications. The Reynolds laboratory is equipped with various equipment/instruments such as Microfluidic set-up, optical microscope, high speed camera, HPLC, GC-MS etc.

List of the Equipment:

- Micro Stater Fluidic Kit
- Hot Air Oven
- HPLC (High Pressure Liquid Chromatography)
- GC-MS (Gas Chromatography-Mass Spectrometer)
- Gel Permeation Chromatography
- Micro Particle Image Velocimetry
- Rotary Evaporator
- Vapor Pressure Analyser
- Density Meter

High Pressure Liquid Chromatography

Gas Chromatography-Mass Spectrometer (GC-MS)

3.4.1.4 McCabe Laboratory

This laboratory has sophisticated equipment used by both research scholars and undergraduate students for membrane studies and material preparation. The mass transfer laboratory course is conducted in this laboratory.

Rotary Evaporator

Major Instruments

- Micro & Ultra Filtration System
- Rotary Evaporator
- Vapour Pressure Tester
- Vapour in Air Diffusion System
- Liquid Density Meter
- Infrared Camera

Vapour Pressure Tester

3.4.1.5 Levenspiel Laboratory for Reaction Engineering

The Levenspiel laboratory aims to implement the knowledge of the chemical reaction engineering course and conduct research. It will cover the fundamental reaction engineering experiments such as kinetics of reactions, batch, and continuous reactors, non-ideality of reactors, etc. this laboratory is equipped with Batch Reactor, Plug Flow Reactor, Continuous stirred Tank Reactor, and Thermogravimetric Analysis (TGA)/Differential Scanning Calorimetry (DSC), Foam Analyser, and the Sieve Shaker.

Thermogravimetric Analysis and Differential Scanning Calorimetry

3.4.1.6 Laplace Laboratory for Process Control and Automation

The Laplace laboratory aims at demonstrating classical and modern control concepts. This laboratory is equipped with First and Second Order Systems, a Level/Flow control demonstration unit, and Multivariable Control: Stirred tank, and a temperature controller.

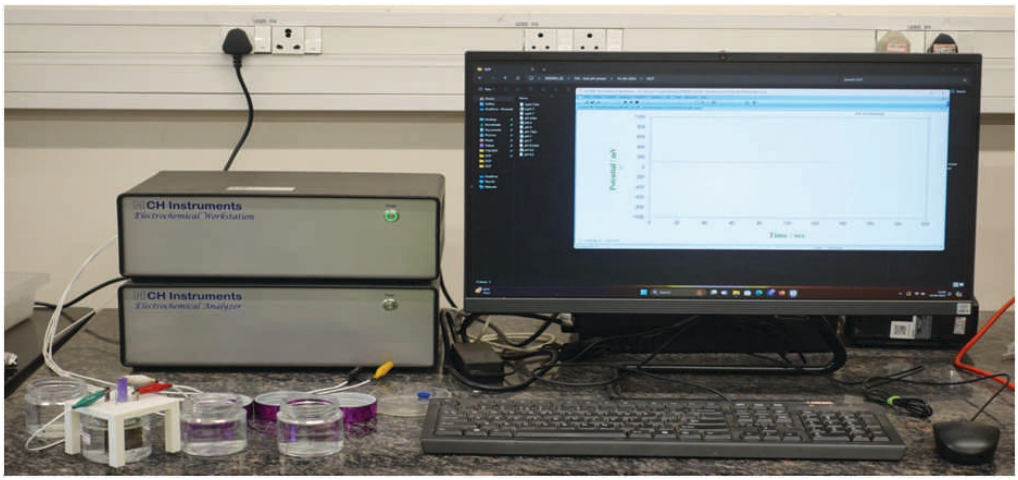
3.4.1.7 Nicolas Laboratory

The Nicolas laboratory is equipped with food technology based on the unit operations involved in chemical engineering, they can be easily adopted for food science and technology, one of the thrust areas of our institute. This laboratory consists of the equipment for the separation and purification processes, size reduction, drying, membrane separations, fluid flow, mixing and homogenization, etc.

Membrane Systems (NF/RO/OMD)

3.4.1.8 Thiele Laboratory

Thiele laboratory is equipped to synthesize the materials (e.g., nano materials, thin films, etc.) via different techniques, which will be useful for research in the field of catalysis, photo catalysis, water splitting, CO2 reduction, energy Storage, etc. This laboratory is equipped with a Microwave Synthesis system, UV Visible Spectrophotometer, Electrochemical workstation, Force tensiometer, optical tensiometer and spin coating unit.



Electrochemical Workstation

UV Visible Spectrophotometer

3.4.1.9 Langmuir Laboratory

The Langmuir Laboratory is used for research and teaching on advanced separation processes, biogas upgradation, natural gas and hydrogen storage, development, and characterization of functionalized nanomaterials for carbon capture, water treatment etc. This laboratory is equipped with an Automated Gas Sorption Analyzer (BET) and Automated Chemisorption Analyzer (TPR/TPD/TPO).

3.4.2 Civil and Environmental Engineering Laboratories

The Civil & Environmental Engineering Laboratories are located in the Lab-1 block in an area of 5400 sq. ft housing the facilities to conduct UG/PG laboratory classes and high-quality research. Further, additional laboratory facilities covering an area of over 40000 square feet are also being created on-campus through the Institute funds with the support of Ministry of Education (MoE) and Ministry-sponsored research grants. The laboratories also provide exposure to students in activity-based learning and hands-on problem-solving. CEE is currently involved in various sponsored research projects funded by national and international agencies in excess of Rupees 20 Crore. The faculty members are engaged in several national and international collaborative projects with centres of excellence, universities, and research institutes. The following are laboratories that facilitate the teaching and research in the Dept. of Civil and Environmental Engineering.

1. Structural Engineering Laboratory
2. Transportation Laboratory
3. Building Material Laboratory
4. Geotechnical Engineering Laboratory
5. Environmental Engineering Laboratory
6. Hydraulics & Water Resources Engineering Laboratory
7. Surveying Laboratory
8. Non-destructive Testing Laboratory

3.4.2.1 Str uctural Engineering Laboratory

The Structural Engineering Laboratory at IIT Tirupati consists of state-of-the-art table-top equipment for undergraduate instruction and advanced equipment for research purposes. The equipment in the UG laboratory facilitates students to understand the fundamental concepts related to the mechanics of materials.

The list of equipment available is given below:

- Stress analysis in a thin-walled cylinder
- Buckling behaviour of Struts
- Deformation of straight beam
- Deformation of bars under bending or torsion
- Bending stresses in beam
- Torsion testing machine
- Analysis of statically indeterminate beam
- Analysis of suspension Bridge
- Three Hinged arch
- Unsymmetrical bending of beams
- Pendulum impact tester

Major research equipment available in the laboratory:

Servo hydraulic universal testing machine (UTM) of 100kN Capacity

MTS-100kN servo hydraulic fatigue rated load frame with cross head-mounted actuator UTM to study the range of materials including plastics, elastomers, steel, aluminium, alloys and more for a range of tests specified below,

- Monotonic (Tensile/compressive) loading
- Reversed cyclic tests
- Fatigue tests (Low cycle & High cycle), fracture toughness and crack propagation studies
- Three/four-point bending tests
- Range of test fixtures compatible with the UTM for advanced material characterisation

Data Acquisition System (DAQ) and displacement transducers

The following HBM make DAQ and transducers available

- 16 Channel DAQ system for strain gauges – 1 No
- 8 Channel universal DAQ system – 2 No
- Linear Variable Displacement Transducer
  0-20 (4 Nos), 0-50mm (2 Nos), 0-100 mm (1 No)
- Strain Gauges starter kit and Installation Kit – 1 No each

As add-on actuator of capacity 250KN compatible with 100kN load frame is procured, and development of structural testing facility at full scale level is presently in progress.

A view of lab with 100kN UTM and DAQ system

Servo controlled Universal Testing Machine (UTM) of 1200kN capacity

Zwick Roell Servo controlled electro-mechanical Universal testing machine (UTM) of 1200kN capacity to test high strength steel rebars (0~60mm diameter), multi-wire strands (0~20mm diameter) and metal flat coupons (0~60 mm thick, up to 100 mm wide) under monotonic tensile loading. The machine is specially equipped with the following displacement transducer, a) contact type extensometer for re-bars and flat specimens, and b) Non-contact Laser type extensometer for Stranded Wires.

Electro-mechanical actuator of 5kN actuator

Zwick Roell electro-mechanical actuator of 5kN capacity is with load frame for testing films, fibres, elastomer, geotextiles and composites, under monotonic and cyclic loading.

Low force UTM of capacity 2.5 KN with necessary test fixtures

Zwick Roell Electromechanical UTM with 2.5 kN capacity for testing like ceramics, plastics, rubber, individual natural and composite fibres, matrix materials, agricultural products, biomaterials such as tissues, packaging materials, foams, composite films and membranes under different loading scenarios such as under tensile, compression, shear and flexure.

Compressive Testing Machine

The family of CTM has a wide range of testing capacity with high precision (i.e., 15 kN to 5000 kN). Major components of the equipment are

- 5000 kN CTM for concrete and rock test
- 15 kN & 500 kN frame for mortar test
- 350 kN bending test frame.

IIT Tirupati's Structural Engineering Lab has acquired twin-acting hydraulic cylinders (commonly known as Jacks) with capacities of 140 tonnes and 300 tonnes. The system is supported by an electric hydraulic pump with accessories. The lab has also procured linear variable transducers (LVDTs) with capacities of 20 mm, 50 mm, and 100 mm.

3.4.2.2 Transportation Engineering: Advanced Pavement Systems (APS) Laboratory

The Advanced Pavement Systems (APS) laboratory at IIT Tirupati is currently housed inside a state-of-the-art sustainable building on the permanent campus. The equipment housed in this laboratory allows for undergraduate teaching and postgraduate and doctoral research activities in the areas of sustainable transportation infrastructure and pavements/materials. The APS laboratory is divided into two major sections, as listed under.

The details of the state-of-the-art equipment and accessories under each head is provided below.

A) Asphalt Binder Characterization Equipment, Semi-automated penetrometer, Ring and ball apparatus, Ductilometer, Rotational viscometer, Dynamic shear rheometer and Pressure aging vessel

B) Asphalt Concrete and Cement Concrete Mixtures Characterization Equipment, Asphalt mixer, Pan mixer, Marshall Compactor, Marshall stabilometer and Vacuum pycnometer, Superpave gyratory compactor, Los Angeles Abrasion test

Major research facilities available:

Universal Testing Machine or Dynamic Testing System: This state-of-the-art equipment and several associated accessories are capable of characterising various pavement materials such as asphalt concrete, pervious concrete, soil, unbound granular materials, fibres, and plastics. The machine houses a computer programmable control unit and a 16-channel data acquisition control system that is flexible to use any transducer in any channel, which are automatically calibrated on power-up.

The following test configurations are available within the system:

i. Uniaxial cyclic compression
ii. Indirect tensile modulus, creep compliance, and strength
iii. Indirect tensile fatigue
iv. Four-point bending on both asphalt concrete and low-strength cement concrete
v. Dynamic modulus
vi. Resilient modulus
vii. Triaxial test
viii. Semi-circular bending

A View of Transportation Engineering Lab

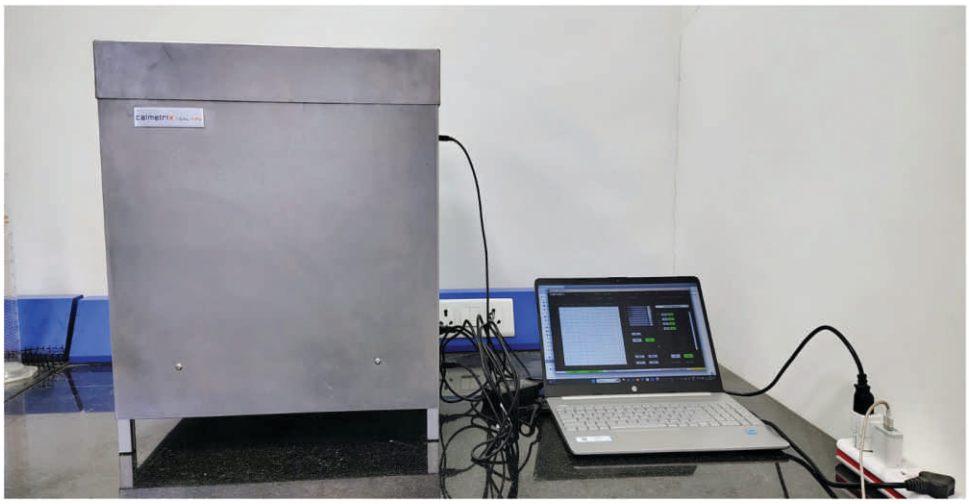
Equipment in Advanced Pavement Systems Laboratory at IIT Tirupati:
(a) Rotational viscometer (b) Marshall stabilometer (c) asphalt mixer (d) Marshall compactor (e) Softening point apparatus (f) Penetrometer (g) Universal testing machine 30 kN capacity (h) Ductilometer (i) Dynamic shear rheometer (j) Pressure aging vessel (k) Los Angeles abrasion testing machine

3.4.2.3 Building Materials Laboratory

The main objectives of experimental studies on building materials and its components are to facilitate quality control and compliance with specifications. These studies impart an understanding of the test methods to find the physical and mechanical properties of building materials such as concrete ingredients such as cement, coarse and fine aggregates, wet and hardened concrete, brick, and tile, et cetera.

The lab is equipped with the following major equipment:

- 2000kN Load Controlled Compression Testing Machine (CTM)
- Vee Bee Consistometer, Flow Table, Compaction Factor Apparatus, Slump Cone
- Pycnometer and Cylindrical Metal Measure
- Cement Mortar Vibrator, Table Vibrator and Poker Vibrator
- Pan type concrete mixer 130-litre capacity and Drum type concrete mixer 60-litre capacity
- Isothermal Calorimetry



Isothermal Calorimetry

The experimental studies performed in the lab have been categorised into:

- **Tests on cement:** Normal consistency; Initial and final setting times; Specific gravity; Soundness; Finesses; Compressive strength of cement cubes
- **Tests on coarse aggregate:** Specific gravity; Bulk density; Impact value; Abrasion value; Crushing value
- **Tests on fine aggregate:** Specific gravity; Bulk density; Particle size distribution
- **Tests on fresh and hardened concretes:** Slump test; Compaction factor test; Flow table test; Vee Bee Consistometer test; Compressive strength of concrete cubes and cylinders; Split tensile strength; Modulus of rupture
- **Tests on brick:** Compressive strength; Water absorption; Warpage; Efflorescence; Dimensional tolerance
- **Tests on tile:** Transverse strength of tiles; Wear resistance of tiles

3.4.2.4 Geotechnical Engineering Laboratory

The Geotechnical Engineering Laboratory at IIT Tirupati is equipped with the basic and state-of-the-art equipment for Undergraduate and Postgraduate studies to characterise the physical, hydraulic, and mechanical properties of soils under static and seismic loading conditions. In addition to the basic equipment, the laboratory is also fully equipped with advanced testing facilities for research purposes. The laboratory facilities are created to train and prepare the civil engineering students to meet the industry need in providing solutions to real-life geo-engineering, geo-hazards, and geo-environmental related issues.

The basic equipment for conducting routine soil characterisation include:

- **Soil classification** - to classify the soil based on grain size distribution analysis is done using a set of sieves, sieve shaker, hydrometer analysis and Atterberg limit tests.
- **Automatic compactor** - to determine the maximum dry density and optimum moisture content of soils for earthwork applications.
- **Automatic soil sample extruder** - manual-cum-hydraulic 60 kN capacity soil sample extruder for extracting samples from 38 mm diameter to 150 mm diameter and up to 600 mm length.
- **Permeability tests** - the permeability of coarse-grained soil and fine-grained soils are measured using the constant head and falling head apparatus, respectively.

- **Consolidation settlement** - 3-gang unit to determine the magnitude and rate of 1D-consolidation settlement of fine-grained soil deposits
- **Direct shear testing** - used to determine the shear strength parameters of cohesionless soils and the interface friction parameters between soil-concrete and soil-geotextile on a small scale.

Advanced geotechnical testing equipment:

- **Automated Stress-path Triaxial Equipment**
  - Used to measure the stress-strain, volume change or pore pressure behaviour of soils under varied combination stresses.
  - Can be used to test the specimens of soils of diameter from 38 mm diameter to 150 mm diameter.
  - Can also be used to measure the permeability using constant gradient method.
  - Can be used to apply axial load up to 50 kN and confining pressures up to 2000 kPa.
- **Automated Cyclic Triaxial Equipment**
  - to determine the maximum dry density and optimum moisture content of soils for ear

MASW setup with 24-channel seismograph to measure in-situ shear wave velocity

Toxicity Characteristic Leaching Procedure (TCLP) Equipment

In-plane permeability apparatus for Geosynthetics

UTM for Geosynthetics

Toxicity Characteristic Leaching Procedure (TCLP) Equipment

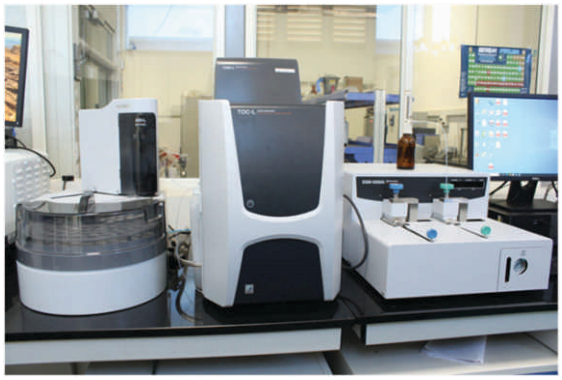
3.4.2.5 Environmental Engineering Laboratory

The Environmental Engineering program at IIT Tirupati is designed to give an insight into the core skills required to be a professional environmental engineer. The undergraduate and graduate-level courses are designed with strong practical components to acquire hands-on experience and equip students to understand better and solve real-life environmental issues. The laboratory is equipped with state-of-the-art facilities to perform advanced water, wastewater, and air quality analyses. A team of faculty and students is dedicated to research and development and offers engineering solutions to address diverse industrially and socially relevant environmental problems.

A View of Environmental Engineering Wet Lab

Environmental Engineering Laboratories

- Advanced Instrumentation Facility
- Air Quality Research Laboratory
- Water Quality Laboratory
- Microbiology Laboratory
- Geoenvironmental Laboratory



Total Organic Carbon (TOC) analyser and Total Nitrogen (TN) Analyser

3.4.2.6 Hydraulics & Water Resources Engineering Laboratory

The Hydraulics and Water Resources Engineering Laboratory at IIT Tirupati boasts of futuristic equipment for undergraduate instruction and advanced equipment for research purposes. The laboratory allows students to understand the various aspects of fluids at rest and in motion in engineering applications. For instance, students learn the fundamentals of fluid mechanics and hydraulics, such as hydrostatic pressure on plane surfaces, Bernoulli's principle, flow measurement devices, the impact of jets on surfaces, frictional losses in pipes, and flow over weirs and notches.

Ground penetrating radar

Research equipment includes an Advanced Hydrologic Investigation module that can be used for studying a variety of hydrological processes. For instance, this apparatus can be used to study the effects of rainfall of varying durations and intensities on runoff generated and storage capacities of soils. It can also be used to study seepage flow and the effects of wells on groundwater levels over time. This apparatus can also study the flow behaviour in rivers, impact of obstacles in the riverbed, sediment transport, etc.

3.4.2.7 Surveying Laboratory

The Surveying Laboratory is equipped with a wide range of instruments available for conducting experiments. This includes relatively simple equipment like Prismatic Compasses, Vernier Theodolites, Dumpy Levels, Plane Tables and associated accessories like Ranging Rods, Cross Staff, Arrows, Pegs, etc. More sophisticated equipment, such as Auto Levels, Hand-held GPS devices, and Total Station (5" and 1" accuracy) are also available in the laboratory. Civil Engineering students are trained to use all the necessary equipment in order to learn the fundamentals of surveying.

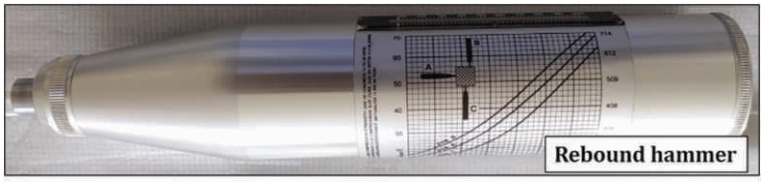
3.4.2.8 Seismological Observatory Station

The observatory station is established by the National Centre for Seismology under the Ministry of Earth Sciences. This records any seismic related activities in the Southern portion of Andhra and the Northeastern part of Tamil Nadu.

3.4.2.9 Non-Destructive Testing and Health Monitoring Laboratory

Modern urban built environment is largely concentrating on infrastructure creation, and the demand for concrete and steel structures in this context is enormous. Ensuring quality in construction process and assessing the condition of a structure are imperative in ensuring sustainable infrastructure. Structures usually undergo deterioration when exposed to environment due to deleterious agents like chlorides, carbon dioxide, sulphates etc.. Instead of adopting a corrective approach, philosophy of maintenance of infrastructure shall be proactive in nature, and hence, condition assessment of structures plays a significant role in infrastructure creation and maintenance, and this is normally achieved using non-destructive testing and evaluation. Non-destructive testing (NDT) is carried out to detect defects and anomalies in test specimens without affecting them. This is carried out as part of inspection processes and is normally

centred around the idea that the existing performance/service of the structure is not hindered while inspecting. Currently, the NDT and health monitoring laboratory at IIT Tirupati is equipped in estimating in-situ strength and quality of structures. In addition, the lab also consists of state-of-the-art equipment to determine the corrosion characteristics of reinforcing steels.



Potentiostat

Multichannel electrochemical workstation

3.4.3 Electrical Engineering Laboratory

The Department of Electrical Engineering at IIT Tirupati has set up state-of-the-art lab facilities with cutting-edge technology, providing hands-on training to students. Through these laboratories, over the course of their curriculum, students get trained in various verticals like Power & Control, Signal Processing & Machine Learning, Next Generation Wireless Communications & Networks, Semiconductor Devices, VLSI & Embedded Systems and Radio Frequency & Microwave Engineering. The details of the specific laboratories are as follows:

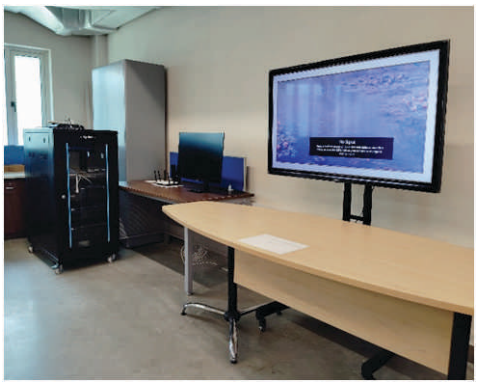
3.4.3.1 5 G - Use Case Lab

The 5G use case lab was awarded by the Department of Telecommunications to propel the development of 5G. It is designed to provide students with hands-on experience in understanding, designing, and implementing use cases based on 5G technology. As the fifth generation of mobile networks, 5G offers significant advancements over previous generations, such as ultra-low latency, massive connectivity, high data rates, and improved reliability. This lab focuses on exploring these capabilities through various real-world use cases across industries like IoT (Internet of Things), smart cities, autonomous vehicles, and healthcare.

The key Equipment's

• 5G CORE	• 5G SERVER
• 5G RADIO (g Node B)	• 5G HANDSETS
• 5G INDOOR CPE	• 5G MINI DRONE
• 5G XR(AR/VR/MR)	• IoT GATEWAY
• 5G AI CAMERA	• IoT SENSORS

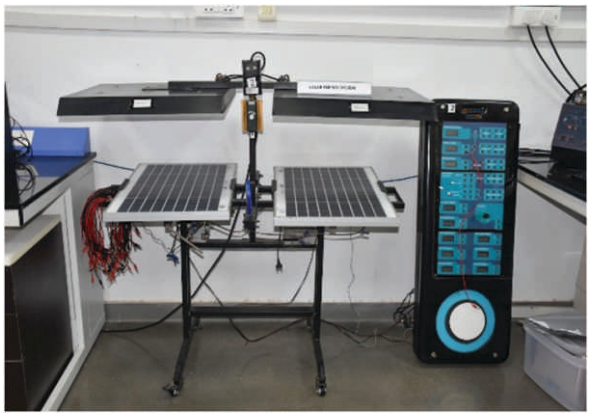
Lab View



5G Rack

3.4.3.2 Control and Automation Lab

Control systems are at the heart of modern automation and technology, ensuring precision, efficiency, and safety across various industries. In a Programming Logic Controller (PLC)-based environment, control systems enable the automation of complex processes, ensuring real-time monitoring and decision-making. Pneumatic and Hydraulic Controllers leverage the power of air and fluid to operate machinery with high precision, often used in industrial automation. In robotics, control systems are critical, whether guiding Wheeled Robots in navigation tasks or managing the intricate balance and manoeuvring of Drone Control Systems. With the advent of the Internet of Things (IoT), control systems are increasingly connected, allowing for remote control and data analysis for more intelligent automation. In renewable energy, control systems play a pivotal role in optimising the performance of Wind and Solar Energy systems, adjusting parameters in real-time to maximise energy output and efficiency. These systems represent the backbone of technological advancement and provide reliable and scalable solutions across various applications.



The key equipment in this lab are:

- Programming Logic Controllers
- Pneumatic and Hydraulic Controllers
- Wheeled Robots
- Drone Control System
- OT Modules
- Wind Energy Control System
- Solar Energy Control System
- Solar Emulator

3.4.3.3 Device Simulation Lab

This laboratory was established in January 2024 to conduct research on both advanced CMOS and post-CMOS devices. The lab has expertise in computational nanoelectronics. The lab focuses on understanding the behaviour of emerging nanoelectronics devices through analytical modelling and numerical simulation. The activities focus on a wide range of devices, which includes Analytical and Compact Modelling, Power Semiconductor Devices, Boundary Value Problems, and Circuit Design with Novel Materials and Devices.

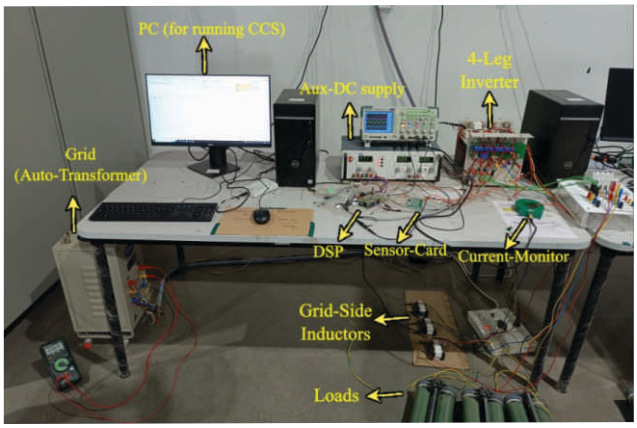
The key software in this lab are:

- Synopsys Sentaurus TCAD V-2024.03
- AsiaPac Advanced TCAD University Bundle 3 Years TSL Network
- Floating License Number of Licenses: 5 (FIVE)
- Synopsys Quantum ATK - Materials and Device Simulation (with NEGF) -
- Standard Academic Bundle
- 5 Licenses of Quantum ATK (DFT/Semi-empirical) + NEGF
- 5 Licenses of ATK Master Forcefield (Classical)
- 2 Licenses of VNL (GUI)
- 2 Licenses of VNL Links (VASP Interface)
- 256 MPICH Slaves for faster simulation
- Floating License: All licenses on single cluster

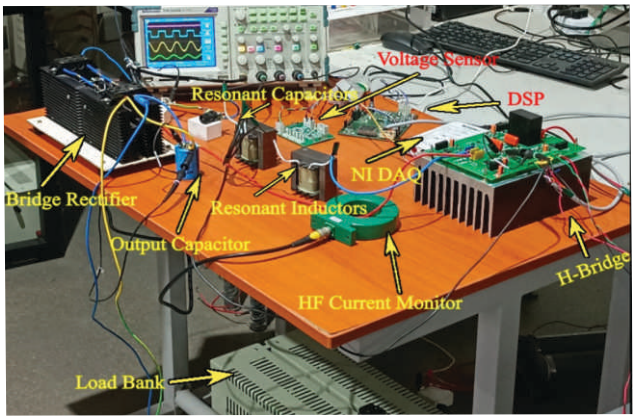
3.4.3.4 Electric Drives Lab

The Electric Drives Lab is a dedicated research facility supporting the institute's core course on “Electrical Drives” and advanced studies in related fields. It provides undergraduate, master's, and doctoral students with the tools for hands-on learning and research in power electronics applications, particularly in electric vehicle (EV) charging, renewable energy integration, and high-efficiency power conversion. Equipped with

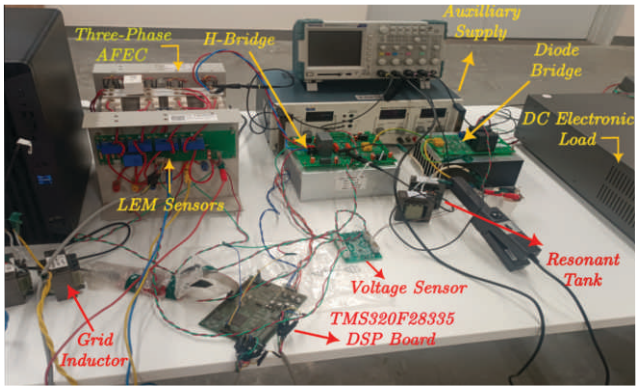
advanced instruments, the lab enables experimentation on high power density and resonant converters. Research on motor drive applications is also a key focus, with several machines being procured to support further studies, making the lab a hub for innovation in modern energy systems.



Standalone Three-Phase AFEC



Standalone Resonant Converter



Cascaded System Hardware Setup

Bidirectional DC Power Source

The key equipment in this lab are:

- Bi-Directional DC Power Source
- High-frequency current sensors and Current monitors
- Various ratings and configurations of 3 Phase and Single Auto Transformers
- Multi-channel Isolated and Non-Isolated scopes
- High-value performance power supplies
- Multi-leg and multi-level variants of Inverters and Rectifiers
- Various variants of Programmable Power supplies
- Various configurations of Machine assembly units along with drive
- Precision Workstations
- Resistor banks
- Various variants of DSP Development Boards
- Various Sensor Cards with one-channel voltage and Four Channel Current Sensing
- Grid side and High-Frequency filters
- Miscellaneous items like tachometers, fluke DMMs, and soldering units, as well as some associated equipment tools and connectors, are also included.

3.4.3.5 Electrical Machines Lab

An Electrical Machines Lab for industrial applications focuses on the study and hands-on exploration of critical machinery like transformers, induction machines, DC machines, synchronous machines, and AC and DC drives. In this lab, students learn how transformers manage voltage levels in power distribution while induction machines and drives power industrial equipment like pumps, conveyors, and fans. DC machines offer precise control needed in applications such as elevators and electric vehicles, and synchronous machines ensure consistent speed in power generation and high-precision industrial processes. By working with AC and DC drives, students understand motor control, energy efficiency, and automation, all vital for modern industrial systems. This lab is essential for preparing individuals to manage and optimise the electrical machinery critical in manufacturing, power generation, and automation industries.

The key equipment in this lab are as follows:

- Transformers
- Induction Machines
- DC Machines
- Synchronous Machines
- AC and DC Drives
- DAQ

3.4.3.6 Electronics Instrumentation Lab

The Electronic Instrumentation Lab is primarily a teaching lab designed to conduct fundamental experiments related to the institute's core course on “Principles of Measurements.” The Electronic Instrumentation Lab is a crucial platform where students apply theoretical knowledge from lectures to real-world scenarios, deepening their understanding of sensors, signal conditioning, electronic principles, and measurement techniques. With state-of-the-art equipment, it supports the development of advanced measurement techniques and system designs, bridging the gap between academic theory and real-world engineering applications. The lab serves undergraduate, master's, and doctoral students, equipping them to conduct their research activities.

Key research areas of this lab include sensor development and calibration, instrumentation systems design, and prototyping, using advanced tools to innovate and enhance real-world applications.

3.4.3.7 Electronics Lab

An electronics lab is a creative space where students and engineers explore the principles of electrical and electronic systems. Equipped with tools like oscilloscopes, multimeters, soldering stations, and circuit simulators, it serves as a hands-on environment for designing, testing, and troubleshooting circuits. Projects range from simple components to complex systems, fostering innovation and problem-solving skills. Labs often focus on key areas such as microcontrollers, signal processing, and communication systems. Collaboration and experimentation are encouraged, making it an ideal setting for learning and applying theoretical knowledge in real-world applications, ultimately preparing individuals for careers in engineering and technology.

The key equipment in this lab are as follows:

- Analog Lab Kit (ASLK-Pro)
- Arbitrary Function generator(25MHz)
- Digital Storage Oscilloscope (100MHz & 200 MHz)
- Regulated DC Power Supply
- Digital Multimeter
- Desktop PCs

3.4.3.8 Nanoelectronics Lab

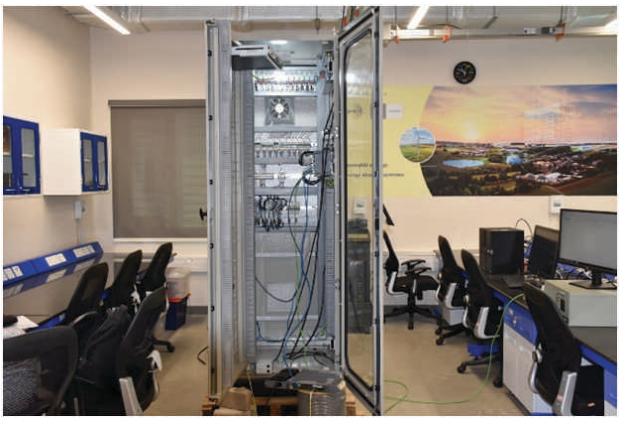
The Nanoelectronics Laboratory (Nano Lab) is working on research topics in advanced nanoelectronics, with special emphasis on the technology, design and modelling of nanoscale solid-state devices. The group explores new materials, novel fabrication techniques, and novel device concepts for future applications in Spin mechanics, Injection locking & synchronization and Spin caloritronic.

The key equipment in this lab are as follows:

- Nanovoltmeter, Source Measurement Unit
- Synopsys Quantum ATK - Materials and Device Simulation (with NEGF)
  a. Standard Academic Bundle
  b. 5 Licenses of Quantum ATK (DFT/Semi-empirical) + NEGF
  c. 5 Licenses of ATK Master Forcefield (Classical)
  d. 2 Licenses of VNL (GUI)
  e. 2 Licenses of VNL Links (VASP Interface)
  f. 256 MPICH Slaves for faster simulation
  g. Floating License: All licenses on single cluster
- Asia Pac Advanced TCAD University Bundle 3 Years TSL Network Floating License Number of Licenses: 5 (FIVE)
- Maskless Lithography System

3.4.3.9 Power Electronics Lab

The Power Electronics Lab is a well-equipped teaching and research facility focused on practical learning in power electronics. It supports core coursework and advanced studies with high-bandwidth and multi-channel scopes, Pearson current monitors, AC/DC probes, DC electronic loads, and function generators. The lab features regulated and programmable DC power supplies, autotransformers, and simulation software on desktops for circuit design and analysis. Safety tools, including soldering equipment and thermal imaging cameras, ensure a secure working environment. The lab also serves the needs of undergraduate, master and doctoral students in hands-on learning, experimentation, and research in power electronics, which is a critical field in modern electrical engineering.



A View of Power Electronics Lab

The key equipment of this lab are as follows:

- WR3000M Soldering Station
- High Bandwidth Isolated Scope
- Thermal Imaging Camera
- Multi-channel Isolated and non-isolated Scope
- Programmable DC Power Supplies
- Pearson current monitor
- AC/DC Current probes
- DC Electronic Load
- Arbitrary Function generators
- Digital storage oscilloscope
- Regulated DC Power Supplies
- Various ratings of Auto Transformers
- Desktops and Workstations
- Miscellaneous items like soldering associated tools, Sensors.

3.4.3.10 Power System Lab

A Power System and Smart Grid Lab equip students and researchers with tools to study and optimize modern electrical grids using advanced technologies like the Real-Time Digital Simulator (RTDS) for simulating and testing grid control strategies in real-time and Phasor Measurement Units (PMUs) for monitoring grid stability through real-time electrical wave data. The lab also utilises Satellite Synchronized Clocks to ensure accurate time-stamped measurements across the grid and Phasor Data Concentrators (PDCs) to aggregate and process data from multiple PMUs for centralised analysis. Microgrid Panel Relays also manage microgrids' protection and automation, allowing efficient control of distributed energy resources. These components provide a comprehensive environment for studying grid reliability, automation, and integrating renewable energy into smart grids.

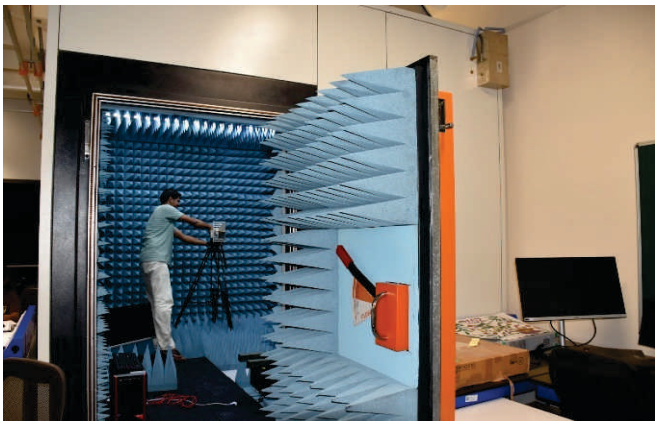
The key equipment of this lab include:

- Real-Time Digital Simulator
- Phasor Measurement Unit
- Satellite Synchronized Clock
- Micro grid Panel Relay
- Phasor Data Concentrator

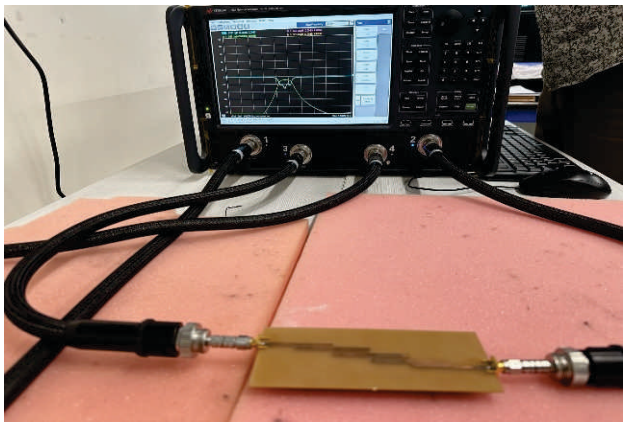
A View of Power System Lab

3.4.3.11. Radio Frequency & Microwave Engineering Lab

The Radio Frequency (RF) and Microwave Lab was established in the year of 2023, and it is a critical area of electrical and communication engineering focused on the design, analysis, and measurement of circuits and systems operating at high frequencies. This lab is essential for students to gain hands-on experience with components, techniques, and equipment used in the study of RF and microwave signals. The frequency range of interest typically spans from 30 kHz to 300 GHz, which includes radio, television, radar, satellite communications, and other wireless systems. The lab primarily caters to the needs of undergraduate, master and doctoral students in the broad area of RF and Microwave.



Anechoic Chamber



LPKF Protomat

The key equipment of this lab include:

- Anechoic Chamber Diamond Microwave 43.5 GHz, 3 axis receiver rotatory positioner system with VNA interfacing.
- LPKF Protomat S104 for PCB fabrication.

3.4.3.12 Semiconductor Devices Lab

Semiconductor device lab is a facility that focuses on the development and study of semiconductor devices. Semiconductor device lab with special emphasis on understanding the Reliability of Semiconductor Devices, Defect identification and characterisation in semiconductors (Diamond, SiC), Electrochemical soil sensors fabrication and characterisation, Ferroelectric devices, memories fabrication and characterisation, Radiation effects in semiconductors and wide-bandgap semiconductors.

3.4.3.13 Visual Information & Signal Analysis Lab (VISAL)

This lab can effectively serve educational and research needs in signal/image processing and computer vision. By focusing on essential equipment and leveraging modern software, it can provide a valuable learning environment. Key components include a high-performance computer with a GPU (8 x NVIDIA HGX A100 80GB card), image acquisition devices (3D fringe Projection, Stereo Vision Camera and high-speed camera), image processing software like MATLAB and Python, data storage, and internet high speed connectivity. Research areas can span medical image analysis, autonomous systems, deep learning, biomedical signal processing, and image restoration. Educational opportunities include undergraduate and graduate courses, research projects, and workshops. A well-equipped compact lab can foster innovation and learning in these fields. Lab capacity with 73 people.

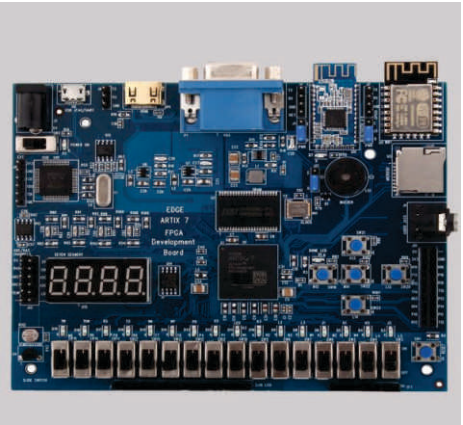
The key equipment of this lab include:

- GPU Based Deep Learning System
- High Performance Computing Machines
- Asus B560/Z590 i9 with RTX A4000 with 16 GB Card
- 3D fringe projection
- ADSP KIT ADZS-SC589-EZLITE sponsored by ADI
- TMS320C6748 by Texas Instruments
- Cytocube Model-R, portable slide profiler with software
- ZED 2i Vision Cameras
- NVIDIA Jetson AGX Orin Developer Kit (64GB)

3.4.3.14 VLSI Lab

A VLSI (Very Large-Scale Integration) lab is a specialised facility focused on the design, testing, and fabrication of integrated circuits. Equipped with advanced tools and software, such as simulation and synthesis platforms, it allows students and engineers to create complex electronic systems on a single chip. The lab provides hands-on experience with hardware description languages (HDLs), layout design, and verification processes. Collaborative projects often involve real-world applications in areas like telecommunications, computing, and embedded systems. By fostering innovation and practical skills, a VLSI lab prepares individuals for careers in semiconductor design and related fields, driving technological advancements.

VLSI & Embedded System Lab is associated with the institute's core courses like “Analog VLSI Design,” and “FPGA Lab Course.” In VLSI Lab, the main research focus is in the areas of analog and digital design. All major VLSI Cad vendor's tool licenses (Vivado 2023, Cadence, Mentor Graphics, Xilinx, Synopsys etc) are hosted here.



Workstation with fully loaded licensed EDA Tools

The key equipment of this lab include:

- Desktop Workstation-25 Nos
- ZYNQ ZYBO, PYNQ-ZU FPGA Development Boards
- High-Performance GENESYS 2 FPGA Development Boards
- EDGE ZYNQ and EDGE ARTIX 7 FPGA ARM Development Board with all accessories
- Software Available with License: Cadence, Mentor Graphics, Synopsys, Vivado, et cetera.

3.4.3.15 WiCoN Lab

The WiCoN Lab is a research facility dedicated to advancing wireless communication and networking. It offers students the opportunity to explore cutting-edge technologies and develop innovative solutions in areas such as performance analysis, network economics, game theory, distributed algorithms, interference management, physical layer security, and ultra-reliable low-latency communication. Equipped with state-of-the-art hardware and software, the WiCoN Lab provides students with the tools necessary to conduct experiments, simulations, and develop solutions. The present capacity of the lab is limited to around 20 people.

The key equipment of this lab include:

- High-end Desktop computers with Intel Core i7 9th generation 16 GB RAM.
- 9No USRP B210 Kit with Metal Casing by Ettus Research (B210).
- 8No USRP N210 with SBX 400-4400 MHz Rx/Tx (40 MHz-BW) & UBX 10-6000 MHz Rx/Tx (40 MHz-BW) RF Daughter Board (N210)
- Antennas with Vert 2450 Vertical Antenna (2.4-2.5 and 4.9-5.9 GHz), Log Periodic PCB Antenna (850 MHz to 6.5 GHz) with SMA cable and VERT400 Vertical Triband Antenna (144M,400M and 1200 MHz)
- Spectrum Analyzer with 9KHz - 20GHz with Anritsu Model of MS2720T (SA)
- Network Simulator Software with 15 NetSim Standard and 2 Academic v13.1(NetSim)

3.4.4 Mechanical Engineering Laboratories

The mechanical engineering laboratories cater to the practical experience provided to undergraduate and postgraduate students to carry out high-quality research by the research scholars of the department. The laboratories are equipped with facilities to demonstrate principles in all the domains of mechanical engineering.

3.4.4.1 Applied Thermal Engineering Laboratory

Applied thermal engineering laboratory has been setup to provide hands-on experience to students on thermal engineering concepts such as Internal combustion engines, refrigeration and air conditioning, fuel property measurements.

3.4.4.2 Metrology Laboratory

Metrology Lab has been set up for the students to perform various measurement related experiments. We have versatility in the equipment unlike any other metrology lab. We have both basic measurement tools (for example Vernier, micrometer et cetera) as well as advance equipment (such as 3D Profiler, CMM, Form tester) to meet the present-day Industry requirements. Also, we have equipment like Autocollimator, Height gauge, Surface roughness tester, Surface roughness and Contour measurement. This lab also houses the following metrology hand tools: GO & NOGO ring, plug and feeler gauges, sine bar, dial gauge setup with magnetic base and thread plug gauge.

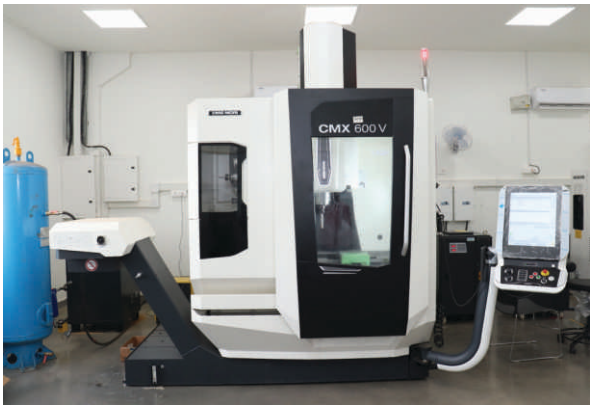
The Metrology Laboratory is designed to strengthen student's theoretical knowledge which they acquire through their course on Metrology. The laboratory consists of following experimental setups:

3.4.4.3 Machine Tools Laboratory

Machine tools laboratory has been set up for the students to perform experiments related to advanced machining process. This Lab has advance machines like CNC Lathe, CNC Milling, and CNC Wire cut EDM. We have Master CAM software available in the laboratory to convert CAD based 3D geometry to CNC part program. Also, there is dynamometer available to measure cutting forces in machining.

The Machine Tools Laboratory is designed to strengthen student's theoretical knowledge which they acquire through their course on Manufacturing. The laboratory consists of following experimental setups:

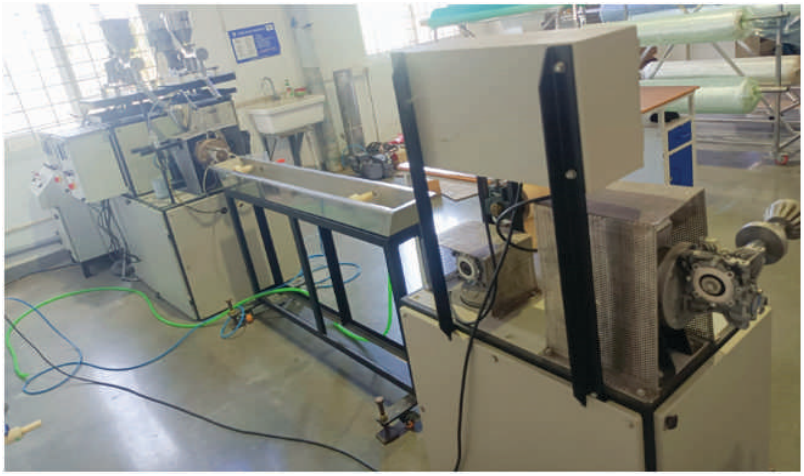
CNC WIRE CUT EDM



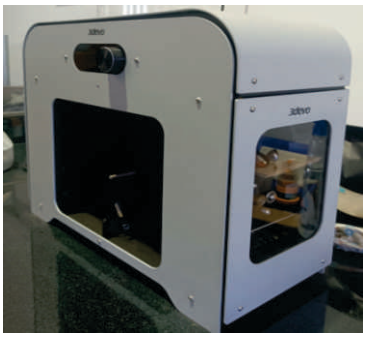
CNC MILLING

3.4.4.4 Composite Filament Fabrication Laboratory

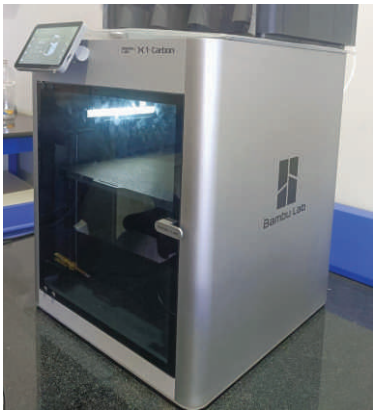
This laboratory facilitates the equipment to develop customised composite filaments suitable for Fused Deposition Modelling (FDM). The conical twin screw extruder (make: AASABI Pvt. Ltd.) can compound the polymer matrix and reinforcement, to produce a composite filament. The filament is then pelletised and characterised. These composite pellets re-extruded into a composite filament, suitable for 3D printing. This machine can perform large scale production. The bench top single screw extruder (make: 3Devo) is meant for small scale production and preferably used for neat polymer filament fabrication. This extruder can process the composite granules with limited solid loading into the composite filaments. The bench top FDM printer (make: Bambu Lab X1 Carbon) can print the polymer filaments as well as composite filaments at faster rates. The nozzle is made up of hardened steel and capable of processing highly infilled filaments.



Conical twin screw extruder



Single screw extruder



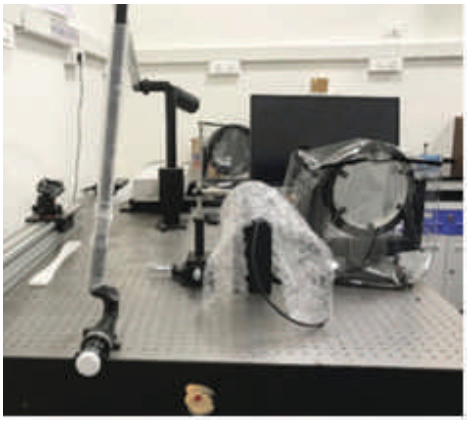
Bench top FDM printer

3.4.4.5 Droplet, Spray and Combustion Research Laboratory

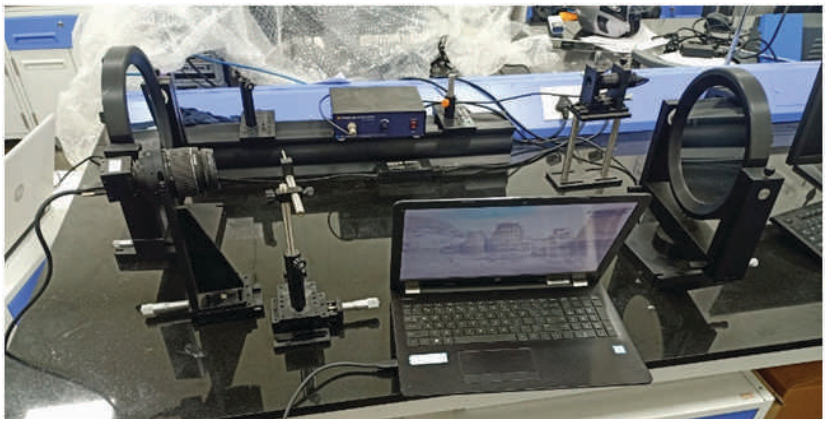
Spray Research Lab has been established to conduct fundamental and applied research on sprays and combustion. The research carried out in the laboratory finds application in the areas of spray combustion, nutrient delivery in agriculture, spray coatings et cetera. The Spray research lab consists of the following equipment:

Facility/ Equipment

- High Imaging systems (Photron SAZ and Photron SA1.1) including long distance microscope and lenses
- Particle Image Velocimetry Setup (TSI)
- Spraytec from Malvern with 0.1 to 900 um measurement range
- High pressure liquid and gas supply systems with flow controllers (max. 3 MPa)
- High pressure high temperature spray chamber (up to 60 bar and 800K)
- Spray tower with optical access
- Schlieren Imaging setup



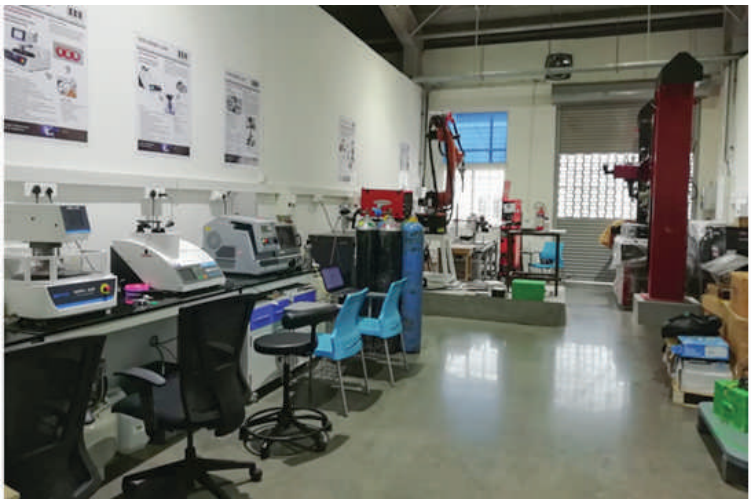
Particle Image Velocimetry



Schlieren imaging setup

3.4.4.6 Smart Welding and Additive Manufacturing Laboratory (SWAAM Lab)

Smart Welding and Additive Manufacturing Laboratory is developed to train the undergraduate and postgraduate students on the latest joining processes and metallographic studies. Active research is being performed in the JAM lab where five PhD and four M. Tech students are pursuing their research work. The JAM lab consists of the following equipment:



Smart Welding and Additive Manufacturing Laboratory

Joining facilities

• Shielded Metal Arc welding process	• Submerged arc welding process
• Gas Tungsten Arc welding process	• Down drought tables
• Robotic Gas metal arc welding process	

3.4.4.7 Advanced Materials Manufacturing & Tribology *(Laboratory - 1)*

In Advanced Materials Manufacturing & Tribology Laboratory, the students perform experiments and computational work-related casting. Advanced metal casting facilities (Stir Casting, Squeeze Casting, Pressure Infiltration and Induction Furnace) have been established at the department of Mechanical Engineering IIT Tirupati. These facilities are used for new material development such as alloys, composites, metal foams, composite foams and high entropy alloys et cetera. Foundry 4.0 Student Activity Centre (F4SAC) was also started in association with Indian Institute of Foundrymen (IIF) Chennai and Andhra Chapter on 9th October 2021.

Foundry 4.0 Student Activity Centre programs

3.4.4.7.1 Metal casting/forming simulation facilities

Metal Casting/Forming Simulation software facilities have been started at Advanced Materials Manufacturing and Tribology Lab. The following software are available for students:

Z-CAST PRO Stress

- Flow Simulation
- Solidification Simulation
- Heat Stress Simulation

AFDEX - Metal Forming Simulation Software

AFDEX is an Intelligent Metal Forming Simulation tool. It is based on Rigid or Elasto thermo-visco-plastic finite element analysis using quadrilateral / tetrahedral elements thus providing faster & higher accuracy results.

AFDEX is a general-purpose metal forming simulator, which meets the requirements of intelligent bulk-metal-forming (BMF) simulation (BMFS)

- Forging
- Extrusion
- Rolling
- Deep Drawing
- Sheet Forming
- Swaging
- Open/Closed Die Forming
- Hot/Warm/Cold Forming
- Rotary Forging
- Swagging
- Cogging

VCNC PRO - CNC Simulation Software

VCNC pro simulation software analyses a NC code programmed and transmits machine-commands to the virtual controller. The Virtual CNC machine simulates the NC code in the 3-dimensional environments.

QFORM Software

QForm is a professional engineering software for simulation, analysis and optimisation of metal forming processes based on the Finite Element Method. QForm software allows simulation of an entire technological chain at high speed and excellent reliability and provides a wide range of possibilities for process analysis.

- The most important economic benefits of QForm software include:
- Decreasing production lead time
- Eliminating defects in metal forming production
- Increasing quality and improving product properties
- Reducing material consumption
- Elimination of test dies
- Reduced development time and improved efficiency

3.4.4.7.2 Casting facilities

The laboratory also has equipment related to casting including a Bottom Pouring stir casting machine and a Vacuum Induction Furnace. Bottom Pouring stir casting machine is a casting machine that allows you to mix the reinforcements in the base metal and pour it into the mold with ease and without loss in the melt temperature.

Bottom Pouring Stir Casting Machine

Vacuum Induction Furnace

3.4.4.8 Advanced Manufacturing Laboratory

Advanced manufacturing laboratory is a research laboratory, and the laboratory is equipped with various polishing machines. The following finishing machines are available in this laboratory:

Facilities Available

• Abrasive flow finishing	• Drag Finishing
• Plasma Polishing	• Electro polishing Machine

3.4.4.9 Additive Manufacturing Laboratory

The additive manufacturing lab is developed to introduce/train students, especially research scholars, to the latest technologies in the field of additive manufacturing. It is a research lab rather than a curriculum lab. The lab is filled with the metal 3D printer (M290) EOS make and its accessories, including a vacuum furnace, shot peening equipment, automatic argon gas bank with automatic change-over setup, dehumidifier, et cetera, a 3D Scanner and a plastic 3D printer at present.

3D Scanner

3D printer

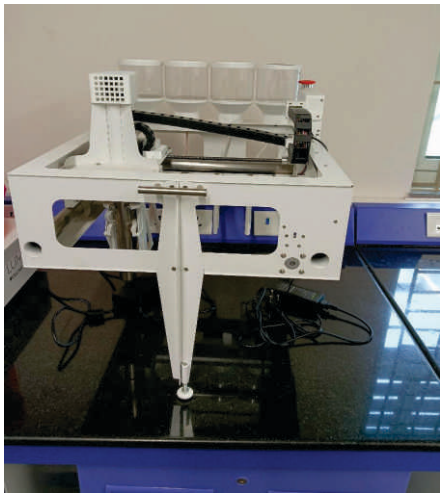
3.4.4.10 Precision Machining Laboratory

This is an advanced manufacturing and finishing laboratory. Instruments related to both manufacturing and finishing are available in this laboratory. The key equipment of this lab include:

Facilities Available

• LumenX 3D BioPrinter	• 5-Axis polishing machine
• 3D Metal foam Printer	• Hybrid Laser Micromachining Centre
• Rheometer	• Magnetic Polishing Machine
• Micromachining Centre	

BioPrinter



3D Metal foam Printer

Micro-machining Centre

3.4.4.11 Vibration and Dynamics Laboratory

This is a research laboratory under design stream. The available instruments are mainly used for vibration and dynamics studies. The available instruments are listed below:

Facilities Available

• Data Acquisition System	• Calibration Shaker for Accelerometer
• Accelerometers	• Dynamic Shaker
• Force Sensors	• Pistonphone calibrator
• Free Field microphone	• Modal Impact Hammer

3.4.4.12 Fluid Mechanics Laboratory

The Fluid Mechanics Laboratory is designed to fortify students' theoretical knowledge which they learn in the Fluid Mechanics course. In the fluid mechanics laboratory, the students perform experiments related to basic principles of fluid mechanics. Students from both Civil and Mechanical Engineering departments conduct their experiments on these equipment sets, ranging from Reynold's apparatus, Bernoulli's principle, impact of jets on flat and curved surfaces, frictional head losses in pipes, estimation of flow rates in pipes using venture meter/orifice meter, estimating meta-centric height of floating bodies, to flow visualisation using streamlines. The laboratory consists of the following experimental setups:

1) Reynolds experiment setup to visualise laminar and turbulent flows
2) Different flow measuring set-ups such as venturimeter, orifice plate, rotameter
3) Free and forced vortex experimental setup
4) Impact of jet on surfaces to verify momentum conservation
5) Experimental setup to verify Bernoulli's theorem
6) Experimental setup to study losses in different pipe segments
7) Fluid property measurement equipment to measure density, viscosity, surface tension
8) Water flow bench to visualise flow around different shapes
9) Experimental setup to study the stability of floating bodies

A View of Fluid Mechanics Laboratory

3.4.4.13 Solid Mechanics Laboratory

The Solid Mechanics laboratory consists of a universal testing machine for tensile tests, hardness testing machine, torsion measurement, stresses in thick and thin cylinders, strain measurement using strain gauges, bending of beams, photoelasticity measurements and impact tester.

3.4.4.14 Heat Transfer Laboratory

The heat transfer laboratory at IIT Tirupati is also a part of the applied thermal engineering laboratory. It has various experimental setups to enhance student's understanding of concepts of heat transfer. This laboratory consists of the following experimental setups:

1) Thermal conductivity measurement of solids and fluids
2) Linear and Radial heat conduction setups
3) Free and forced convection over different objects
4) Pool boiling and condensation experimental setup
5) Heat exchanger setup with tube in tube, shell and tube, Plant and fin and jacketed vessel heat exchangers
6) Different temperature measurement instruments and their calibration
7) Thermal conductivity measurements of insulating materials
8) Experimental setup to verify Kirchhoff's law and Stephen Boltzmann Law

3.4.4.15 Robotics & Autonomous System Laboratory

This is a new laboratory added under mechanical department to study the robotic movements and forces acting on it. An industrial grade Doosan 1013 robot is housed in this lab, and UG/PG and PhD students are doing their projects/research work on that. The Doosan 1013 Cobot is an industrial grade 6 degree-of-freedom (6DoF) Cobot with a reach of 1.3 m, capable of handling a load of 10 kg, and having a repeatability of 0.05 mm. The Cobot can also sense the forces and moments experienced by the joints and can therefore

work together with human operators. It will primarily be used to demonstrate the geometry, kinematics, and dynamics of robot manipulation to undergraduate and postgraduate students, as part of their regular coursework. Besides that, the robot can also be used to perform experiments where an object has to undergo a prescribed motion. The Cobot comes with a teach pendant, a controller, and an electric three-finger end-effector.

Doosan 1013 Cobot

3.4.4.16 Metallography Laboratory

Metallography Laboratory is developed to train undergraduate and postgraduate students on metallographic studies. This lab is being used actively by five Ph.D. and four M. Tech. students who are pursuing their research there. The metallography lab consists of the following equipment:

Metallography facilities

- Precision cutting machine
- Hot mounting press
- Double disc polishing machine
- Single disc automatic polishing machine
- Stereomicroscope
- Upright metallurgical microscope
- Heat treatment furnace (1200^{0}C)
- Heat treatment furnace (1600^{0}C)
- Melting furnace (1500^{0}C)
- Residual Stress measurement by portable XRD
- Micro Hardness tester

3.4.4.17 Advanced Materials Manufacturing and Tribology (AM2T) Research Laboratory - 2

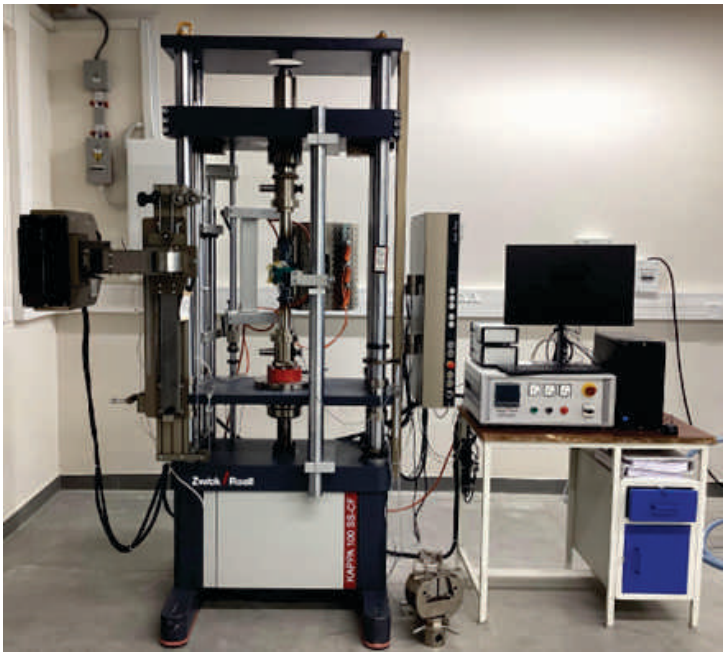
This is a research-based laboratory basically working on experimental tribology and tribological issues of fouling, friction and corrosion, and the use of advanced techniques to understand bio tribological performance at the interface of artificial material. The working group develops novel self-repairing, adaptive, regenerative multifunctional surfaces for smart applications.

The group has an outstanding history of experimental tribology research and focusing on tribological issues of fouling, friction and corrosion, and the use of advanced techniques to understand bio tribological performance at the interface of artificial material. We develop novel self-repairing, adaptive, regenerative multifunctional surfaces for smart applications. The Department of Mechanical Engineering has started

Advanced Materials Manufacturing and Tribology (AM^2T) Research Laboratory at IIT Tirupati. The Tribology and Surface Engineering facility was inaugurated on 3rd June 2022 by Prof. Satish V. Kailas, President TSI. A multifunctional Tribometer MFT-5000 has been procured for various tribology tests

Facilities Available

• Creep Fatigue UTM	• Twin Roller Sampling System
• Universal Tribometer	• Manual Double Disc Polishing Machine
• High Temperature Vacuum Hot Press	• Diamond Cutter Machine



Creep Fatigue

UTM Universal Tribometer

3.4.4.18 Fluid Science and Renewable Energy Technology (FSRE) Lab

The lab aims to establish the lowest turbulence wind tunnel in India at IIT Tirupati which can be employed in both fundamental and applied research. The lab is equipped with the following advanced measurement systems for flow diagnostics. The instruments available in this lab are used for measuring velocity of fluids, velocity measurements in wind tunnel testing, and analyse propulsion systems. The available equipment are listed below:

Facilities Available

• Laser Doppler Velocimeter	• Hot wire anemometer
• MicroDaq2-32-DTC Pressure scanner	• PXIA Labview Data Acquisition System
• 6270A Pressure Controller/Calibrator	• Propeller test bench

3.4.4.19 Solid Mechanics & Composite Materials Laboratory

In Solid Mechanics & Composite Materials Laboratory the students are working on composite manufacturing and testing. The 100 kN Fatigue UTM available in this lab is capable of complex studies on mechanical fatigue to standard tension and bending tests.

3.4.4.20 Hydrogen Energy and Storage Laboratory

Hydrogen Energy and Storage Laboratory is a research lab where UG/PG/PhD students work extensively on projects related to hydrogen energy. The equipment available in this lab are listed below:

Facilities Available

• Chiller	• Gas Chromatography
• Heater	• Air Heater
• Vacuum Pump	• DAQ

3.5 HSS COMPUTER LAB

In recent years it has become imperative for students to engage with emerging digital tools, platforms and software. The Department has, from its very inception, encouraged the use of digital technologies in the classrooms. With this in mind, the HSS Computer Lab was set up in January 2024 to support students' learning outcomes and develop their research competence. The lab hosts 29 computers with state-of-the-art software that are widely used in management, public policy, social sciences, and other related disciplines. The lab provides students with the opportunity to hone their skills and enhance their competence in a wide variety of domains.

A View of the HSS Computer Lab

3.6 MAKERS LAB

The Central Workshop has recently been renamed as the Makers Lab. The Makers Lab (formerly known as the Central Workshop) is situated in Lab 2 of the South Campus. The Central Workshop was set up in a space of 5400 sq. ft with facilities for training B. Tech students and assist the scholars in their research works.

One of the recent additions to the Makers Lab is the Rapid Prototype Lab, which is equipped with 3D printers, Laser cutting and Laser Engraving. The Rapid Prototype Lab is dedicated to creating various prototypes using various technologies available. As part of the curriculum for the B Tech 2023 batch students, a new module on 3D Printing has been introduced, allowing the students to explore this innovative field.

This innovative approach has led to a two-phase curriculum within the Makers Lab, aimed at providing students with a comprehensive learning experience. In the first phase, students are introduced to the fundamentals of Conventional Machining processes such as Turning, Milling, Foundry, Sheet Metal, Pneumatics & Hydraulics and 3D Printing. This phase provides a solid foundation for the students to understand the basics of manufacturing and fabrication techniques.

In the second phase, students are encouraged to apply the concepts they have learned in the first phase to work on product-based projects. These projects are carried out in groups, allowing students to collaborate and apply their knowledge practically.

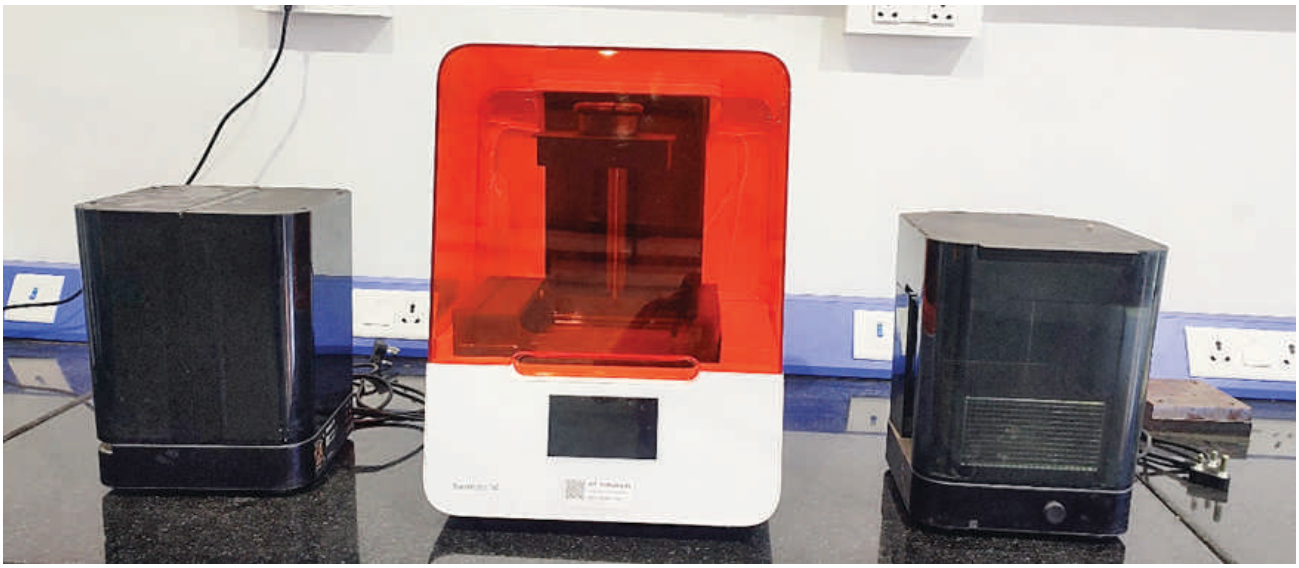
Including 3D Printing modules in the curriculum has been a game-changer for the students. It has empowered them to unleash their creativity and design their own unique prototypes. The Makers Lab ensures the safety of its students by providing essential safety items such as safety goggles, aprons, hand gloves, and masks. These precautions are taken to ensure that students can carry out machinery activities and handle equipment without compromising their well-being.

The Makers Lab is not only utilized by the students but also serves as a valuable resource for scholars to conduct research by utilizing its facilities and equipment to fabricate the research setups and works of the students.

Various 3D Printers in Rapid Prototype Lab

A View of FDM 3D Printing

Hyrel 3D Printer



A View of Resin 3D Printer

A View of Rapid Prototype Lab

3.7 CENTRAL LIBRARY

The Central Library of the Institute was established in the year 2015 with the mission to support and facilitate learning, teaching, and research activities in IIT Tirupati by providing resources, facilities, and services. In accordance with the objectives of the Institute, the Library aims to develop a comprehensive and dynamic resource collection which includes e-resources, which will be useful for the faculty and students, supporting their scholarly advancements. The library balances its efforts toward supporting both the educational and research functions of the institution.

The library shifted to the Academic Building-1 in March 2023. The present area is more spacious and can accommodate more users.

A view of Central Library

The library has integrated its services with the institute-wide ERP system. The library implemented the MyLOFT remote access tool during the pandemic, which started in 2020, to help IIT Tirupati members who were off-campus to access all library e-resources easily. The library is equipped with a library automation system using KOHA open-source integrated library software with Online Public Access Catalogue (OPAC), which has enabled computerising the library operations. The library has RFID technology to enhance circulation services and enable users to issue and return books. It has also helped fortify the security of library holdings, complemented by the introduction of CCTV within the Library.

In order to provide research support for the Institute, the library procured plagiarism checking software (Turnitin) and an academic writing support tool (Grammarly Premium). INFLIBNET has provided DrillBit plagiarism checking software. The library actively responds to users' needs, which include meeting their article requests, plagiarism detection requirements, and any other information or research-related queries they may have.

The library is also working on bringing all IIT Tirupati faculty profiles on the institute's IRINS portal which will help showcase the institute's research output and scholarly network. During this period, the central library added 1584 printed books, including textbooks and reference books on Engineering, Science, and Humanities and Social Sciences.

The library has renewed the existing collection of e-resources, including databases like SCOPUS, SciFinder, CMIE, CCDC, and other resources like EBSCO Management Collection, Taylor & Francis, Science and Technology plus Arts and Humanities Collection, Wiley 100 Title Collection, etc. The library has newly procured AWS Online Education Library and PressReader which is a digital platform providing access to more than 7000+ magazines and newspapers from countries across the globe.

Total number of resources available in central library presently is as follows,

- Books 10384
- CD-ROM 80
- Newspapers (Print) 05
- e-Books 592
- e-Journals 8000+
- Print Journals 5+
- Databases 22
- Standards 03

e-Shodh Sindhu Consortium Membership

The Central Library is an active member of the e-Shodh Sindhu Consortium.

The library has been conferred with 2021 Highest Usage Award for ACS Journals amongst 3rd Generation IITs. It also won the "Thieme Connect Award of Excellence" in 2023.

4. SPONSORED RESEARCH AND INDUSTRIAL CONSULTANCY

4.1 SPONSORED RESEARCH PROJECTS AND INDUSTRIAL CONSULTANCY

The Centre for Sponsored Research and Consultancy (CSRC) has been created in the year 2017 for the promotion, facilitation, coordination and administration of all research, consultancy and innovation related activities. CSRC focuses on enabling Industry relations and Innovation ecosystem in the campus by implementing various Innovation related initiatives.

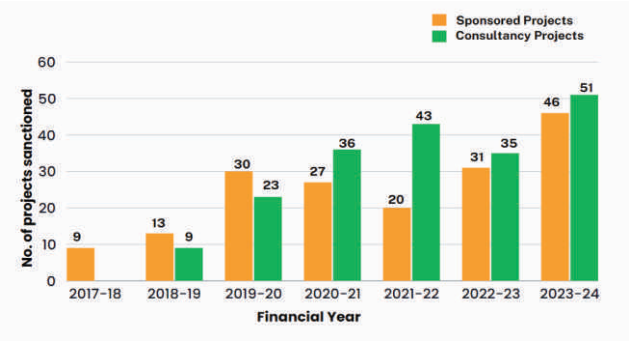
Leveraging faculty expertise, IIT Tirupati has partnered with IISER Tirupati to establish the 'Center for Atomic, Molecular, and Optical Sciences Technologies (CAMOST)'. The institute is actively engaged in national missions such as the Interdisciplinary Cyber-Physical Systems (ICPS), Quantum Technology Applications (QTA), the Hydrogen Mission, and the India Semiconductor Mission. In collaboration with Siemens and Wipro, IIT Tirupati has established a Center of Excellence in Smart Manufacturing and EV Technologies. Other notable initiatives include a 5G Use-Case Lab funded by the Department of Telecommunications and a PM-FME Common Incubation Center supported by the Ministry of Food Processing Industries through the Andhra Pradesh Food Processing Society (APFPS).

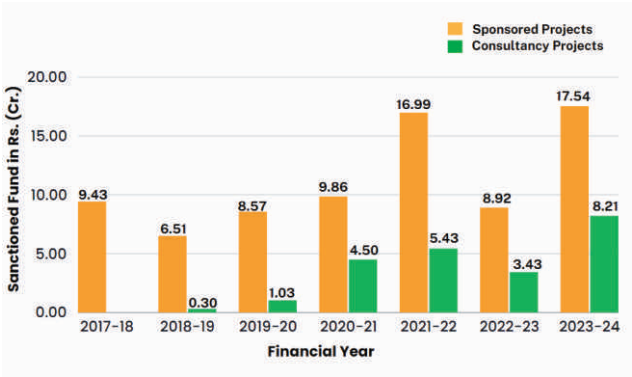
IIT Tirupati faculty members are actively engaged in a wide range of sponsored research projects and industrial consultancies, collaborating with both government and private agencies. The faculty's research capabilities are evident from the impressive number of projects undertaken and successfully executed in a relatively short period. In the financial year 2023-24, the faculty secured 46 sponsored research projects worth approximately Rs. 17.54 crore and 51 consultancy projects valued at around Rs. 8.21 crore, bringing the total value to about Rs. 25.75 crore. Overall, the faculty members have undertaken 194 sponsored research projects and 197 industrial consultancy projects, with a cumulative value of about Rs. 203 crores. Some of the organisations that funded our sponsored research include the Department of Science and Technology, Anusandhan National Research Foundation (ANRF), previously Science Education and Research Board (SERB), Defence Research and Development Organisation (DRDO), Ministry of Earth Sciences (MoES), United Nations Development Programme (UNDP), Ministry of Electronics and Information Technology, Ministry of Environment, Forest & Climate Change, Public Health Department, Government of Andhra Pradesh, TVS Motor Company, and Pushpit Steels Private Limited.

Few notable sponsored projects are Dr. Arijit Sharma (Department of Physics) secured ₹2.5 crores for developing a transportable all-optical trapped ion atomic clock for Positioning, Navigation, and Timing (PNT) applications. Prof. Muthukumar Palanisamy (Department of Mechanical Engineering) received ₹2.09 crores for advancing LPG, PNG, and CNG-operated refractory burners for cooking and industrial purposes. Prof. Suresh Jain (Department of Civil and Environmental Engineering) was awarded ₹1.78 crores by UNDP India for evaluating policies to prevent environmental pollution and protect public health. The Departments of Civil and Environmental Engineering and Electrical Engineering obtained ₹1.58 crores and

₹1.46 crores, respectively, under the DST's FIST Scheme to enhance their research infrastructure. Over all summary of sponsored and consultancy projects and List of Sponsored Research Projects and Consultancy Projects received in 2023-24 are given below.

4.1.1. Summary of sponsored and consultancy projects





**Excluding Rs. 100 Cr. DST TIH project sanctioned in FY 2020-21*

4.1.2 List of sponsored research projects and consultancy projects received in 2023-24 are given in the tables below:

Sponsored Research Projects

S. No.	Title	Funding Agency	Investigator and Department
1.	Design and Development of Algorithms for Online LongTerm Target Tracking	Defence Research and Development Organisation (DRDO)	Dr. Rama Krishna Sai Gorthi, Department of Electrical Engineering
2.	Dialectics of Prakriti and Sanskriti: An ecosophical study of the select ancient Indian texts	JPN National Centre, IIT Indore	Dr. Prabha Shankar Dwivedi, Department of Humanities and Social Sciences
3.	Food security and the problem of fit: examining local innovations to milk wastage in India	University of Waterloo	Dr. Sanchayan Nath, Department of Humanities and Social Sciences
4.	DST's Nodal Center at IISER Tirupati (Tirupati-Chennai-Bengaluru Cluster) for the development and production of key starting materials, intermediates, and other raw materials that are required by the Health Care Sector	Department of Science and Technology	Dr. Gouriprasanna Roy, Department of Chemistry
5.	Design, Development, Testing and Automation of LPG, PNG and CNG Operated Refractory Burners for Cooking and Industrial Applications	Science and Engineering Research Board- SERB	Prof. P. Muthukumar, Department of Mechanical Engineering
6.	GPU Accelerated Mesh free Method Solution for FSI Problem on Hemo dynamics and its influence on cancer treatments	Department of Science and Technology	Dr. Panchatcharam, Department of Mathematics and Statistics

S. No.	Title	Funding Agency	Investigator and Department
7.	Quantum signal processing and quantum singular value transformation	I-HUB Quantum Technology Foundation	Dr. Arvinda S, Department of Physics
8.	Separation, Purification and Characterization of Valuable Compounds from Coconut Waste/by-products for incorporation in health foods	Coconut Development Board	Prof. KSMS Raghavarao, Department of Chemical Engineering
9.	Machine Learning Techniques to Address the Pilot Transmission Overhead in an Intelligent Reflecting Surface Aided Antenna Selection System	Department of Science and Technology	Dr. Sarvendranath Rimalapudi, Department of Electrical Engineering
10.	Multiple intelligent reflecting surfaces to improve network coverage in rural areas and hilly terrains	Science and Engineering Research Board- SERB	Dr. Sarvendranath Rimalapudi, Department of Electrical Engineering
11.	Design of a Secure and Dependable RISC-V Core for Cryptographic Applications	Ministry of Electronics and Information Technology	Dr. Vikramkumar Pudi, Department of Electrical Engineering
12.	AI assisted techniques to extract business rules from legacy code base	Indian Institute of Technology Tirupati	Dr. Sridhar Chimalakonda, Department of Computer Science and Engineering
13.	Performance enhancement of Multi-Temporal Synthetic Aperture Radar Interferometry (MT-InSAR) for accurate and fast deformation estimation in mountainous terrain	Science and Engineering Research Board- SERB	Dr. Avadh Bihari Narayan, Department of Civil and Environmental Engineering
14.	Understanding the microscopic origin of kosmotropicity and chaotropicity of osmolytes in the aqueous phase	Department of Science and Technology	Dr. Rajib Biswas, Department of Chemistry
15.	Mechanochemical Approach for Solvent-Free Synthesis of (Hetero)Aromatic Fluorides	Ministry of Education (MoE)	Dr. Gandeepan P, Department of Chemistry
16.	Organomercurials are More Neurotoxic than the Inorganic Mercury Compounds: A Detailed Investigation at Molecular and Cellular Levels to Understand the Mechanisms Underlying Extremely High Neurotoxicity of Organomercurials	Ministry of Education (MoE)	Dr. Gouriprasanna Roy, Department of Chemistry
17.	Nano Finishing of 3D Printed Complex Biomedical Implants using Economic Polymer Rheological Abrasive Semisolid Medium	Department of Science and Technology	Dr. Mamilla Ravi Sankar, Department of Mechanical Engineering
18.	Development of an atomic processes data base using calculation & measurement in Tokamak & Lab Plasma	Department of Atomic Energy (DAE)	Dr. Reetesh Kumar Gangwar, Department of Physics

S. No.	Title	Funding Agency	Investigator and Department
19.	Granular chains, translating or rotating or oscillating objects in a granular medium	Science and Engineering Research Board- SERB	Dr. Anki Reddy Katha, Department of Chemical Engineering
20.	Micro-irrigation Adoption, Resource Efficiency, Sustainability, and Smallholder Farmers Well-being: Evidence from the Rayalaseema Region in Andhra Pradesh: A study under PM Krishi Sinchai Yojana	Indian Council of Social Science Research	Dr. Chandra Sekhar Bahinipati, Department of Humanities and Social Sciences
21.	Development of High Valent First Row Late Transition Metal-Halide Complexes for Bio-inspired C-H Halogenation Reactions	Science and Engineering Research Board- SERB	Dr. Prasenjit Mondal, Department of Chemistry
22.	Deep Understanding of Driving Behaviour in Lane Free Mixed Traffic to Optimize its Efficiency	Ministry of Education	Dr. Gowri Asaithambi, Department of Civil and Environmental Engineering
23.	Synthesis of Difluoromethylated Organic Compounds via Electrocatalysis	Science and Engineering Research Board- SERB	Dr. Gandeepan P, Department of Chemistry
24.	Effect of interaction anisotropy on microstructural defects and mechanical properties of amorphous solid	Science and Engineering Research Board- SERB	Dr. Murari Singh, Department of Physics
25.	Development of semi-automatic farm devices for usage in small agricultural fields	Department of Science and Technology	Prof. Thamida Sunil Kumar, Department of Chemical Engineering
26.	Scalable Sparse Tensor Computations	Science and Engineering Research Board- SERB	Dr. Raghavendra Kanakagiri, Department of Computer Science and Engineering
27.	Improvement of geoid model derived from EGM at regional scale by advanced gravimetric geoid modelling, a case study in Kanpur and Unnao district of UP	Department of Science and Technology	Dr. Avadh Bihari Narayan, Department of Civil and Environmental Engineering
28.	RES-URSC-2022-005: Development of precision laser spectroscopy system for testing and characterization of MEMS based vapour cells for quantum technology applications in computing, communication, sensing and metrology	Indian Space Research Organization	Dr. Arijit Sharma, Department of Physics
29.	RES-URSC-2022-006: On-board Software Verification Automation Platform	Indian Space Research Organization	Dr. Sridhar Chimalakonda, Department of Computer Science and Engineering
30.	Development of High Resolution-Diffraction-Limited Single-ION Imaging System	I-HUB Quantum technology foundation	Dr. Arijit Sharma, Department of Physics

S. No.	Title	Funding Agency	Investigator and Department
31.	Development of transfer cavity-based laser frequency stabilization scheme aided by wavelength meter	I-HUB Quantum technology foundation	Dr. Arijit Sharma, Department of Physics
32.	A portable all-optical trapped ion (40Ca+) based atomic clock as a deliverable	IIT Tirupati Navavishkar I-Hub Foundation	Dr. Arijit Sharma, Department of Physics
33.	PHEM for D^3 – Parallel Heterogeneous External Memory Algorithms for Dealing with the Data Deluge	Science and Engineering Research Board- SERB	Dr. G. Ramakrishna, Department of Computer Science and Engineering
34.	RES-SDSC-2022-017: Alternative solvent for TCE	Indian Space Research Organization	Dr. Someswara Rao Sanapala, Department of Chemistry
35.	Modelling Metal-Free Functional Organic Molecules in Condensed Phase for Efficient Triplet Harvest	Science and Engineering Research Board- SERB	Dr. Arun Kumar Manna, Department of Chemistry
36.	Configurable learning through dynamic fusion of lightweight few-class object detectors – Applications to EHR from clinical records	Science and Engineering Research Board- SERB	Dr. Y Kalidas Department of Computer Science and Engineering
37.	Development of UV Sensor using CNTs for monitoring combustion in engines	Department of Science and Technology	Dr. Mamilla Ravi Sankar, Department of Mechanical Engineering
38.	Biomimetic Studies of Bacterial Enzymes Organomercurial Lyase MerB and Mercuric Ion Reductase (MerA): Development of Smart System for the Detoxification of Organomercury Compounds	Science and Engineering Research Board- SERB	Dr. Gouriprasanna Roy, Department of Chemistry
39.	Wire arc additive manufacturing of Naval impeller/propeller of 500 mm diameter	Defence Research and Development Organisation (DRDO)	Dr. Degala Venkata Kiran, Department of Mechanical Engineering
40.	Design and Development of Ultra-High-Density Sodium Metal batteries for Autonomous Under water vehicles	IIT Guwahati Technology Innovation and Development Foundation (TIH)	Dr. Brindha M, Department of Chemical Engineering
41.	Phonons and their interactions in complex oxide systems	Science and Engineering Research Board- SERB	Dr. Rudra Sekhar Manna, Department of Physics
42.	Design and Synthesis of Biologically Active N-Heterocycles Using Transition Metal Catalysts	Science and Engineering Research Board- SERB	Dr. Venkaiah Chintalapudi, Department of Chemistry

S. No.	Title	Funding Agency	Investigator and Department
43.	Combined experimental and theoretical investigations of novel quantum states of matter at high frustration and low dimensions	Science and Engineering Research Board- SERB	Dr. Koteswara Rao Bommisetti, Department of Physics
44.	DST FIST Program to strengthen Research Facility in the department	Department of Science and Technology	Dr. Krishna Prapoorna Biligiri, Department of Civil and Environmental Engineering
45.	DST FIST Program to strengthen Research Facility in the department	Department of Science and Technology	Dr. N N Murty, Department of Electrical Engineering
46.	Centre of Excellence CoE proposal on Membrane Technologies for Desalination, Brine Management, and Water Recycling	Department of Science and Technology	Dr. Shihabudheen Maliyekkal, Department of Civil and Environmental Engineering

Industrial Consultancy projects

S. No.	Title	Funding Agency	Investigator and Department
1.	Dynamic Analysis of Drum Brakes	TVS Motor Company	Dr. Sriram S, Department of Mechanical Engineering
2.	Assessment of strength and durability properties of stones of Sri Prasanna Varadaja Swamy Temple, Sri Kalahasti, A.P.	Sri Kalahasteeswara Swamy Vari Devasthanam	Dr. Behera Prasanna Kumar, Department of Civil and Environmental Engineering
3.	Structural vetting of Warehouse & assembly area at Hyderabad	Amara Raja Infra Private Limited	Dr. M. Nithyadharan, Department of Civil and Environmental Engineering
4.	Geotechnical investigations on the soil samples excavated at Pallamala MI tank and Tottambedu MI tank for soil classification and permeability tests to assess their suitability of its use for the work Augmentation of MVS scheme to Renigunta and other habitation	Rural water supply and sanitation, Govt of Andhra Pradesh	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
5.	Advanced testing of soil samples for Offshore Block KG/OSDSF/GSKW/2018, Odalarevu, Andhra Pradesh	FUGRO Geotech (India) Pvt. Ltd.	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
6.	Development of room temperature warm atomic vapor-based Quantum Memory	Qulabs Solutions (India) Pvt. Ltd.	Dr. Arijith Sharma, Department of Physics
7.	Laboratory Performance Report on the use of RARX in India	Circulo Technologico 2020 SL	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering

S. No.	Title	Funding Agency	Investigator and Department
8.	Vetting of the design and drawings of the proposed RCC counterfort cantilever retaining wall for the SS Tank at Tadepalligudam, Eluru, Andra Pradesh.	Public Health Division, ELURU	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
9.	Witness and check the post tensioning and pre-tensioning of structural member stressing sequences in corridor no. 5, Chennai.	Chennai Metro Rail Limited	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
10.	Developing technology for AI enables weld defect analyser	Hindustan Shipyard Limited	Dr. Degala Venkata Kiran, Department of Mechanical Engineering
11.	Welding distortion control in shipbuilding	Hindustan Shipyard Limited	Dr. Degala Venkata Kiran, Department of Mechanical Engineering
12.	Proof checking of axillary building for Directors Residence and formwork for library building, Auditorium building and Sports Complex IISER Tirupati	DEC Infrastructure Projects India Pvt. Ltd.	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
13.	Condition assessment of Sri Lakshmi Narasimha Swamy Vari Devasthanam Temple, Antarvedi, Sakhinetipalli Mandal, A.P.	Sri Lakshmi Narasimha Swamy Vari Devasthanam	Dr. Behera Prasanna Kumar, Department of Civil and Environmental Engineering
14.	Mixture design for normal concrete (M30 grade) and self-compacting concrete (M40 and M60 grade)	KPC Projects Limited	Dr. A.V. Rahul, Department of Civil and Environmental Engineering
15.	Geotechnical Investigations for the proposed 2650 ML capacity summer storage tank near Vinukonda ULB, Guntur District, Andhra Pradesh.	P.H. Quality Control Circle	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
16.	Techno Economic Study-Removal of CO2 and N2 from Natural Gas produced from Dandewala Field of Oil Rajasthan	Oil India Limited	Dr. Sasidhar Gumma, Department of Chemical Engineering
17.	Enhancing Communication Aspects of Unmanned Aerial Vehicles	KISANKOPTERS LLP	Dr. Sarvendranath R, Department of Electrical Engineering
18.	Geotechnical investigations of foundations soil along the proposed earthen bund alignment of summer storage tank at Peddacheruvu, Vishakhapatnam, A.P.	Public Health Division Vishakhapatnam, AP.	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
19.	Proof Checking of 3D printed small structures - 3 units	Tvasta Manufacturing Solutions Pvt. Ltd.	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering

S. No.	Title	Funding Agency	Investigator and Department
20.	Developing a highly thixotropic self-compacting concrete for inclined surfaces and sloped roof applications	DEC Infrastructure Projects India Pvt. Ltd.	Dr. A.V. Rahul, Department of Civil and Environmental Engineering
21.	Evaluation of Mechanical Properties of HYSD bars	KPC Projects Limited	Dr. N. Nithyadharan, Department of Civil and Environmental Engineering
22.	Structural proof checking for box culverts	Andhra Pradesh Industrial Infrastructure Corporation	Dr. N. Nithyadharan, Department of Civil and Environmental Engineering
23.	Proof checking of steel framing system supporting solar panels	M/s Arcedo Systems	Dr. N. Nithyadharan, Department of Civil and Environmental Engineering
24.	Proof checking of structural design of BSL-03 & Animal House Building at IISER Tirupati Campus	Integrated Cleanroom Technologies Private Limited	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
25.	Mix Design of Pavement Quality Concrete	Sai Construction & Services	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering
26.	Conducting Ultrasonic Pulse Velocity Test on U-girders and pier arms of CMRL Phase- II	Chennai Metro Rail Limited	Dr. Behera Prasanna Kumar, Department of Civil and Environmental Engineering
27.	A Complier base approach for automatic conversion of python Scripts to C++	Toshiba Software (India) Private	Dr. Kalidas Y, Department of Computer Science and Engineering
28.	Green AI Frameworks Comparing Energy Consumption of Deep Learning Frameworks	Accenture Solutions Private limited	Dr. Sridhar Chimalakonda, Department of Computer Science and Engineering
29.	Recommendation of remedial measures to restore the distressed portion between the chainage 1520 m and 1735 m of the Summer Storage Tank Bund at Puttur, A.P.	Public Health Division, Nellore	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
30.	Compressive strength and initial tangent modulus for concrete core	Common Code Consultancy Registration	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
31.	Impact Assessment of the Policy and strategic framework for preventing environmental pollution and protecting public health	The United Nations Development Programme (UNDP) India	Prof. Suresh Jain, Department of Civil and Environmental Engineering
32.	Proof checking for underground tunnel design at Railway /Metro crossings	Chennai Metro Rail Limited	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering

S. No.	Title	Funding Agency	Investigator and Department
33.	Proof checking of structural design of ETB and MCW Hanger	M/s Karekar & Associates	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
34.	The Purañjana Project - Towards Creating a Sense of Excitement on Computing Research for Underrepresented Rural Students of India	Google Research	Dr. Sridhar Chimalakonda, Department of Computer Science and Engineering
35.	No One Is Left Behind - Fostering DEI and Nurturing Communication, Collaboration and Computing skills in Underrepresented Rural Students of India through a Collaborative Game	Google Research	Dr. Sridhar Chimalakonda, Department of Computer Science and Engineering
36.	Proof checking of Design of CMRL elevated viaduct and tunnels crossings railway tracks/existing metro tunnels-Part 2	Chennai Metro Rail Limited	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
37.	SiNON Consulting Project for Drug/Biologics Encapsulation Services	SiNON Therapeutics/SiNON Nanoscience	Dr. Shihabudheen Mundampra Maliyekkal, Department of Civil and Environmental Engineering
38.	Evaluating an Electrochemical Device for Electric Vehicles (EVs)	Octillion Power Systems India Private Limited	Dr. Brindha Moorthy, Department of Chemical Engineering
39.	CRMB and PG76-10 Binder Testing	Tinna Rubber and Infrastructure Limited	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering
40.	Structural failure investigation of collapsed ESP at SDSTPS, Nelaturu, Nellore, Andhra Pradesh	Andhra Pradesh Power Development Company Limited (APPDCL)	Dr. Jashnav Pancheti, Department of Civil and Environmental Engineering
41.	Annual certification of coal ash pond and dykes at Sri Damodaram Sajeevaiah Thermal Power Station, Nelatur, Nellore, Andhra Pradesh	Andhra Pradesh Power Development Company Limited (APPDCL)	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
42.	Characterization of the high assymetic corrosion and accelerated test for suitable remedial coating	Power Grid Corporation of India Limited	Prof. Mamilla Ravisankar, Department of Mechanical Engineering
43.	JMF for BC2 Mix Design with CRMB Madhya Pradesh	G R INFRAPROJECTS LIMITED	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering
44.	JMF for BC2 Mix Design with CRMB Gujarat	G R INFRAPROJECTS LIMITED	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering

S. No.	Title	Funding Agency	Investigator and Department
45.	JMF for BC2 Mix Design with CRMB Rajasthan	G R INFRAPROJECTS LIMITED	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering
46.	Slope stability and seepage analysis of earth dam section between the chainage 3700 m and 4255 m of Isarda dam project across Banas River, Tonk District, Rajasthan.	Om Metals Infra Ltd.	Dr. B. Janaki Ramaiah, Department of Civil and Environmental Engineering
47.	Segregation of High-Grade Barite from Waste/Discarded Barite	Empra Mines and Minerals Pvt. Ltd.	Dr. Vir Anil Babasaheb, Department of Chemical Engineering
48.	Assessment and Implementation of Sanitation Works at Navajeevan Blind Relief Centre, Tirupati.	Navajeevan Blind Relief Centre	Dr. Narasamma Nippatlapalli, Department of Civil and Environmental Engineering
49.	Development of atmospheric nonthermal plasma-based liquid fertilizer as a natural growth enhancer and biocidal agent	Ozone Research and Applications India Pvt. Ltd.	Dr. Shihabudheen M Maliyekkal, Department of Civil and Environmental Engineering
50.	Proof checking of SITC 5 MLD STP	Ishwar Singh & Associates Cons. Pvt. Ltd.	Dr. Bijily Balakrishnan, Department of Civil and Environmental Engineering
51.	NH332 Wetting of Methodology of PQC Panel Repair & Full / Partial Replacement	Dilip Buildcon Limited	Dr. Krishna Prapoorna, Department of Civil and Environmental Engineering

4.2 PATENTS FILED AND GRANTED

Intellectual property plays an important role in providing a competitive edge to any Institution. IIT Tirupati has an IPR Cell and has filed around Thirty patents & five Industrial Design so far. The IPR cell creates conducive environment in the Institute for the development of Intellectual Property. IIT Tirupati faculty members and students are actively participating in the IPR filing process in different disciplines of Engineering & Technology and Science. During the academic year 2023-24 filed eleven patents, two Industrial Design and one patents granted as listed below,

Patent granted

1. **Dr. Ajay Kumar and Mr. Tumula Tirumala:** "A Process for Surface Coating Through Casting with Sheet Inserts" Indian patent granted in the year 2024.

Patent filed

1. **Dr. Degala Venkata Kiran and Mr. Srihari Chitral:** "Tandem wire arc additive manufacturing system for the high productive and customized multi-material product development" Indian patent filed in the year 2023.

2. **Dr. Kalidas Yeturu:** "Method of Vectorization and Verification of Handwritten Signatures on Touch Sensitive Hardware" Indian patent filed in the year 2023.
3. **Dr. Ajay Kumar and Mr. Tumula Tirumala:** "Fabrication of Aluminium-Stainless Steel Bimetallic Pipes Through Die-Casting Via Reverse-Cladding" Indian patent filed in the year 2023.
4. **Prof. Thamida Sunil Kumar, Dr. Anil Vir and Mr. Babajan Bakthar Khan:** "Pressure Oscillation Based Approach for Counting Droplets in Microfluidics" Indian patent filed in the year 2023.
5. **Mr. Selvakumar M, Prof. KSMS Raghavarao, Dr. Trivikram Reddy Nallamilli, Dr. Siva Mahesh Tangutooru and Dr. Vishwa Pria Podduturi;**" Method for Preparing A Stable-Liquid Emulsion of Black Pepper Oleoresin" Indian patent filed in the year 2024.
6. **Dr. A.V. Rahul, Dr. Shihabudheen Mundmapra Maliyekkal and Ms. Revathy Sunil:** "Two-Part Pre-Packaged Easy-To-Mix Waste-Derived Graphene Oxide-Modified Ultra-High-Performance Concrete" Indian patent filed in the year 2024.
7. **Md Ehtesham Azam:** "Method for Automating Civil Engineering Calculation Tasks for Efficiency and Accuracy" Indian patent filed in the year 2024.
8. **Dr. Mamilla Ravi Sankar, Dr. Abdul Wahab Hashmi and Joijode Kiran Kumar:** "Low Viscous Xanthomonal Campestris-Galactomannan Polysaccharide Based Polymer Medium for Abrasive Flow Finishing of Micro-Scale Passages" Indian patent filed in the year 2024.
9. **Dr. Sridhar Chimalakonda:**" Dbjoules- A System and Method For measuring Energy Consumption of Database Management Systems" Indian patent filed in the year 2024.
10. **Dr. Sridhar Chimalakonda :**" System and Method for Generating natural Language Summary of Source code Using Federated Language Model" Indian patent filed in the year 2024.
11. **Dr. Shihabudheen Mundmapra Maliyekkal, Dr. Reetesh Kumar Gangwar, Mr. Shaik Mahamad Allabakshi, P S Naga Sai Raghavendra Srikar and Abhay Kumar:** "Chemo-Photo-Plasma Hybrid Advance doxidation Process for Ultrafast Removal of Environmental Pollutant" Indian patent filed in the year 2024.

Industrial Design filed

1. **Dr. Soujit Sengupta, Ms.Vajitha G and Dr. Shihabudheen Mundampra Maliyekkal:** "Design Of 3000 To 5000 LPH Fully Automated membrane Modified Capacitive Deionization module" Industrial Design filed in the year 2023.
2. **Dr. Subbareddy Daggumati, Mr. Maruthi Amardeep and Mr. Utham Kumar Dharmapuri:** "Vertical Take-Off and Landing (VTOL) Aircraft Structure and Design" Industrial Design Filed in The Year 2023.

4.3 INSTITUTION'S INNOVATION COUNCIL (IIC) ACTIVITIES

IIT Tirupati has a dynamic Institution's Innovation Council dedicated to nurturing a culture of innovation and supporting the start-up ecosystem within the campus. The institute participated in the performance star rating for the Institute of National Importance / Central University category, where 98 institutions were evaluated. Out of these, only two institutions achieved a rating of four stars out of five. Eleven institutions scored between 3 and 3.5 stars, and IIT Tirupati is proud to be one of them.

CSRC handles overall IIC activities and conducted few notable Innovation activities as per the MIC guidelines as listed :

1. Faculty Interaction Session for Product and Technology Developments was organized on 4th May 2023. The resource persons were Dr. Kalaiselvi- DG-CSIR and Prof. Santanu Bhattacharya, Director-IISER Tirupati.

The Resource person briefed technology development in various fields and supported technology development projects under CSIR. The program supports activities aimed at developing and integrating technologies to evolve technology systems both in advanced/emerging areas and in traditional sectors/areas. Under the Programme, the feasibility of fresh ideas/ concepts is assessed for their potential conversion into useful technology/products.

2. The IIT Tirupati team took part in the IInvenTiv-2024 R&D Fair held from January 19th to 20th January, 2024. Three teams from the institute showcased their projects at the exhibition. The participating teams are as follows:

i. Prof. P. Muthukumar and team, "Metal Hydride based Hydrogen Storage, Compression and Purification Systems."

ii. Dr. Shihabudheen, Dr. Reetesh Kumar Gangwar and team, "Nonthermal-Atmospheric-Photo-Plasma (NAP) reactor: Wastewater to liquid Fertilizer."

iii. Dr. Shihabudheen and team, "Sustainable Antimicrobial Film Enabled (SAFE) Water Disinfection."

3. The Institution's Innovation Council of IIT Tirupati participated in the IIC Regional Meet held at KL University, Vijayawada on 6th January 2024.

The Ministry of Education Innovation Cell organized state level regional meets to guide and encourage the Innovations & Startups in Higher Educational Institutes. A team from IIT Tirupati (Dr. K. Thirupathi, Startup Coordinator- IIC, Chief Manager-CSRC and Mr. Vishnu Aravind, Member E-Cell & IIC) participated in the regional meet to understand the Ministry expectations and to strengthen Innovation & Startup Ecosystem.

4.4 INCUBATION/INNOVATION ACTIVITIES STATUS

IIT Tirupati Pre-incubation Cell provides funding support to the students/research scholars up to Rs. 1.5 Lakhs for each Innovative technical business ideas to improve Technology Readiness Level (TRL)/ Prototyping/ Testing etc. IIT Tirupati students/research scholars are encouraged to submit the technical business ideas throughout the year. During academic year 2023-24 period two phases of technical business ideas selection process has been completed and selected nine technical business ideas for funding. This year Institute allotted Rs. 10 Lakhs from Institute Innovation Fund to support students Innovations to promote & enable Startup and Innovation ecosystem.

IIT Tirupati Section-8 company (Not-for Profit) called "IIT Tirupati Innovation & Incubation Foundation (IITT IIF)" Board of Directors (BoDs) meeting was held on 27th June 2023 and 14th October 2023 to review the operations as per the Ministry of Corporate Affairs (MCA) guidelines and all necessary papers were subsequently submitted to MCA.

A snapshot of IITT IIF Board of Directors' meeting

5. INSTITUTE CENTRES

The Institute boasts of various centres that seek to promote innovation and foster specialised domains of knowledge in some of the thrust areas that have been identified, IIT Tirupati currently has four centres that are functioning. These centres include the Centre for Atomic, Molecular, and Optical Science & Technologies [CAMOST], the Centre for Continuing Education [CCE], the Centre of Excellence [CoE] on Smart Manufacturing and Electric Vehicle Technologies, and Technology Innovation Hub - IIT Tirupati [Navavishkar I-Hub Foundation]. Given below are the activities of these centres for the period under consideration:

5.1 CENTRE FOR ATOMIC, MOLECULAR, AND OPTICAL SCIENCE & TECHNOLOGIES [CAMOST]

Centre for Atomic, Molecular, and Optical Sciences & Technologies (CAMOST), a joint initiative of IIT Tirupati and the IISER Tirupati, is India's first centre of national importance in Atomic, Molecular, and Optical (AMO) Sciences, established to address key challenges in frontier areas of AMO sciences which encompass significant areas of human activities directly impacting life through applications in health, communication, navigation, metrology, space, internet, and quantum technologies. Some of the activities and accomplishments of CAMOST during the period under consideration are as follows:

5.1.1 Third Anniversary Colloquium Series

In observance of the CAMOST's third anniversary, a CAMOST-G20-S20 consortium seminar series on Disruptive Sciences and Technologies, supported by esteemed institutions such as the Indian National Science Academy (INSA), G20, and S20 groups was curated. This series featured distinguished experts in quantum technology from both national and international academic circles. Hosted by IISER Tirupati and IIT Tirupati, the seminars were held from August 16 to October 27, 2023, incorporating both in-person and hybrid lecture formats. The Indian Association of Physics Teachers (IAPT) collaborated with CAMOST as the Outreach Partner. The event concluded with a comprehensive panel discussion on October 28, 2023.

A View of the Third Anniversary Colloquium Series

5.2 CENTRE FOR CONTINUING EDUCATION [CCE]

The Centre for Continuing Education at IIT Tirupati offers a range of programs aimed at professionals seeking to enhance their skills and knowledge in various engineering and technology fields. Through workshops, short-term courses, and certificate programs, the centre provides opportunities for lifelong learning and professional development. Leveraging the expertise of IIT Tirupati's faculty and state-of-the-art facilities, the centre focuses on emerging technologies and industry-relevant topics, fostering innovation and practical application in real-world scenarios. This initiative supports individuals in staying competitive and adapting to the rapidly changing technological landscape. Given below are some of the activities of the CCE during the period under consideration:

1. A short-term course conducted by Dr. Gowri Asaithambi on Traffic Flow Theory and Simulation, supported by CCE, on April 17, 2023.

2. The Department of Mathematics and Statistics, IIT Tirupati, and IISc Bangalore organised a two-day Computational and Applied Mathematics workshop on April 14 & 15, 2023, supported by CCE.

3. A 5-Day workshop on "Finite Element Methods - Theory and Practice (ANSYS)" during June 19-23, 2023, conducted by Dr. N. N Kishore, and supported by CCE.

4. A GIAN Course on "Body Politics: The Philosophy of Autobiography through Literature," from 17th July to 21st July 2023. Faculty Coordinator: Dr. Bharath Kumar, Resource Person: Prof. Aakash Singh Rathore, International Fellow, ETHOS (Luiss University), Rome, Italy.

5. An Indo-German Workshop on Data Mathematics and Scientific Computing was conducted by Dr. Panchatcharam on 8th September 2023.

6. The 29th International Conference on Processing and Fabrication of Advanced Materials - PFAM was conducted from September 6 to September 8, 2023, by Dr. Ajay Kumar from the Mechanical Engineering Department.

7. A Certification Course in Digital Manufacturing and Automation in Foundry Industry (One Month Residential Course) from 4th October 2023 to 4th November 2023, was conducted by Dr. Ajay Kumar, from the Department of Mechanical Engineering.

8. The following NPTEL Courses were recorded during the period under consideration (these courses are slated for offering from July 2024):
   a) **Indian Popular Culture** by Dr. Bibhuti Mary Kachhap from the Department of Humanities and Social Sciences.
   b) **Public Organisation and Management** by Dr. Vaneet Kashyap from the Department of Humanities and Social Sciences.
   c) **Probability Theory for Data Science** by Dr. Ishapathik Das from the Department of Mathematics.
9. Dr. Thamida Sunil Kumar coordinated a workshop on **"Capacity Building for LPG Distributors of IOCL"** for Indian Oil Corporation Limited at Secunderabad on 19th of August 2023.
10. Dr. Vikram Pudi coordinated a one-week workshop on **"Innovative Product Design for Startups"** for AICTE IDEA Lab, Mohan Babu University, Tirupati, from 25th to 30th September 2023.
11. Dr. Vikram Pudi has coordinated a 6-month certification course along with Square Micron Institute, Hyderabad on **"VLSI Physical Design Training Program"** from October 23 to March 2024.
12. A two-day workshop from 1st to 2nd December 2023 on **Industrial Wastewater Treatment** was organised by Dr. Narasamma, from the Department of Civil and Environmental Engineering.
13. A SERB-sponsored KARYASHALA workshop on "Characterisation of Cementitious Materials & Laboratory Testing" was conducted at IIT Tirupati from 18th to 24th March 2024. The coordinator for the workshop was Dr. Prasanna Kumar Behera, from the Department of Civil & Environmental Engineering.

5.3 CENTRE OF EXCELLENCE [COE] ON SMART MANUFACTURING AND ELECTRIC VEHICLE TECHNOLOGIES

The Centre of Excellence (CoE) at IIT Tirupati (IITT) has been established in collaboration with Siemens Ltd., an integrated technology company, and Wipro Enterprises Ltd., a leading technology services and consulting firm focused on developing innovative solutions. Siemens Ltd. is the technology partner, while Wipro Enterprises Pvt. Ltd. is the execution partner. The total budget for the CoE is INR 65.9 crore, with IITT contributing INR 9.2 crore and Siemens Ltd. providing the remaining INR 56.7 crore as an in-kind grant.

One of the key focus areas of IITT, aligning with national needs, local relevance, and global trends, is Materials & Manufacturing. IITT aims to be a leader in Smart Manufacturing and Electric Vehicle (EV) technologies, making significant contributions nationally and internationally. The CoE at IIT Tirupati will concentrate on technologies related to Product Design, Digital Manufacturing, Simulation & Test Solutions, Electric & Autonomous Vehicles, the Industrial Internet of Things (IIoT), Factory Automation, and Micro Grid.

The CoE will foster a dynamic environment for research, training, skill development, internships, and industrial consultancy. It will enable IITT to establish world-class Smart Manufacturing and EV technology facilities, supporting India's "Make in India" initiative. The Government's push for Industry 4.0 and "Atmanirbhar Bharat" in the manufacturing sector highlights the importance of a strong manufacturing base for sustainable growth and employment, compared to a service-based economy. There is also a significant policy focus on electric vehicles (EVs) from central and state governments. As a result, several educational institutions are establishing research centres and offering programs to address the skill gap in this sector. The National Smart Grid Mission (NSGM), led by the Ministry of Power, was launched to scale up Smart Grid initiatives, ensuring that India's power infrastructure becomes more cost-effective and reliable to provide 24x7 power to all homes in the country through a seamless transmission network.

The establishment of this CoE represents a significant milestone, reflecting IITT's dedication to advancing research, innovation, and excellence in Smart Manufacturing and EV technologies. The Union Minister of Education and Skill Development & Entrepreneurship, Shri Dharmendra Pradhan, virtually inaugurated the Centre of Excellence (CoE) at IIT Tirupati during the 4th and 5th convocation ceremonies of IIT Tirupati held on 22nd February 2024.

Currently, the Wipro team is leading a "train-the-trainer" program for the CoE labs, which is expected to be complete by the end of November 2024. Starting in January 2025, the core faculty group will conduct training sessions on various aspects of Smart Manufacturing and EV technologies, with detailed plans for these programs currently being developed.

5.4 TECHNOLOGY INNOVATION HUB - IIT TIRUPATI [NAVAVISHKAR I-HUB FOUNDATION]

Under the Nation Mission on Inter disciplinary cyber physical systems, the Technology Innovation Hub with focus on positioning and precision technologies has been setup at IIT Tirupati.

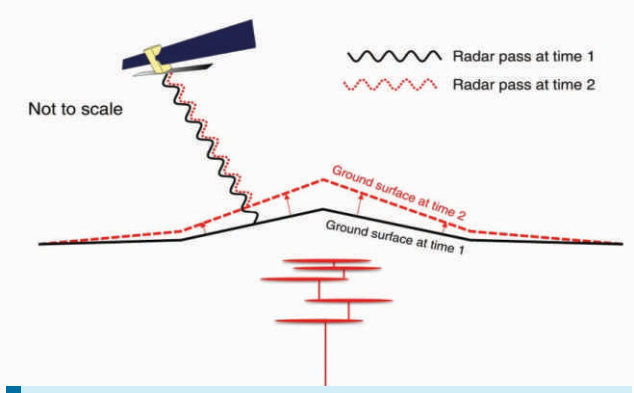
Positioning and Precision Technologies (PPTs) are indispensable tools for monitoring, integrating, and analysing spatially and temporally distributed resources to aid in effective decision-making across multiple domains. These technologies include Remote Sensing, Geographical Information Systems (GIS), Global Navigation Satellite System (GNSS), and other non-invasive technologies. The Technology Innovation Hub (TIH) primarily focuses on Public Private Partnership (PPP) model to generate revenue through (i) Research and development sponsorship from industries, government, and start-ups in the form of innovative products and services in PPT; (ii) linkage with industries, accelerators and Venture Capital to create funding ecosystem; (iii) training and consulting; (iv) standards development and policy creation for rapid adaptation of PPT across various stakeholders; and (v) databank creation across strategic areas of PPT. Some of the activities and accomplishments of TIH during the period under consideration are as follows:

5.4.1 Start-Ups & Entrepreneurship

The IIT Tirupati Navavishkar I-Hub Foundation has announced a call for startups on 24.10.2023 as part of a new funding program aimed at supporting startups in the field of Precision and Positioning Technology. A total of 48 applications were received, with 9 being selected for the pitch event. Further, selected startups participated in an online pitch event held on November 24th, 2023. After careful deliberations from the jury, 3 startups were selected for the IITTNiF startup funding program.

- Thazhal Geospatial Analytics Pvt Ltd: delivers real-time, tailored insights by seamlessly integrating earth observation, IoT, drones, and AI with deep domain expertise.
- Garudalytics: Transform Field Operations with G-Field: Seamless, Secure, and Smart Solutions.
- Spaceinf Technologies Pvt Ltd: Explore.Spatialize.Envisage- For sustainable future of our planet.

Preliminary geospatial damage assessment dashboard from Spaceinf technologies



Satellite-based land subsidence monitoring for assets to assess climate risk from Thazhal Geospatial Analytics

5.4.2 Human Resource Development

PhD Fellowship Program

In June 2024, IITTNiF and SASTRA Deemed University, Thanjavur, launched a PhD program focused on product development. This quarter, three scholars enrolled:

- Ishhanie Majumdar: Trusted Positioning with GNSS for Autonomous Driving Vehicles
- Venkatesan R: Analyze, design and develop a gap waveguide slotted array antenna for SAR on remote sensing applications.
- D. Saranya: Development of Reconfigurable Metasurface Ku band Antenna for Wide Angle Beam steering in 6G Vehicular Applications

Chanakya Post-Doctoral Fellowship Program

During July-September 2024 period, IITTNiF successfully launched a new call for **Chanakya Postdoctoral Fellowship Program**. So far, five individuals have benefited from this initiative, and the results have been declared successfully.

5.4.3 Skill Development Program

5.4.3.1 Stakeholders Gathering (June 27, 2023)

The inaugural stakeholders gathering for the Indian Regional Navigation Satellite System (IRNSS)/Global Navigation Satellite System (GNSS) was held at the IIT Tirupati Navavishkar I-Hub Foundation on June 27, 2023. Key participants included ISRO, Space Applications Centre, Elena Geo Systems Private Limited, Accord, Electrono Solutions Pvt. Ltd., Chola Design Solutions, and Wiman Investment Innovation & Research Alliance. This event marked a crucial milestone in fostering collaboration and advancing discussions on navigation satellite systems.

NAVIC/IRNSS - TEST BED Facility at IITTNiF

5.4.3.2 IIT Bombay FOSSEE MAPATHON 2023 (June 13, 2023)

Mapathon is a competitive event focused on creating thematic maps using open-source data and mapping software. It encourages collaboration to develop tools that enhance map accuracy for communities. The initiative aims to build indigenous mapping capacity to address societal challenges and create opportunities for Indian youth. This year's event saw participation from over 5151 students across 26 states and 2 union territories, forming 1780 teams. Recognitions include 14 Champions, 74 winners, and 257 notable participants, who will have opportunities for problem-specific GIS internships, summer fellowships, and potential job placements.

IITTNiF & IIT Bombay FOSSEE Mapathon Results Declaration

5.4.3.3 Google Earth Engine and its Applications on Natural Resources Management (July 04-05, 2024)

IITTNiF hosted an advanced workshop led by Ms. Liza Goldberg, providing hands-on training in Google Earth Engine for research applications. Emphasizing forest coverage mapping, night sky analysis, vegetation indices (NDVI patterns), and predictive modelling with machine learning, participants learned JavaScript coding to tackle specific environmental challenges. Divided into groups, each team received a unique research problem, receiving personalized guidance from Ms. Goldberg to develop impactful solutions. The workshop concluded with group leaders presenting their findings, showcasing the capabilities of Google Earth Engine in environmental research and forecasting.

Introducing Google Earth Engine by Ms. Liza Goldberg

Ms. Liza Goldberg with participants

5.4.3.4 India Space Congress, Delhi (July 11-12, 2023)

IITTNiF participated in the Indian Space Congress 2024, organised by SIA at Hotel Lalit, Delhi. This event offered a valuable platform to engage with industry leaders, startups, and key players in the space-tech ecosystem. IITTNiF also showcased its initiatives at an exhibitor stall, strengthening its presence and fostering connections within the space industry.

Dr. Roshan Srivastava at the India Space Congress 2023 Panel Discussion

Stall presentation at India Space Congress

5.4.3.5 India Space Congress, Delhi (July 11-12, 2023)

IITTNiF organised a hands-on demonstration session featuring industry experts from AARVEE Associates Architecture & Consultancy Pvt. Ltd. The session provided an in-depth introduction to aerial imaging and airborne LiDAR survey techniques. Industry specialists presented the advanced equipment used for these surveys and explained the data capture process in detail. This session aimed to familiarise participants with cutting-edge aerial survey methods, offering valuable insights into the application of these technologies in various geospatial and mapping projects.

Advanced Aerial Survey and Mapping Techniques, IIT Tirupati

5.4.3.6 Atomic Clock/Quantum Navigation Stakeholders Meeting (August 21, 2023)

The Atomic Clock/Quantum Navigation Stakeholders Meeting held on August 21, 2023 brought together 35 experts from prestigious Institutes/Organisations including:

- Research Centre Imarat (RCI) Lab, DRDO
- Nexatom Research and Instruments Pvt. Ltd.
- DRDO Industry Academia Raman Centre of Excellence
- Indian Institute of Science (IISc) Bangalore
- DRDO Young Scientists Lab Quantum Technologies
- Inter-University Centre for Astronomy and Astrophysics
- The Raman Research Institute
- Indian Institute of Science Education and Research Pune
- Indian Space Research Organisation (ISRO)

- Centre for Quantum Engineering, Research and Education
- Indian Institute of Space Science and Technology (IIST) Trivandrum
- Indian Institute of Technology (IIT) Madras
- Division Head, DRDO SSPL New Delhi
- Principal Scientist, NPL New Delhi
- Inertial Systems Unit (IISU)
- QuLabs Hyderabad
- Tata Institute of Fundamental Research (TIFR) Mumbai
- Indian Institute of Technology (IIT) Tirupati

Experts facilitated discussions and advancements in atomic clock and quantum navigation technologies

This assembly of experts facilitated discussions and advancements in atomic clock and quantum navigation technologies.

5.4.3.7 IITTNiF Product Showcase Event (August 21, 2023)

The IITTNiF Product Showcase Event, held on August 08, 2023, featured displays of 17 products from various prestigious Institutes/Organisations, including:

- SASTRA University
- IIITDM- Kurnool
- IIT Tirupati
- IIT Bombay
- FOSSEE, IIT Bombay
- GISE Hub, IIT Bombay
- Research and Training Unit for Navigational Electronics, Osmania University
- ELENA GEO SYSTEMS, Bangalore
- Navavishkar-i-GEE
- Meta Verse Navigation
- SAMEER-MIETY
- TechEagle

This event served as a platform to showcase a diverse range of innovative products and technologies, highlighting collaborative efforts across different institutions and organisations.

Atomic Clock Stakeholders Meeting and TIH Showcase Event at IITTNiF

5.4.3.8 GIS for Farmers (December 16, 2023)

IIT Tirupati Navavishkar I-Hub Foundation has launched a new program: GIS for Farmers, in line with the National Geospatial Policy goals. The inaugural session, held at IIT Tirupati, saw over 100 registrations and 75 attendees. The program highlighted the potential of GIS and Remote Sensing in Precision Agriculture. Expert representatives engaged with farmers to understand their technological challenges. We aim to build a network of farmers interested in adopting the latest GIS and Remote Sensing technologies for Precision Agriculture.

GIS for Farmers, IIT Tirupati

5.4.3.9 NavIC - The Game Changer (January 22, 2024)

IITTNiF hosted the inaugural national seminar, "NavIC - The Game Changer," spotlighting India's indigenous Navigation Satellite System. The event convened stakeholders to explore NavIC's advantages and foster networking opportunities. Presentations showcased innovative solutions, marking a significant step in promoting NavIC's integration and future applications.

NavIC - The Game Changer, Bengaluru

SICCI Agri Summit 2024

5.4.3.10 IITTNiF- SICCI (February 8, 2024)

IITTNiF contributed to the SICCI Agri Summit 2024, centred on "Sustainable Agriculture through Digital Innovation." Dr. Y V N Krishnamurthy, a Board member of IITTNiF, shared insights on geospatial NavIC applications. Fruitful discussions ensued with representatives from MOFPI, Coromandel, Kothari Group, and GSNR Rice Industries.

5.4.3.11 Smart GIS (March 21, 2024)

IITTNiF organised the Smart GIS Innovation Challenge on "Soil Health & Mapping for Agricultural Research and Tech Transformation through GIS" on March 21, 2024, at the IIT Campus. The program saw over 50 participants engaged in exploring innovative GIS applications for sustainable agriculture, fostering research and technological advancements in soil health mapping.

Prof. KN Satyanarayana, Director of IIT Tirupati

Participants of the Smart GIS Innovation Challenge with Special Guests at the Smart GIS Innovation Challenge

6. MEMORANDUMS OF UNDERSTANDING SIGNED BY IIT TIRUPATI

IIT Tirupati places a strong emphasis on building collaborative educational and research opportunities by establishing Memorandums of Understanding (MoUs) with globally renowned universities, research institutions, laboratories, and industries. These partnerships enable diverse forms of collaboration, such as faculty, student, and research staff exchange programs, as well as joint conferences, workshops, and student internship initiatives.

Since its establishment, IIT Tirupati has signed several MoUs with educational institutions, government research and development agencies, public sector undertakings, government bodies, and industry partners. Below are the details of the MoUs signed during the 2023-2024 academic year.

6.1 DEUTSHER AKADEMISCHER AUSTAUSCHDIENST (DAAD)

An MoU was signed between IIT Tirupati and Deutsher Akademischer Austauschdienst (DAAD) under the title Enhance the scope of the present agreement of Cooperation on 30 June 2023. The aim of this MoU is to promote collaboration between IIT Tirupati, DAAD and German Universities or Research Institutions.

6.2 COURSE ON DIGITAL MANUFACTURING AND AUTOMATION FOR FOUNDRY INDUSTRY

An MoU was signed between IIT Tirupati and Institute of Indian Foundrymen Centre for Education and Training under the title, “Course on Digital Manufacturing and Automation for Foundry Industry.” The duration of this MoU is for two years that is from 11 July 2023 to 11 July 2025.

6.3 IIITDM KANCHEEPURAM

An MoU was signed between IIT Tirupati and IIITDM Kancheepuram for Joint Agreement for Academic, Research and Innovation Collaboration. The duration of this MoU is five years that is from 24 August 2023 to 23 August 2028.

6.4 RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES, ANDHRA PRADESH

An MoU was signed with Rajiv Gandhi University of Knowledge Technologies, Andhra Pradesh to facilitate the academic and scientific relationship, to promote joint research activities, and to extend mutual support in graduate, postgraduate and doctoral programmes. The duration of this MoU is for four years that is from 6 December 2023 to 05 December 2027.

6.5 INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH TIRUPATI (IISER TIRUPATI)

IIT Tirupati signed an MoU with IISER Tirupati regarding admissions, expenditures, operations, and maintenance of the Kendriya Vidyalaya, hosted in the IITT campus, with IITT being the sponsoring agency on behalf of IISER Tirupati and IIT Tirupati. The duration of this MoU is till 29 January 2044.

6.6 AARVEE ASSOCIATES ARCHITECTS ENGINEERS AND CONSULTANTS PVT. LTD.

An MoU was signed between IIT Tirupati and AARVEE Associates Architects Engineers and Consultants Pvt. Ltd. for estimation of embodied energy and carbon footprints performance indicators of highway infrastructure on 15 March 2024.

7. RESEARCH PUBLICATIONS AND ACHIEVEMENTS

IIT Tirupati provides a dynamic academic environment where faculty and students actively participate in innovative teaching and learning activities, contributing to the nation's technological progress. Like other IITs, the institute is renowned for its research efforts, with faculty members deeply involved in the development of cutting-edge technologies. As a relatively new institution, IIT Tirupati is focused on establishing world-class research facilities on campus. Faculty members are also dedicated to producing high-quality research, presenting their findings at prestigious international conferences.

Their contributions, including publications, conference participation, and research projects, are detailed in Appendix Chapter 12.

7.1 RESEARCH PUBLICATIONS

During the period April 2023 – March 2024, a total of 208 research articles in various journals of high repute, 15 book chapters, and 12 newspaper articles were published by the faculty members of the Institute. Please refer to Appendix – I for more details on the research publications.

7.2 CONFERENCE PROCEEDINGS/PRESENTATIONS

The faculty members of IIT Tirupati are actively involved in presenting their research at prestigious international conferences and seminars. In the year 2023-24, IITT faculty presented and published 201 research papers at various conferences and seminars. For further details on these conference proceedings and presentations, please refer to Appendix – II.

7.3 INVITED LECTURES DELIVERED BY THE IITT FACULTY MEMBERS

The Institute's faculty members are frequently invited to deliver special talks and lectures at various academic institutions, both in India and internationally. During this period, IITT faculty delivered 83 lectures. For more details on these invited talks, please refer to Appendix – III.

7.4 AWARDS AND ACHIEVEMENTS

The faculty members of the institute have earned various academic distinctions, honours, awards, and memberships on editorial boards of journals and esteemed international societies. For more information on the awards and achievements by the Institute's faculty members, please refer to Appendix – IV.

7.5 MEMBERSHIP OF PROFESSIONAL BODIES AND EXTRACURRICULAR ACTIVITIES

The faculty members of the Institute are members of various professional bodies, contributing to the advancement of their respective fields. They are also actively involved in several extracurricular activities within their disciplines, which support the academic community in multiple ways. For further details on faculty memberships in professional organisations, as well as their involvement in extracurricular activities, please refer to Appe

8. ACADEMIC EVENTS

IIT Tirupati has been organising national and international level seminars, conferences, and workshops to facilitate the interaction of the faculty members and students of the Institute with scholars from across the world. During the period under discussion, the Institute organised four international conferences/seminars, one symposium, fourteen workshops, and one GIAN course. The Institute, for the benefit of its faculty and students, invites scholars from across the world for delivering special talks on various topics. The Instituted hosted 40 invited special talks, and one lecture under distinguished lecture series during the period under discussion. The Institute also organised an orientation programme for providing an overview of the Institute and the curriculum for the eight batch of students at the onset of the new academic year.

8.1 ACADEMIC ORIENTATION PROGRAMME

The Institute conducted its 8th Orientation Programme from 5th-8th August 2023 to induct the 2023-2027 batch of B. Tech students. Also, Orientation Programmes were conducted on 27th July 2023 to induct the 2023-2025 batch of M. Tech, M.Sc. and MPP students. Orientation Programmes were conducted from 24th-25th July 2023 to induct MS/Ph.D. scholars of July-Dec 2023 Session and on 21st November 2023 to induct MS/Ph.D. scholars of Jan-June 2024 Session. The students and their parents were briefed about the academic programmes and the facilities available at IIT Tirupati. An interactive session followed it for the parents with the Director and the Deans of the Institute.

8.2 CONFERENCES/WEBINARS/SYMPOSIUMS/WORKSHOPS ORGANISED

A One-Day Conference on Air Quality Management in Cities

A one-day conference on air quality management in cities was organised on 7 November 2023. It culminated in the presentation of project outcomes, key learnings, and successful interventions from both the EU and India. Funding agencies, EU stakeholders, and Indian stakeholders were all invited to this dissemination event. The conference facilitated knowledge exchange and capacity building between EU and Indian cities, aiming for long-term improvements in air quality. Dr. Michael Bucki, Counsellor and Head of Section at the Delegation of the European Union to India, delivered concluding remarks. He discussed potential applications of crop residue as biofuels, biomaterials, and other uses. Dr. Bucki emphasized the importance of a science-based approach, while also advocating for considering the health costs borne by affected citizens in decision-making processes. Finally, Prof. Jain concluded the event by highlighting the need for a science-based approach coupled with community engagement and stakeholder involvement to develop integrated and sustainable solutions for agricultural practices and crop residue management.

Conference on Modern Trends in Chemical Sciences

The Department of Chemistry at IIT Tirupati organised a two-day conference on "Modern Trends in Chemical Sciences (MTCS)" from 16-17 February 2024. The conference provided a lucid foundation for intense discussion on the thriving contemporary areas in Chemical Sciences, thereby setting up the course for future directions and shedding light on potentially more powerful applications of these concepts in interdisciplinary areas.

Conference on Processing and Fabrication of Advanced Materials

The Department of Mechanical Engineering in collaboration with the National Design and Research Forum (NDRF), Bangalore organised a three-day conference on "Processing and Fabrication of Advanced Materials" between 6-8 September 2023. The conference covered a wide range of topics from Manufacturing Technologies and Additive Manufacturing to AI, ML, and Non-Destructive Evaluation. It also included industry focus areas such as Power and Energy, Marine and Defence, Biomedical and Healthcare, Electronics and Communication, and Heavy Equipment, Machinery & Goods.

Webinar on Air Quality Management

This webinar on air quality management in cities was organised on 13 November 2023. It showcased an air quality management toolkit, drawing on EU expertise. The toolkit addressed NCAP implementation, explored the viability of crop residue management using existing policies and technologies, and provided an e-portal to facilitate access to air quality management resources for Indian companies and financial institutions. The webinar also included presentations on project outcomes, key learnings, and successful interventions from both the EU and India. Notably, Dr. Guido Lanzani, Head of Air Quality Unit at ARPA LOMBARDIA, MILANO, Italy, shared his experiences with air quality management in Italy.

Symposium on Water Management

Dr. Shamik Mishra organised a symposium on "Water Management: Adaptation to Climate Change and Sustainability" between 22-23 February 2024. This symposium was conducted in collaboration with Shastri Indo-Canadian Institute. It delved deep into the nexus among water resources, climate change, and the need for sustainable practices. The strategies related to smart potable water management, industrial wastewater treatment, reservoir operation, energy generation and storage, and sustainable seafood culture and waste management were some of the thrust areas of this two-day event.

International Workshop on Justice in Policy Research

Dr. Chandra Sekhar Bahinipati organized an international workshop on "Building Ideas about Justice into Policy Research," at the Indian Institute of Technology Tirupati, on November 3 and 4, 2023 (in collaboration with Arizona State University, USA). Dr. Sonja Klinsky, Associate Professor at the School of Sustainability, Arizona State University discussed about the justice dilemmas presented by climate change and climate change policy design at multiple scales.

Online Workshop on the Role of IPR [Intellectual Property Rights] for Academia

The Centre for Sponsored Research and Consultancy, IIT Tirupati organised an online workshop on "Role of Intellectual Property Rights for Academia" on 17 May 2023 for the benefit of the students and faculty members.

Pre-Conference Workshop on Additive Manufacturing

A pre-conference workshop on "Additive Manufacturing" was organised by IIT Tirupati in association with Central Manufacturing Technology Institute (CMTI), Bangalore on 5 September 2023. The conference focused on bringing in the synergy of semiconductor packaging and allied processes for device and technology development in both academic and industrial capacity.

Workshop on Air Quality Management (AQM) in Cities

A workshop on air quality management was organised on 4 August 2023. Stakeholders from pollution control boards and regional knowledge networks in Bihar, West Bengal, Uttar Pradesh, and Orissa participated. The workshop commenced with an opening address by Prof. Suresh Jain emphasising the importance of coordinated air pollution control across airsheds. Ms. Kamilla Kristensen Rai, counsellor at the Delegation of the European Union to India, delivered the welcome address, highlighting the EU Green Deal's focus on resource efficiency and a healthy environment. The long-term vision is to achieve pollution levels that no longer harm public health or the economy by 2050. Key takeaways included the importance of collaboration and an airshed-based approach. The workshop aimed to foster mutual learning and collaboration among key stakeholders, including the National Knowledge Network, Pollution Control Boards, Municipal Corporations, and the local public.

Workshop on Algebraic and Combinatorial Methods in Representation Theory

A two-week workshop on "Algebraic and Combinatorial Methods in Representation Theory" was conducted by Dr. B. Ravinder from November 13 to November 24, 2023. The objective of the workshop was to present current progress in many aspects of Lie theory and related representation theory, to highlight its interactions with other areas of mathematics and physics and attract researchers to work on outstanding problems and challenges.

Workshop on Computational and Applied Mathematics

A two-day workshop on "Computational and Applied Mathematics" was conducted by P. Mariappan at IIT Tirupati from April 14 to April 15, 2023. The participants in this workshop had the unique opportunity to learn about the latest advances in computational mathematics and to hear from experts in the field about their research and applications.

Workshop on Data Mathematics and Scientific Computing

A one-day workshop on "Data Mathematics and Scientific Computing" was conducted by P. Mariappan at IIT Tirupati on 8 September 2023. The event focused on exploring the intersection of mathematical and computational techniques for analysing and solving problems in various fields such as physics, engineering, biology, economics, and social sciences. It provided a forum for researchers and practitioners to share their knowledge, exchange ideas, and collaborate on solving challenging problems in various domains.

Workshop on Finite Element Methods

A five-day workshop on "Finite Element Methods: Theory and Practice" was organised by the Department of Mechanical Engineering from 19-23 June 2023. The workshop was geared toward solving representative engineering problems using commercial FE software. In addition to providing a holistic view on numerical integration, system of linear equation, and isoperimetric formulation, it also gave participants hands-on sessions with ANSYS.

Workshop on India's Low-Carbon Future

Dr. Chandra Sekhar Bahinipati organized a training workshop on "Envisioning India's Low-Carbon Future: An Interactive Workshop Using the India Energy Policy Simulator," at Indian Institute of Technology Tirupati, on November 9, 2023 (in collaboration with World Resources Institute, India). The workshop was a scholarly attempt to understand India's emission profile and projections until 2050 in a "Business as Usual" (BAU) scenario. It also highlighted the potential advantages and limitations of using energy-economy modelling in informing low-carbon pathways for India.

Workshop on Legal Environment Assessment

A workshop on Legal Environment Assessment for Air Pollution and Health was conducted on 31 January 2024. The National Consultation Workshop culminated in the presentation of the UNDP-supported Legal Environmental Assessment in India to stakeholders. A subsequent discussion was initiated to explore how the legal framework could be most effectively leveraged to mitigate air pollution and protect public health, particularly among vulnerable populations.

Workshop on Measuring Urban Water Security

Dr. Chandra Sekhar Bahinipati organised a training workshop on "How to Measure Urban Water Security? using the Water Security Assessment Tool (WATSAT)," at the Indian Institute of Technology Tirupati, on October 1, 2023 (in collaboration with Asian Institute of Technology Bangkok, ABCD Centre & Supported by DAAD, Germany). The workshop introduced participants to a digital tool called Water Security Assessment Tool (WATSAT) that can help make an objective evaluation of the water security of a city.

Workshop on Reason, Feeling, and Experience

The Department of Humanities and Social Sciences in association with the Philosophy Department (School of Interwoven Arts and Sciences, SIAS), Krea University organised a workshop on "Reason, Feeling, and Experience" on 10 February 2024. The workshop focused on the questions of feeling and moral agency with reference to Kant and Okin and offered interesting insights into the applicability of such theoretical postulations vis-à-vis Malayalam, Hindi, and Sri Lankan Anglophone fiction.

Workshop on Sustainable Agriculture

A thematic stakeholder workshop on Sustainable Agriculture and Crop Residue Management (CRM) was organised on 4 August 2023. It facilitated a multi-party discussion on challenges associated with stubble burning and explored alternative crop residue management solutions. The event also served as a platform to present and gather feedback on the draft Feasibility Study, developed under the EU-funded Air Quality Management Initiative in India project. This feedback will be used to further refine the draft before formal publication.

Workshop on Sustainable Wastewater Management

The Department of Civil and Environmental Engineering, IIT Tirupati organised a two-day workshop on "Sustainable Wastewater Management: The Role of Advanced Treatment and Sensing Technologies" from 01-02 December 2023. The workshop addressed innovative treatment options for wastewater. It specifically focused on sources of wastewater and their potential differences, conventional and emerging treatment technologies, design of a potential wastewater treatment plant, and socio-economic impacts and opportunities.

GIAN Course on Body Politics: The Philosophy of Autobiography Through Literature

A GIAN course on "Body Politics: The Philosophy of Autobiography Through Literature" was hosted by Dr. Bharath Kumar, during 18-22 July 2023, at the Indian Institute of Technology Tirupati. Prof. Aakash Singh Rathore, an International Fellow of ETHOS (Luiss University), Rome, Italy was the teaching faculty for the course. The course offered intimate readings of a diverse range of global autobiographical literature in order to foreground the centrality of somatic experience that ties together the life-writing of philosophers, activists, artists, and politicians.

8.3 INVITED TALKS HOSTED BY IIT TIRUPATI

1. **Dr. Anirban Roy,** Research Associate, Cornell University, USA, delivered a talk on "Exploring the Universe: From the First Billion Years to the Present Day", on 1 September 2023.
2. **Dr. Anubhab Baksi,** Postdoctoral Fellow, Nanyang Technological University, Singapore, delivered a talk on "Fundamental Topics in Cryptography", on 7 November 2023.
3. **Dr. Arpan Mukherjee,** Postdoctoral Fellow, RICAM, Austrian Academy of Sciences, delivered a talk on "Mathematical Analysis of Therapy Modalities Using Acoustic Cavitation", on 18 January 2024.
4. **Dr. Atanu Rajak,** Assistant Professor, IIT Hyderabad, delivered a talk on "Prethermalisation in Driven Many-Body Systems with Unbounded Chaotic Diffusion", on 7 March 2024.
5. **Dr. Barun Kumar Maity,** Postdoctoral Fellow, California Institute of Technology (Caltech), USA, delivered a talk on "Super-Resolution Imaging by Peptide-PAINT and Multivalent LCD-LCD Interaction in Regulating PAX3FOXO1 Transcription in Rhabdomyosarcoma", on 25October 2023.
6. **Dr. Debabrata Pramanik,** Assistant Professor, SRM Amravati, India, delivered a talk on "Understanding Complex Biomolecular Systems Employing Molecular Dynamics Simulations", on 1 August 2023.
7. **Dr. Devendra Tiwari,** NBHM Postdoctoral Fellow, Bhaskaracharya Pratisthana, Pune, delivered a talk on "A Topological Way to Classify Modular Subgroups", on 22 August 2023.
8. **Dr. Diksha Jain,** Postdoctoral Fellow, TIFR Mumbai, India, delivered a talk on "Perturbative Soft Photon Theorems in De Sitter Spacetime", on 11 August 2023.
9. **Dr. Hema Kuntrapakam,** Postdoctoral Fellow, Advanced Science Research Centre CUNY, New York, delivered a talk on "Stimuli-Induced Transformations in Confined Systems", on 22 December 2023.
10. **Dr. Hemant Kumar,** Assistant Professor, IIT Bhubaneswar, delivered a talk on "Exploring Gene Regulation through Chromatin Organization: Computational Framework Connecting HiC to Gene Transcription", on 16 February 2024.
11. **Dr. Jalaj Jain,** Centre for Research on the Intersection in Plasma Physics, Matter and Complexity, Santiago, Chile, delivered a talk on "Fundamental Studies on Plasma Focus Devices and their Applications", on 12 January 2024.

12. **Dr. Mathew Joseph,** Associate Professor, ISI Bangalore, delivered a talk on "A Random String Among Random Obstacles", on 2 November 2023.
13. **Dr. Minerva Mukhopadhyay,** Assistant Professor, IIT Kanpur, delivered a talk on "Bayesian Variable Selection Under High-Dimensional Settings with Grouped Covariates", on 31 October 2023.
14. **Dr. M. S. Bootharaju,** Research Associate Professor (IBS Young Scientist Fellow), Centre for Nanoparticle Research, Seoul National University, South Korea, delivered a talk on "Atomically Precise Nanochemistry", on 12 January 2024.
15. **Dr. Narendra Kurra,** Assistant Professor, IIT Hyderabad, delivered a talk on "2D MXenes and their Hybrids for Advanced Energy Storage Devices", on 6 March 2024.
16. **Dr. Nazma Islam,** NASA Goddard Space Flight Centre, USA, delivered a talk on "Exploring the Hot and the Energetic Universe", on 5 February 2024.
17. **Dr. P. Shankar,** Senior Optical Engineer, NKT Photonics, Southampton, UK, delivered a talk on "Structured Light for Quantum Technology Applications", on 2 March 2024.
18. **Dr. Puneet Sharma,** Associate Professor, IIT Jodhpur, India, delivered a talk on "Topological Dynamics: An Introduction", on 19 August 2023.
19. **Dr. Sankha S Basu,** Assistant Professor, IIIT Delhi, delivered a talk on "Logic: Metaphysics to Mathematics", on 31 August 2023.
20. **Dr. Sivarama Krishnan,** Associate Professor, IIT Madras, India, delivered a talk on "Unravelling Correlated and Collective Quantum Dynamical Processes in Quantum Aggregates and Fluids: Playgrounds for Femto-Second and Atto-Second Physics", on 10 November 2023.
21. **Dr. Sneha Chaubey,** Assistant Professor, IIIT Delhi, delivered a talk on "Distribution of Spacings of Real-Valued Sequences", on 4 March 2024.
22. **Dr. Subhajit Dutta,** Assistant Professor, IIT Kanpur, delivered a talk on "On Exact Feature Screening in Ultrahigh-Dimensional Classification", on 30 October 2023.
23. **Dr. Subhajit Ghosh,** Postdoctoral Fellow, Bar-Ilan University, Ramat-Gan, Israel, delivered a talk on "Aldous-Type Spectral Gap Results for the Complete Monomial Group", on 3 November 2023.
24. **Dr. Sunethra Ramanan,** Associate Professor, IIT Madras, delivered a talk on "Strongly Correlated Atomic Systems", on 15 March 2024.
25. **Dr. Sunil Pulletikurti,** Postdoctoral Fellow, Scripps Research Institute, California, delivered a talk on "Heterogeneous Protocells: Membrane Properties and Compartmentalisation", on 12 February 2024.
26. **Dr. Surabhi Jaiswal,** Assistant Professor, IISER Pune, India, delivered a talk on "Exploring Low Temperature Plasma Fundamentals and Technology for Environmental Applications", on 26 April 2023.
27. **Dr. Tanujit Dey,** Assistant Professor, Harvard Medical School, Boston, Massachusetts, delivered a talk on "Air Pollution: From Data to Model – A Statistician's Perspective", on 20 July 2023.
28. **Dr. Tathagata Biswas,** Postdoctoral Fellow, Arizona State University, delivered a talk on "Incorporating Excited State Properties into Computational Material Designing and Discovery", on 19 January 2024.
29. **Dr. Tom Z. Bradstreet,** Associate Professor, University of South-Eastern Norway, delivered a talk on "In Whose Language? Literature, Human Rights, and Disability Studies", on 1 September 2023.
30. **Prof. Aleksandar Petrovic,** Professor, University of Belgrade, Serbia, delivered a lecture on "Artificial Intelligence and the Rise of Posthuman World", on 24 April 2023.
31. **Prof. Anup Bose,** Professor, Indian Statistical Institute, delivered a talk on "Estimation of Bergsma's Covariance", on 1 March 2024.

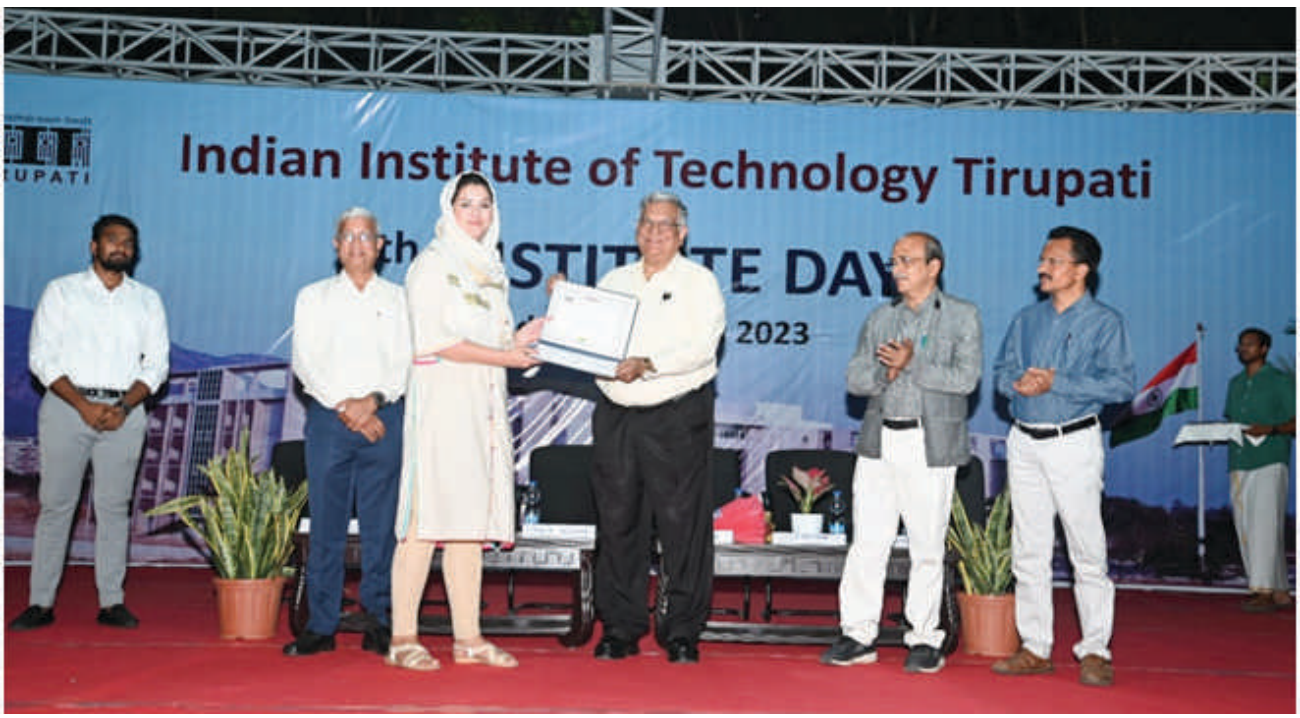
32. **Prof. Anup Bose,** Professor, Indian Statistical Institute, delivered a talk on "Valuable Moments", on 29 February 2024.
33. **Prof. B. L. S. Prakasa Rao,** Retired Professor, ISI Kolkata, delivered a talk on "Introduction to Statistics in Finance", on 26 October 2023.
34. **Prof. G. P. Rajasekhar,** Professor, IIT Kharagpur, delivered a talk on "Mathematical Modelling of Tumour Growth and Mechanical Behaviour", on 12 October 2023.
35. **Prof. Nalini Ravishanker,** Professor, University of Connecticut, delivered a talk on "Ensemble Hindcasting of Coastal Wave Heights", on 13 December 2023.
36. **Prof. Nalini Ravishanker,** Professor, University of Connecticut, delivered a talk on "Models for High Frequency Time Series", on 13 December 2023.
37. **Prof. Nishith Prakash,** Professor, Northeastern University, Boston, USA, delivered a talk on "Sexual Harassment in Public Places and Police Patrols: Experimental Evidence from Urban India (Hyderabad)", on 21 September 2023.
38. **Prof. Pramod K. Nayar,** Professor, University of Hyderabad, delivered a talk on "The Literature of Climate Crisis", on 27 October 2023.
39. **Prof. S. Ramakrishnan,** Professor, Indian Institute of Science, Bengaluru, delivered a talk on "Fun and Games with Polymers", on 27 February 2024.
40. **Prof. Suresh Valiyaveetil,** Professor, National University of Singapore, delivered a talk on "Plastic Pollution-Environmental and Health Impact, Transportation and Removing Plastic Particles from Different Matrices", on 13 December 2023.
41. **Professor Karuna Mantena,** Professor of Political Science, Columbia University, delivered a lecture on "Scaling up Satyagraha: Miscalculation and Discovery," on 21 February 2024.

9. INSTITUTE EVENTS

IIT Tirupati organises various on-campus events to give the students ample opportunity to develop their overall personalities along with expertise in their respective branches. This section of the report details the various events organised by the Institute during the year 2023-24.

8th Institute Day Celebrations

IIT Tirupati celebrated its 8th Institute Day on 6 April 2023 with Padmashri Prof. Sudhir Kumar Jain, Vice Chancellor, Banaras Hindu University, Varanasi, as the Honourable Chief Guest. Prof Jain addressed the students, faculty, and staff and shared his vision for a new institute like ours. This was followed by the award ceremony where students were recognised for their academic accomplishments and their various innovative projects. The last segment of the program consisted of the Cultural event where Kalaimani Madhavi Reddy, an artist from Chennai enthralled the audience with her elegant dance performance.



3K Cycling Event

On 3rd June 2023, the institute celebrated World Bicycle Day with great enthusiasm by conducting a 3k cycling event around the campus. The event aimed to promote cycling as a sustainable and healthy mode of

transportation and to raise awareness about the importance of physical activity for overall well-being. The 3km route was carefully planned within the campus premises to ensure a safe and enjoyable experience for all participants.

9th International Day of Yoga (21st June 2023)

The institute observed International Yoga Day with fervour within the confines of the indoor stadium. The event commenced with the distribution of t-shirts to all participants, thereby setting the tone for a collective experience. Our esteemed guest, Mr. Amarnath conducted a session on Yoga Therapy that delved into various yoga poses and practices. This celebration not only honoured the ancient art of yoga but also underscored its profound benefits for physical and mental well-being.

77th Independence Day

IIT Tirupati celebrated the 77th Independence Day on 15 August 2023 in all its glory and colors. It started with the guard of honour by the security guards at the main flag post near the Administrative Building, followed by the flag hoisting by the Director, Prof. K. N. Satyanarayana. This was followed by multiple cultural programs from both students and children of staff. The programme ended with the distribution of prizes and certificates to all the participants.

3K Run

On 29th August 2023, IIT Tirupati commemorated National Sports Day with an invigorating 3K run, igniting the spirit of athleticism and camaraderie among participants. The event, held within the institute's premises, saw individuals from various backgrounds coming together to celebrate the sheer joy of sports and physical activity. The 3K run not only promoted the importance of regular exercise and active lifestyles but also fostered a sense of unity and sportsmanship within our institute community, embodying the essence of National Sports Day.

Visit of Shri Sajjan Jindal, Chairman & Managing Director, JSW Group as the Chairperson of the Board of Governors (BoG) of IIT Tirupati

Shri Sajjan Jindal, the Chairperson of the Board of Governors (BoG) of IIT Tirupati officially visited the institute's campus on 23 September 2023. Prof. K. N. Satyanarayana, Director, IIT Tirupati warmly welcomed him and introduced him to the Deans and the Heads while briefing him about the various programmes and courses offered by each department. Shri Jindal went around the campus, visited the departments and labs with state-of-the-art infrastructure and complimented the Director for the institute's infrastructure that places a premium on sustainable practices and environment-friendly ecosystems.

Vigilance Awareness Week

Vigilance Awareness Week 2023 was observed in IIT Tirupati from 30th September to 05th November. As a part of this programme, the Integrity Pledge was taken on 30th October 2023 by all the students, staff, and faculty. In addition, an online expert talk was organised on 06th November 2023 where Shri R. Sri Kumar, (IPS, Retired DGP), spoke about the importance of saying "no" to corruption as proof of one's commitment to the nation.

Rashtriya Ekta Diwas

Rashtriya Ekta Diwas was celebrated on 31st October 2023 to commemorate the birth anniversary of Sardar Vallabhbhai Patel. As a part of this programme, a Unity Pledge was taken by all the students, staff, and faculty which was then followed by a Unity Run.

Sanyog Tournament

From 3rd to 5th November 2023, IIT Tirupati hosted its first Inter-College Sports Tournament in which neighbouring colleges from Tirupati were invited to participate. With approximately 300 students from eight different colleges joining in, the event marked a significant milestone for our institution. Featuring a wide range of sports including cricket, basketball, volleyball, badminton, and table tennis, the tournament showcased the prowess and sportsmanship of participants.

National Voters' Day

National Voter's Day was celebrated on 25th January 2024 to mark the importance of every vote in a democracy. The theme of NVD celebrations for this year was "Nothing like voting, I vote for sure." As a part of this programme, NVD Pledge was taken on by all the students, staff, and faculty. Several activities like selfie point, essay writing, slogan writing, poem writing, and painting competition, were organised and an exclusive video was made by the students on "Mera Pehla Vote Desh Ke Liye."

75th Republic Day Celebrations

IIT Tirupati celebrated the 75th Republic Day with fervour and pride as the event marked the importance of all the privileges that the nation offers us. This year the festivities were even more special as the theme was "Nari Shakti." The parade began in the sports ground after Prof. K. N. Satyanarayana, Director, IIT Tirupati unfurled the National Flag. The celebrations culminated in the dignified felicitation of the IIT Tirupati students and staff recognising their performance in the Inter IIT Sports and Cultural Meet 2023.

Dedication of the Permanent Campus of IIT Tirupati to the Nation

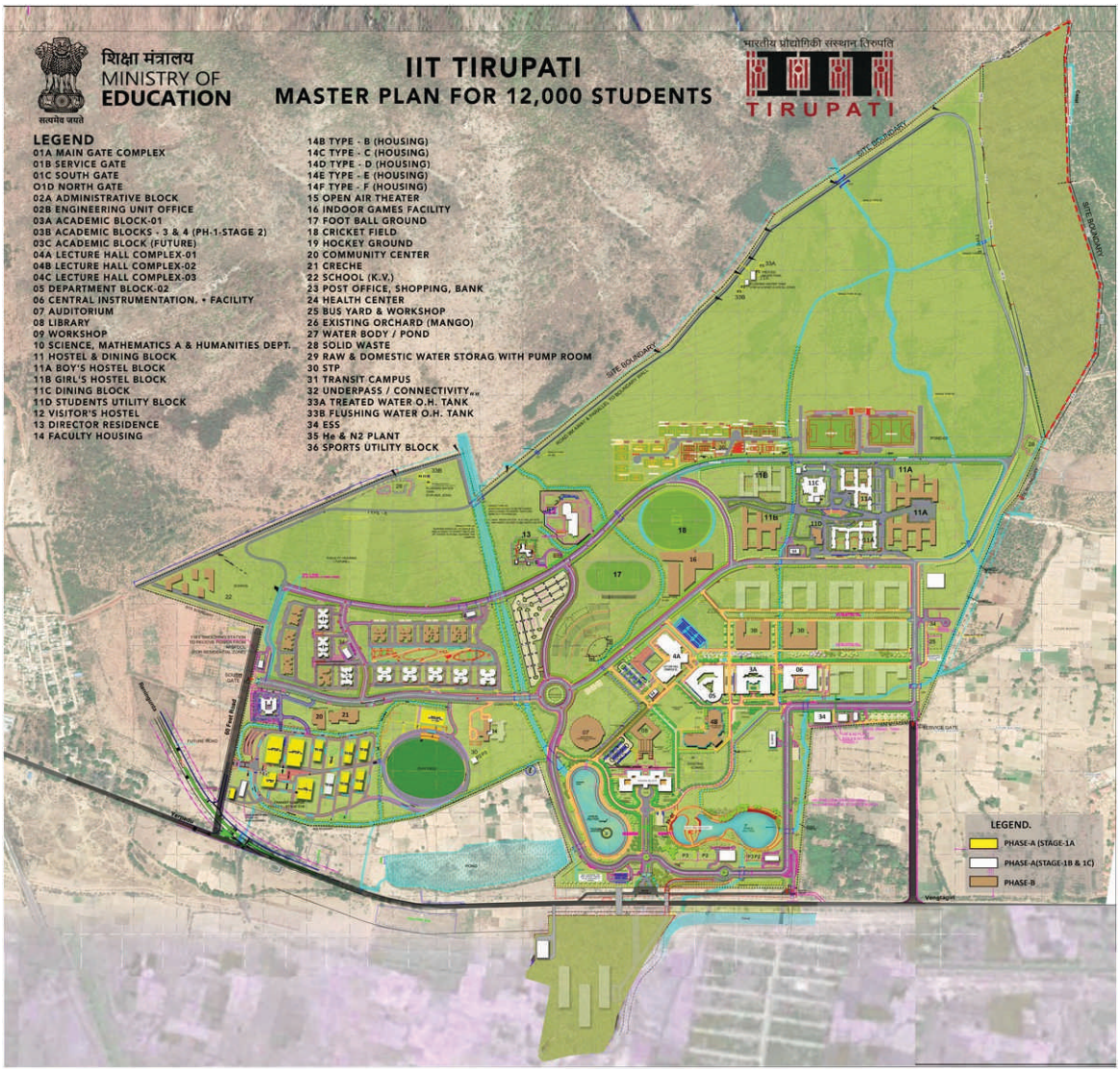
IIT Tirupati's permanent campus was dedicated to the Nation virtually by Shri Narendra Modi, Prime Minister of India on 20th February 2024. The event was attended by all the students, staff, faculty members, and graced by the Honourable Deputy Chief Minister of Andhra Pradesh, Shri Peedika Rajanna Dora and the Member of Parliament from Tirupati, Shri Maddila Gurumoorthy.

MEDHA Talk on Women Empowerment

MEDHA organised a two-day event for the International Women's Day Celebration. It conducted recreational activities for all female housekeeping and security staff. It also organised an Open Mic and a Paper Glass Painting Competition along with a Panel Discussion for all living on campus. Dr. Sangeetha K, a scientist at the Indian Space Research Organisation delivered a talk on “Empowering Excellence: Recognising Women in Science and Technology for a More Inclusive Future.” In addition, Dr. Penna Krishna Prasanthi, Non-Official Independent Director, BIRAC, DBT, GOI, also delivered a talk on “Women's Health – Nation's Wealth.”

10. CAMPUS INFRASTRUCTURE

IIT Tirupati has continued its commitment to enhancing its infrastructure to meet the evolving needs of its esteemed student body and educational requirements. Spanning across 548.11 acres, the campus is strategically situated on the Yerpedu-Venkatagiri Highway in Merlapaka Village, offering convenient access from Tirupati town, Renigunta Railway Station, and Tirupati Airport. The master plan of the IIT Tirupati Permanent campus is planned to be developed in various phases eventually growing over a period of 25-30 years to become a 12,000-student Institute.



It has been planned that the Permanent Campus would be constructed in phases. The Campus seeks to provision 2,500 students, 250 faculty members and 275 staff members in the initial phases. In Phase A, the infrastructure development to cater to 1,200 students along with all associated facilities was completed in September 2023. Now the campus is fully operational with all the developed facilities.

10.1 PERMANENT CAMPUS & MASTER PLAN

10.1.1. South Campus of IIT Tirupati

Earlier Transit campus, developed under Stage1 and 1B, is now called as South Campus that comprise the following buildings and facilities:

1. Five Hostels with G+3 floors, each to accommodate about 150 students, constructed using Glass Fiber Reinforced Gypsum (GFRG) technology.
2. One hostel with G+4 floors to accommodate 180 students
3. A G+1 floor multipurpose building with a 120-seater studio type classroom, a 60-seater recording studio, a 20-seater Computer lab, a Library, and a Health Centre with two medical examination rooms and a 4-bed ward.
4. Classroom Building with G+2 floors housing 13 classrooms (40/60 capacity), one 120-seater classroom, a computer lab, and offices. This building is currently being used for the pre-school, creche and allocated for the Kendriya Vidyalaya Schools (operations starting from the academic year 2024-25) till the school building construction is completed.
5. Two laboratory buildings, Lab 1 and Lab 2 to house laboratories for Civil and Mechanical Engineering (Lab 1), and laboratories for Electrical Engineering and Makers Lab (workshop) facilities (Lab 2).
6. A residential block with four apartments for essential staff/faculty as temporary accommodation.
7. A maintenance office building.
8. Indoor sports complex along with outdoor sports facilities.
9. A dining-cum-kitchen facility for 300 persons in a batch, equipped with a modern and hygienic kitchen.
10. 500 kVA sub-station with a provision to extend DG Power automatically during external power outages.
11. BT Roads with street lighting, Water treatment and Sewage treatment plants etc.

An Aerial View of South Campus

10.1.2. Main (North) Campus

IIT Tirupati main campus infrastructure was built under Stage 1C contract which was started in June 202. Beginning in October 2021, various buildings and zones were progressively occupied, with full functionality achieved by July 2023. Notably, the completion and occupancy of buildings along with full functionality were achieved during this period (April 2023-September 2023).

An Aerial View of the Main Campus

Academic Zone - Total Built-Up Area: 62,351 sqm.

The Academic Zone is the heart of IIT Tirupati, providing cutting-edge infrastructure for teaching and research. It comprises Academic Buildings 01 and 02, a Lecture Hall Complex, the Administrative Building, and a Central Instrumentation Facility (CIF). The academic buildings house classrooms, research labs, faculty rooms, and other necessary spaces to support the academic mission of the institute.

Academic Building 01:

Houses Computer Science, Electrical Engineering, Humanities, and Mathematics departments.

Academic Building 02:

Accommodates Chemistry, Civil Engineering, Chemical Engineering, Mechanical Engineering, and Physics departments.

Lecture Hall Complex:

Includes a 240-seater classroom, multiple 120- and 60-seater rooms, and laboratories for Physics, Chemistry, and Engineering Drawing.

Administrative Building:

Includes the Director's office, Dean's office, Registrar's office, and various administrative departments.

Central Instrumentation Facility (CIF):

To equip with precision instruments for research purposes. Currently, Technology Incubation Hub of IIT Tirupati, Centre of Excellence on Smart vehicles, and IIT Tirupati Innovation and Incubation Foundation are operating from the CIF.

Academic Building-01

Academic Building-02

Lecture Hall Complex

Central Instrumentation Facility

Administrative Building

Hostel Zone

Total Built-Up Area: 30,170 sq.m

The Hostel Zone consists of two hostel buildings designed to accommodate 1,000 students, with a central dining facility comprising a student-mess on the ground floor and a spacious food court on the first floor, catering to diverse culinary tastes and a sports utility building. The hostels provide modern amenities, including study rooms, gyms, and indoor stadiums, ensuring a comfortable living experience for students.

A View of the Hostel zone buildings

View of the Residential Quarters

Residential Zone

Total Built-Up Area: 33,769 sqm

The Residential Zone comprises 168 staff and faculty quarters, a Director's Residence, and a Visitors' Hostel. These facilities were built to provide a comfortable living environment for IIT Tirupati's faculty and staff.

Faculty and Staff quarters:

Type-B qtrs. 16 Flats
Type-C qtrs. 64 Flats
Type-D qtrs. 24 Flats
Type-E qtrs. 32 Flats
Type-F qtrs. 32 Flats

Support Services and Infrastructure-: Total Built-Up Area**:** 5,065 sqm.

IIT Tirupati's support infrastructure ensures the smooth functioning of all academic, residential, and recreational zones. Key elements include electrical substations, water and sewage treatment plants, district cooling systems, roads, and solar power facilities.

Key Facilities

- **Roads, Drains, pathways and Bus-stops:** Paved roads and RCC drains provide access to all zones, with integrated drainage solutions to manage rainwater and prevent flooding.
- **Rainwater Harvesting Ponds and Swales:** Two artificial ponds were constructed to capture rainwater, which is used for irrigation and landscaping. This initiative aligns with the Hon'ble Prime Minister's call to 'Catch the rain, where it falls, when it falls'. The two beautiful ponds are spanning over 10 acres of land with a capacity of 80 million litres to store and use rainwater in a sustainable manner. The creation of natural swales using locally obtained stones effectively manages storm water, directing it to the ponds and contributing to the campus's ecological balance.
- **Water Treatment Plant and Distribution system:** Water management system includes a 600 KLD water treatment plant and distribution system to ensure clean water supply throughout the campus.
- **Sewage Treatment Plant (STP):** Two Sewage Treatment Plants (STP) of 325kLD and 275kLD capacity are operating to treat the sewage / waste water. Treated water from STPs is being used for gardening/irrigation, HVAC cooling tower makeup, and flushing requirements for residential and hostel and facilities, reducing the demand for freshwater.
- **Electrical Infrastructure:** The campus's electrical infrastructure featuring two dedicated feeders from APSPDCL, 33kV for academic & hostel zones and 11kV for residential zone. Five electrical substations (ESS) are functioning to stepdown the power to 0.433kV for distribution. In the event of a power failure, diesel generator (DG) power ensures supply to all academic buildings, with critical loads supported by parallel redundant UPS systems. In residential zone DG power supports essential lighting and fans in flats, and 100% loads of common areas. Essential for uninterrupted power supply has been established across the campus.
- **Solar Power:** Sustainable practices are at the forefront, with a 1MW on-grid rooftop solar system is under execution under a net metering scheme, sending any excess solar power back to the grid. Solar hot water systems are also installed in all hostels. Roof top solar panels contribute to the institute's sustainable energy goals.
- **HVAC System:** A centralized HVAC system provides cooling to all academic buildings, offering better energy efficiency than individual systems. The HVAC system in the academic zone features a centralized district cooling system with 1850TR installed capacity. This includes two 600TR and one 350TR water-cooled chillers for daytime operations, and two 150TR air-cooled chillers for nighttime use.
- **Fire safety systems:** These are comprehensive, with a central pump house supporting wet risers and sprinkler systems in academic buildings. Additionally, a fire hydrant system and fire detection and alarm systems are installed across all academic buildings, ensuring a high standard of safety and preparedness.
- **Horticulture and Micro drip irrigation system development:** Horticulture development at IIT Tirupati is sustainable and ecologically balanced landscaping. with beautifully landscaped garden that prioritizes the selection of native trees, flowering shrubs, and ground covers. A significant endeavor, 5,250 native tree saplings and 110,000 flowering shrubs and ground covers have been planted, enhancing the campus's beauty and aesthetics with minimal lawn areas. In addition to the native

plantings, a biodiversity plantation has been developed, featuring 260 varieties of medicinal plants native to the Seshachalam forest. This not only enriches the campus's biodiversity but also preserves local plant heritage. The use of 100% recycled water for horticulture needs, facilitated by a micro-irrigation system, exemplifies sustainability approaches adopted.

Ponds and road network

Bus stop build using 3D concrete printing technology

View of the Sub Station Building and HVAC Chiller Plant

Boom Lilft for various maintenance operations

Horticulture works

Awards and Recognitions

In addition to the previously received awards from various national and international agencies in recognition of the sustainable construction, health, and safety practices adopted at IIT Tirupati construction project, the following awards were received during April 2023-Mar2024.

- Shrestha Suraksha Puraskar Award 2022 - from the National Safety Council of India – for outstanding performance in OSH
- Industrial Best Safety Performer (Silver) Award 2022 – from CII, A.P - for the Industrial Best Safety Performer Award.
- CE & CR Award 2023 - from CE &CR - for the category of Safe Practices in Construction Space
- ACCE(I) L&T FORM WORK AWARD-2023 - from Association of Consulting Civil Engineers (India) -Best use of Form Work
- 14th CIDC Vishwakarma Award-2023 - from CIDC - for Achievement Award for Best Construction Project
- Certificate of Best E&M Services Completed project -2023 – from CPWD – for E&M Completed Projects Category
- Certificate of Best Project for Labour Welfare & Safety Measures -2023 – from CPWD – for Labour Welfare & Safety

All these achievements have been possible due to excellent teamwork among all the project participants, including the main consultants, M/s Suresh Goel Associates, M/s ADPL and their sub-consultants; the project management consultant CPWD; the main contractor, M/s Kalpataru Projects International Ltd.; and the Engineering Unit Team of IIT Tirupati.

10.2 STUDENT HOSTELS AND OTHER FACILITIES

IIT Tirupati constructed Five Hostels for boys and three Hostel for Girls in the first phase of construction on the Permanent Campus site in Yerpedu. To ensure comfortable living at the hostels, the Institute created all the required facilities at each hostel and provided the students with well-furnished rooms and a dining facility.

The Institute has also arranged a transport facility for the students to commute between the hostels and various facilities on the Permanent Campus. The hostels have a 24x7 Wi-Fi facility, IOT washing machines, TV, water coolers, geysers, and common rooms. In addition, Stationery cum General store, Salon, Cafeteria, and food courts are available in the Permanent Campus.

Hostels in South Campus

Hostel Malhar, North Campus

Hostel Des, North Campus

Dining Hall & Food Court, North Campus

Sports Facilities

An indoor stadium and outdoor sports facilities have also been created for the students on the permanent campus.

Outdoor sports facilities:

- Basketball court with Poly Propylene Tiles
- Two volleyball courts
- One Tennis court and a half practice court
- Running track cum football / Cricket Ground

Indoor sports facilities:

- Three badminton courts with vinyl flooring
- Table tennis
- Gym

View of Indoor and Outdoor Sports Facilities

10.3 HEALTH CENTRE

IIT Tirupati has its primary health centre in the institute's South Campus with two qualified doctors supported by well-trained staff nurses and a 24x7 ambulance service. The Institute provides quality primary care for all emergencies with essential life support. The emergency care equipment present at the Institute Primary Health Centre includes Defibrillator, Multipara Cardiac monitor, ECG machine, Autoclave, O_2 concentrator/O_2 cylinder, etc.

For cashless treatments, a fresh set of MOUs have been signed this year with Narayanadri Hospital, Sankalpa Hospital, Helios Hospital, and Ankura Hospital. The Srikalahasti branch of Apollo Hospitals also signed an MOU with the Centre. It has also signed an MoU with a multi-speciality hospital in the town to provide students with cashless treatment. MoUs have already been signed with Apollo Pharmacy at Korlakunta, Renigunta, Padamvathi Puram and Renigunta for cashless medicines.

This year the Health Centre procured a new BLS ambulance and recruited one physiotherapist for daily services. A new ward containing four beds has been established for the treatment. The Centre not only treated all Outpatient cases and attended all emergencies but also played a pivotal role in conducting a

Blood Donation Camp and a PULSE Polio Immunisation Initiative. A Cancer Screening was conducted on campus by Tata Cancer Hospital.

A View of the Health Centre

IIT Tirupati Ambulance

10.4 VISITORS' HOSTEL

The Visitors' Hostel at IITT is situated at the foothills behind the campus surrounded by greenery with a variety of flora and fauna. The Visitors' Hostel offers lodging and boarding services for the Institute guests from academia, central/state government administration, alumni, and the parents/wards of the students. The peaceful atmosphere of the Visitors' Hostel offers a pleasant stay, and the visitor can enjoy a scenic view of the entire campus.

This facility includes six suites and fourteen standard rooms. All rooms are centrally airconditioned, well-furnished and equipped with essential services including internet, wi-fi and a television. The Visitors' Hostel premises has a diesel generator back up and has a hybrid solar water heater to supply hot water in the washrooms. The facility also includes a conference room to conduct meetings, and a VIP lounge along with a dining area to host the guests. The dining hall can comfortably accommodate 70 sit-down meal services to the guests. Also, the lounge in front of the dining hall is a convenient space for buffet service and caters up to 50 guests during official events.

Front view of the Visitors' Hostel

12. APPENDICES

APPENDIX– I

RESEARCH PUBLICATIONS

Journal Articles

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12. Singh, V. K., Nam, K., Barik, M., Boya, K., Kermarrec, E., Khuntia, P., Kim, K. H., Bhowal, S., & **Koteswararao, B.** (2024). Bi2YbO4Cl: A two-dimensional square lattice compound with Jeff = ½ magnetic moments. *Physical Review B*, 109, 075128.

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18. Shukla, N., **Modak, R.,** & Mandal, B. P. (2023). Uncertainty relations for non-Hermitian systems", *Phys. Rev., A 107*, 042201.

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Books and Book Chapters

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2. Balkhi, S. A. A., Karki, B. K., Philip, L., & **Maliyekkal, S. M.** (2023). Water quality status and challenges in India and Nepal. *Technological Solutions for Water Sustainability: Challenges and Prospects* (Vol. 13).

3. Chandan, P. B., Bhat, P. G., Purushothaman, S., **Krishna, D. V.,** Prasad, T. S., Thet, A. A. & **Sankar, M. R.** (2023). Environmental aspects of 3D Printing Metal and Alloys. In Rajasekar, R., Moganapriya, C., & Kumar, P. S. (Eds.), *Additive Manufacturing with Novel Materials: Processes*, Publishing LLC and John Wiley & Sons.

4. **Deshmukh, P. C.** (2023). *Quantum mechanics: Formalism, methodologies, and applications*. Cambridge University Press.

5. Hebbar, H. U., Sharma, R., Chaurasiya, R. S., Ranjan, S., & **Raghavarao, K. S. M. S.** (Eds.). (2023). *Engineering aspects of food quality and safety*. Springer.

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7. **Kalidas, Y.** Object-oriented basis of artificial intelligence. *Handbook of Statistics* (Vol. 49).

8. Kannan, U., Pullangott, G., Singh, S. P., & **Maliyekkal, S. M.** (2023). Nanoscale silver enabled drinking water disinfection system. *Nanoremediation* (pp. 127-166). Elsevier.

9. Kumar, V., Mantry, L., Maayuri, R. & **Gandeepan, P.** (2022). Photoinduced copper-catalyzed C-H functionalization. *Handbook of CH-Functionalization* (pp. 1-42). Wiley-VCH GmbH.

10. **Lakshmi, C. N.,** & Singh, N. (2022). Removal of pharmaceutical compounds: Overview of treatment methods. In Singh, S. P., Agarwal,T., Gupta, A.K., & Maliyekkal, S.M. (Eds.). *New Trends in Emerging Environmental Contaminants: Energy, Environment, and Sustainability*. Springer. https://doi.org/10.1007/978-981-16-8367-1_8

11. Prasanna, N. S., Yumnam, N., Selvakumar, M., **Choudhary, N., Raghavarao, K. S. M. S.** (2024). Coconut Protein Concentrate: invaluable food supplement." In Ramesh, S. V. & Praveen, S. (Eds.). *Conceptualizing coconut-based nutrition: Food, feed and nutraceutical perspectives*. Springer Nature.

12. Saxena, M., Sharma, A. K., Srivastava, A. K., Dixit A. R., **Singh, N., & Singh, M.** (2023). *Microwave-assisted vs. conventional hydrothermal synthesis, morphology, microstructure, and surface area analysis of g-C3N4/MoS2 nanocomposite*. In Kumar, A., Kumar, P., Srivastava, A. K., Goyat, V. (Eds.), *Modeling, Characterization, and Processing of Smart Materials*, 151-64. IGI Global.

13. **Sirohi, R. A.,** & Gupta, S.S. (2024). *Decolonizing Development: Liberatory Epistemologies from India and Latin America*. Routledge.

14. Vajitha, G., Madan, K. P., Tewari, C., Sahoo, N. G., & **Maliyekkal, S. M.** (2023). Carbon-based filters for water and wastewater treatment. *Technological Solutions for Water Sustainability: Challenges and Prospects* (V0l. 155).

15. Vasu, S., Johnson, V., Archana, M. & **Kumar, U. S.** (2024). Solid state gas sensors based on iron oxides. *Green and Sustainable Synthesis of Iron Oxides Based Nanomaterials for Energy and Environmental Applications. Elsevier*.

APPENDIX - II

CONFERENCE PROCEEDINGS/ PRESENTATIONS

Chemical Engineering

1. **Kumar, T. S.** (2023). "*Low global warming potential refrigerants*," Workshop organized by Ozone Cell, MOEFCC, 4th August.
2. **Gupta, A. K.** (2023). "*Thermal air sterilizer*," Akhil Bharatiya Siksha Samagam, Exhibition of inventions organized by MoE Innovation Council, Delhi, 29th-30th July.
3. **Misra, S.** (2023). "*Control, decision and information technologies*," 9th International Conference, Sapienza University of Rome, 3rd-6th July.
4. **Sinha, R.** (2024). "*Optimizing the synthesis parameters for ZIF-8 MOFs for enhanced photocatalytic degradation of organic compounds*," Sustainable & innovative materials and design for global needs APM 2024, CIPET: Institute of Petrochemicals Technology (IPT), Ahmedabad, 14th -16th March.
5. Areekal, N. N., Joseph, B., Rao, A., & Marak, P. R. (2023). "*µPADs- low cost and compatible device for detection of mosquito-borne diseases*," 6th INAE-SERB-GITAM Youth Conclave, GITAM (Deemed to be University), Visakhapatnam, 3rd-4th November.
6. Khan, B. B., **Vir, A.,** & **Kumar, T. S.** (2023). "*Oscillatory characteristics of the pressure drop and the velocity during droplet formation in microfluidic systems*," ICOM – Indian Conference on Micro-nanofludics, IIT Madras, 29th September to 1st October.
7. Selvakumar, M., Mohanakkaviya, I., & Prasanna, N. S. (2023). "*Sustainable Green Packaging and Renewable Energy from Cheese Whey – Biorefinery,*" 6th INAE - SERB - GITAM Youth Conclave, GITAM University, 3rd-4th November.
8. Joseph, B., & Rao, A. (2023). "*Continuous Flow Extraction of Betalains from Beetroot using Aqueous Two-Phase System*," 9th IFCON, CSIR-CFTRI, Mysore, 7th-10th December.
9. **Sharma, V. P.** (2023). "*Case study on advanced separation techniques used in alkali leaching-based mineral processing plant*," International Conference on Separation & Purification Technologies (ICSPT), IIT Patna, 7th -8th December.
10. Nagalakshmi, C. & **Singh, N.** (2023). "*Comparison of microwave-assisted and hydrothermal synthesis of α-Fe2O3/ZnO/perlite nanocomposites for the photocatalytic degradation of antibiotic*," GCDEM2023, NTU Singapore.
11. Nagalakshmi, C. & **Singh, N.** (2023). "*Effect of doped iron oxide to graphitic carbon nitride ratio in nanocomposites for degradation of emerging pollutants*," ICWT 2023, IIT Bombay, December.
12. **Nagalakshmi, C.** (2024). "*Green synthesis of cobalt/iron oxide nanocomposites for the photocatalytic degradation of ciprofloxacin*," ICECEES-2024, IIT Roorkee, 15th -17th February.
13. Irfan, M., & **Singh, N.** (2023). "*Fabrication of nonfluorinated and superhydrophobic/superoleophilic PDMS/PMMA electrospun membranes for vacuum-driven separation of moisture from virgin coconut oil*," IIT Patna, December.
14. **Irfan, M.** (2024). "*Anti-corrosive and robust superhydrophobic/superoleophilic Co 3 O 4 @ZnO-PDMS coating on 3D metallic foam for separation of oil-water mixture*," ICECEES-2024, IIT Roorkee, 15th -17th February.
15. **Nandan, Y.** (2023). 9th International Food Convention (IFCoN), CSIR–CFTRI, Mysore, 7th -10th December.
16. **Prasanna, N. S.** (2023). "*Omniphobic membranes in membrane distillation for desalination applications*," 4th National Conference on Advances in Chemical Engineering and Science, Department of Chemical Engineering - IISER Bhopal, 1st April.
17. **Saraswat, V.** (2023). Skill Development Program in Seaweed Cultivation and Processing Technology (SEA-CPT), CSIR-CSMCRI Bhavnagar, Gujarat, 1st-3rd November.
18. Selvakumar, M. & Srinivaas, G. M. S. (2023). "*Development of black pepper oleoresin emulsion using nonionic surfactants-based emulsifiers*," 4th National Conference of ACES-2023, IISER Bhopal, 31th March to 2nd April.
19. **Selvakumar, M.** (2023). "*Development of stable liquid emulsions of spice oleoresin using natural emulsifiers*," Stanford University students visiting program, IIT Tirupati, 30th March to 4th September.
20. **Selvakumar, M.** (2023). "*Development of stable liquid emulsions of spice oleoresin using a combination of synthetic and natural emulsifiers*," 1st Research Scholar Symposium, IIT Tirupati, 10th May.
21. **Selvakumar, M.** (2023). 9th International Food Convention (IFCoN), CSIR–CFTRI, Mysore, 7th -10th December.

Chemistry

1. **Chakraborty, S.** (2023). "*Surface activation of transition metal oxides clusters*," GITAM Chemistry Research Conference, GITAM University, Vizag, December.
2. **Chakraborty, S.** (2023). "*Transition Metal Oxides: From Self-Assembly to Surface Activation*," International Conference on Smart Technologies, Gitam University, Vizag, July.
3. **Chakraborty, S.** (2024). "*Alcohol self-assembly inside nano capsule*," Emerging Trends in Supramolecular Science and Technology (ETSST 2024), SRM University, Andhra Pradesh, March.

4. **Chakraborty, S.** (2024). "*Transition metal complexes for wastewater treatment and self-assembly*," Indo-Canadian Symposium on Water Management: Adaptation to Climate Change and Sustainability, IIT Tirupati, February.
5. **Chintalapudi, V.** (2024). "*Strategies and efforts towards the total synthesis of complex natural products*," Department of Chemistry, Silver Jubilee College, Kurnool, 14th March.
6. **Gandeepan, P.** (2023). "*Functionalization of unactivated C-H bonds: Key to sustainable and efficient organic synthesis*," *International Conference on Recent Innovations in Chemical Sciences (ICRICS '23)*, Sona College of Arts and Science, Salem, Tamil Nadu, 29th October.
7. **Manna, A. K.** (2023). "*Modelling intersystem crossing rates in functional organic molecules*," Theoretical Chemistry Symposium (TCS-2023), IIT Madras, Chennai, India, 7th-10th December.
8. **Mondal, D.** (2024). "*To restart or not? - Stochastic resetting in drift-diffusion decision making processes*," Chennai Soft Matter Days 2024, IMSc Chennai, 23rd-24th February.
9. **Roy, G.** (2023). An international symposium on "*The Interface of Chalcogen Chemistry and Biology*," Institute of Advanced Biosciences, Tokai University, Hiratsuka, Japan, 30th June-1st July.
10. **Roy, G.** (2023). "*Se2023*," 9th International Selenium Conference, focused on Selenium in Chemistry, Biology, and Medicine, Department of Chemistry, Advanced Institute of Science & Technology (KAIST), Daejeon, South Korea.
11. **Roy, G.** (2023). *20th International Conference on Modern Trends in Inorganic Chemistry (MTIC-XX)*, Indian Institute of Science, Bangalore, India, 14th-19th December.
12. **Roy, G.** (2023). 3rd International Conference on Main-group Molecules to Materials *(MMM III)*, Department of Chemistry, IIT Hyderabad & School of Chemistry, University of Hyderabad, Telangana, India, 9th-11th December.
13. **Roy, G.** (2024). 6th Symposium on Advanced Biological Inorganic Chemistry *(SABIC-2024)*, Indian Association for the Cultivation of Science (IACS), Kolkata. 7th-11th January.
14. **Sanapala, S. R.** (2023). "*Research challenges in formulation development and contemporary analytical techniques in drug discovery*," Faculty Development program, Department of Pharmaceutics, Annamacharya College of Pharmacy, Rajampet, 7th October.
15. **Sanapala, S. R.** (2023). "*Semisynthetic glycoconjugate vaccine against antimicrobial resistant E. coli O25B*," 12th Asian Community of Glycoscience and Glycotechnologies, University of Hyderabad, 8th-11th November.

Civil & Environmental Engineering

1. Allabakshi, S. M., Srikar, P., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Non-invasive diagnostic of nonthermal hybrid plasmas applied for water treatment applications*," Conference on Plasma Theory and Simulations (PTS 23), JNU Delhi, September.
2. Allabakshi, S. M., Srikar, P., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Photo-plasma: A sustainable way to reduce the scavenging effect of radicals by salts in textile wastewater treatment*," 3rd Energy Security and Chemical Engineering Congress, Malaysia, 28th-30th August.
3. Allabakshi, S. M., Srikar, P., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Surface dielectric barrier discharge: A potential plasma reactor system in treating textile wastewater*," Conference on Desalination, Brine Management and Water Recycling (DeSaltM 23), IIT Bombay, 21st-22nd July.
4. Allabakshi, S. M., Srikar, P., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Non-thermal plasma mediated advance oxidation of textile dying wastewater*," Research Scholars Symposium, IIT Tirupati, 9th May.
5. Divakarraju, P. V., Pandurangan, V. & **Nithyadharan, M.** (2023). "*Predicting the elastic properties of composites using Gaussian process regression*," 9th International Congress on Computational Mechanics and Simulation, IIT Gandhinagar, 20th-22nd December.
6. Gham, T. S., Jadala, S., Sudan, N., Singh, A., & **Prapoorna, B. K.** (2023). "*Characterizing thermal behavior of pervious all-Road class all-weather multi-layered paver blocks*," 6th International Conference on Countermeasures to Urban Heat Islands (IC2UHI2023), Melbourne, Australia, 4th-7th December.
7. Jyothi, M. N., Ramaiah, B.J., & **Maliyekkal, S. M.** (2023). "*Development of an efficient and affordable point-of-use water treatment system for rural India*," Research Scholars Symposium, IIT Tirupati, 9th May.
8. Jyothi, M. N., Ramaiah, B.J., & **Maliyekkal, S. M.** (2023). "*Self-granulated AlOOH-nanocomposite for enhanced selenium removal from groundwater in India-Dalhousie*," Student Research Symposium: Addressing Common Challenges via Research & Innovation, IIT Tirupati, 27th July.
9. Kannan, U. & **Maliyekkal, S. M.** (2023). "Influence of water quality parameters on point-of-use silver- based disinfection system: An unrivalled effect of bicarbonates," 3rd Energy Security and Chemical Engineering Congress (ESChE) 2023, Langkawi, Malaysia,28th-30th August.
10. Kumar, N. G., Singh, A., & **Prapoorna, B. K.** (2023). "*Mechanistic analysis of pavement subbase mixtures produced with tire-derived aggregates and recycled concrete aggregates*," International Road Federation IRF Global R2T Conference and Exhibition, Phoenix, Arizona, USA, 14th-17th November.

11. Kumar, V. P. S. A. & **Nithyadharan, M.** (2023). "*A user interface element to model the contact non-linearity in cold-formed steel screw connections*," 9th International Congress on Computational Mechanics and Simulation, IIT Gandhinagar, 20th-22nd December.
12. Marimuthu, M., Radhika B., & **Prapoorna, B. K.** (2023). "*Asphalt mix material parameter identification using static semi-circular bending test*," International Road Federation IRF Global R2T Conference and Exhibition, Phoenix, Arizona, USA, 14th-17th November.
13. Murthy, S. B. & **Prapoorna, B. K.,** Pandurangan, V. (2023). "*Understanding aging behavior of composite waste modified asphalt binders: Material physiognomy and performance assessment*," International Road Federation IRF Global R2T Conference and Exhibition, Phoenix, Arizona, USA, 14th-17th November.
14. Peraka, N. S. P., **Prapoorna, B. K.,** & **Kalidindi, S. N.,** "*Multi-parametric delineation approach for homogeneous sectioning of asphalt pavements*," Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities, MAIREINFRA 2023, Honolulu, Hawaii, USA, 16th-19th August.
15. Ramaiah, B. J., Raj, S. V., Srikanth, C. S. S. U., **Maliyekkal, S. M.,** & Behera, P. K. (2023). "*Mineralogical and Morphological Characterization of Foundry Waste Sand*."
16. Ramaiah, B.J., Sathaiah, V. R., Srikanth, C. SS. U., **Maliyekkal, S. M.** & P. K. Behera, (2023). "Mineralogical and morphological characterisation of foundry waste Sand," 9th International Congress on Environmental Geotechnics, Chania, Greece. https://doi.org/10.53243/ICEG2023-313
17. Sai, G. R. K., Radhika, B., & **Nithyadharan, M.** (2023). "*Vibration based damage detection using time[1] frequency analysis*," International Conference on Condition Assessment, Rehabilitation & Retrofitting of Structures (CARRS 2023), Department of Civil Engineering, IIT Hyderabad, 10th-13th December.
18. Sharma, M. & **Jain, S.** (2023). "*Investigating the atmospheric assimilation capacity of non-attainment city in southern India*," 20th Annual Meeting of Asia Oceania Geosciences Society, Singapore, 30th July-4th August.
19. Sharma, M. & **Jain, S.,** (2023). "*Seasonal and spatial heterogeneities of PM, chemical constituents and sources contribution at Vijayawada city, Andhra Pradesh India*," 20th Annual Meeting of Asia Oceania Geosciences Society, Singapore, 30th July-4th August.
20. Sharma, M. & **Jain, S.,** (2023). "*Atmospheric particulate bound polycyclic aromatic hydrocarbons in urban region structure: Spatiotemporal variation, source apportionment, and human health risk analysis*," European Geophysical Union General Assembly, Vienna, Austria, 23rd-28th April.
21. Sharma, M. & **Jain, S.** (2024). "*Bottom-up approach to estimate the present and future air emissions under different policy scenarios in Tier-2 non-attainment city in India*," European Geophysical Union General Assembly, Vienna, Austria, 14th-19th April.
22. Sharma, M.& **Jain, S.** (2024). "*Investigating the Spatiotemporal Variation of Particulate Matter, Chemical Composition and Source Apportionment at the Non-Attainment City of Andhra Pradesh India,"* Winter School 2023, Hands on training on Instrumentation and Analytical Techniques for Atmospheric Aerosols Measurement and Source Apportionment Studies, Central University of Jammu, 20th-25th February 2023.
23. Sharma, M., **Jain, S.,** Sengar V. (2024). "*Towards Cleaner Air: A Comprehensive Emission Inventory of Urban Anthropogenic Sources in Vijayawada, India, a Non-Attainment City",* 6th India Clean Air Summit (ICAS) 2024, Bangalore, India, 26th-30th August 2024.
24. Sengar V., Sharma, M., **Jain, S.,** B, Bhupal. (2024). "*Vehicular PM emissions over the non-attainment city in southern India: Estimation of exhaust and non-exhaust sources*" to the 6th India Clean Air Summit (ICAS) 2024, Bangalore, India, 26th-30th August 2024.
25. Sharma, M., B, Bhuapl., Sengar V., Kumar, A., **Jain, S.** (2024) "*Quantification of the Transport-Induced PM Emissions over the Non-Attainment City: Contribution of Exhaust and Non-Exhaust Sources"* to the IASTA National Aerosol Conference 2024, Doon University, Dehradun.
26. Sharma, M., Hema P., Mani, N, M., **Jain, S.** (2024) "*Assessment of physio-chemical characteristics of airborne particulate matter from the construction activities."* to the International Conference on Environmental Science and Technology 2024, SVNIT Surat, India.
27. Srikar, P., Allabakshi, S, M., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Spectroscopy-based optimisation of nonthermal plasma mediated processing for effective degradation of environmental pollutant in water*," An Indo-Canadian Symposium on Water Management: Sustainability & Impact of Climate Change, Dal Housie University Canada & IIT Tirupati, September.
28. Srikar, P., Allabakshi, S. M., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Spectroscopic diagnostics of nonthermal plasma using time-resolved measurements coupled with plasma population kinetic model*," Conference on Plasma Theory and Simulations (PTS 23), JNU Delhi, September.
29. Srikar, P., Allabakshi, S. M., Gangwar, R.K., & **Maliyekkal, S. M.** (2023). "*Optimisation of atmospheric pressure plasma jets for efficient degradation of pesticides in water*," Conference on Desalination, Brine Management and Water Recycling (DeSaltM 23), IIT Bombay, 21st-22nd July.
30. Suhas T. R., Marimuthu, S., Radhika B., & **Prapoorna, B. K.** (2023). "*Equivalent axle*," 6th Conference of the Transportation Research Group of India (CTRG-2023), Surat, India, 17th-20th December.

Computer Science & Engineering

1. Aditi P., Himanshu D., & **Kalidas Y.** (2024). Agrinet: A hyperspectral image based precise crop classification model. *VISAPP*, *2*, 562-566, February.
2. Agarwal, S., **Chimalakonda, S.,** Krishnan, S., Kanvar, V., & Shah, S. (2024). "*Tutorial report on legacy software modernization: A journey from non-AI to generative AI approaches*," 17th Innovations in Software Engineering Conference, February.
3. Anil P., **Kalidas, Y.,** & **Venkataramana, B.** (2023). "*GAN-based super resolution for disease detection in aerial images: A case study of potato crop*," CVIP 2023.
4. Buchipalli, T., **Mahendran, V.,** & **Venkataramana, B.** (2023). "*How fresh is the data? An optimal learning-based end-to-end pull-based forwarding framework for NDNoTs*," 26th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (ACM MSWiM 2023), August.
5. Chattaraj, R., & **Chimalakonda, S.** (2023). "*R. Joules: An energy measurement tool for R*," 38th IEEE/ACM International Conference on Automated Software Engineering (ASE), IEEE, September.
6. **Chimalakonda, S.** Das, D., Mathai, A., Tamilselvam, S., & Kumar, A. (2023). "*The landscape of source code representation learning in AI-driven software engineering tasks*," 45th ACM/IEEE International Conference on Software Engineering, May.
7. Das, D., Mathews, N. S., Mathai, A., Tamilselvam, S., Sedamaki, K., **Chimalakonda, S.,** & Kumar, A. (2023). "*COMEX: A tool for generating customized source code representations*," 38th IEEE/ACM International Conference on Automated Software Engineering (ASE), IEEE, September.
8. Jeripotula, V. V. K., **Mahendran, V.,** & **Venkataramana, B.** (2023). "*Optimal D2D learning-based neighbor selection in mmWave networks using Gittins indices*," STWiMob ' 23, IEEE Workshop on Selected Topics in Wireless and Mobile Computing, Montreal, Canada, June.
9. Kakarla, N.B. & **Mahendran, V.** (2023). "*Lyapunov meets Thompson: learning-based energy-efficient UAV communication with queuing stability constraints*," Infocom DroneCom '23: IEEE Infocom Workshop on Drone-Assisted Wireless Communications for 5G and Beyond, New York, USA, May.
10. Kukreja, P. & **Mahendran, V.** (2024). "*PraaKrum: A practical byzantine-resilient federated learning algorithm*," COMSNETS '24: 16th IEEE International Conference on Communication Systems and Networks, India, January.
11. Kukreja, P., & **Mahendran, V.** (2023). "*Contention matters: Modeling and analyzing the performance of federated learning over WiFi*," PiMRC '23: 34th IEEE Annual International Symposium on Personal, Indoor and Mobile Radio Communications. Toronto, ON, Canada.
12. Neumann, S., Lim, S., & **Joseph, A. G.,** Y Pan, A White, M White (2023). "Greedy actor-critic: A new conditional cross-entropy method for policy improvement", ICLR, March.
13. Pandey, A. C., Nagwanshi, S., **Venkataramana, B.** & **Kalidas, Y.** (2023). "*An efficient indoor positioning and navigation system based on bluetooth and magnetometer*," 13th International Conference on Indoor Position and Indoor Navigation, Nuremberg, Germany, September.
14. Gupta, R., **Mahendran, V.,** & **Venkataramana, B.** (2024). "*Stream IT: Video streaming for resource constrained IoTs - An optimal control approach*," COMSNETS MINDS '24, IEEE COMSNETS Workshop on Machine Intelligence on Networked Data and Systems, India, January.
15. Sai, P. N., Palit, A., & **Kalidas, Y.** (2023). "*Swift convergence: federated learning enhanced with GMMs for image classification*," CVIP 2023.
16. Shanbhag, S., & **Chimalakonda, S.** (2023). "*An exploratory study on energy consumption of dataframe processing libraries*," 19th International Conference on Mining Software Repositories, May.
17. Shanbhag, S., **Chimalakonda, S.,** Sharma, V. S., & Kaulgud, V. (2023). "*DENT: A tool for tagging stack overflow posts with deep learning energy patterns*," 31st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, November.
18. Sundar, P. S., Vasam, M., & Joseph, A. G. (2023). "Monotonic model improvement self-play algorithm for adversarial games," IEEE CDC.
19. Venigalla, A. S. M., & **Chimalakonda, S.** (2023). "*DocMine: A software documentation-related dataset of 950 GitHub repositories*," 19th International Conference on Mining Software Repositories, May.
20. Venigalla, A. S. M., & **Chimalakonda, S.** (2023). "*FlowARP-using augmented reality for visualizing control flows in programs*," ACM Conference on Global Computing Education, December.
21. Venigalla, A. S. M., Ali, M. S., Manjunath, N., & **Chimalakonda, S.** (2023). "*RCgraph – A tool to integrate readme and commits through temporal knowledge graphs*," 31th IEEE/ACM International Conference on Program Comprehension, May.

Electrical Engineering

1. Alavala, S., & **Gorthi, S.** (2023). "*3D CBCT challenge 2024: Improved cone beam CT reconstruction using SwinIR-based Sinogram and image enhancement*," IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Seoul, Korea, 14th-19th April.
2. Arvanitaki, A., Stamatakis, G., Carlsson, N., **Mohapatra, P.** & Pappas, N. (2023). "*Deep reinforcement learning for power control in secure broadcast channels*," 21st

International Symposium on Modelling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt) - WMLC, Singapore, August.

3. Bhargav, P. N. S. & **Gurugubelli, V. K.** (2023). "*On the Fulop's law for impact ionization coefficient in silicon superjunction power devices*," 22nd International Workshop on Physics of Semiconductor Devices (IWPSD), Chennai, India, December.
4. Bhausaheb, B.V. & **Saikrishna, P. S.** (2023). "*Model identification and validation of cascade control schemes for a differential drive mobile robot*," IEEE International Conference on Robotics and Biomimetics (ROBIO), December.
5. D. Kumar & **Mohapatra, P.** (2023). "Role of CSI in short packet communication for Rayleigh fading Z interference channel," IEEE Global Communications Conference (GLOBECOM), Kuala Lumpur**,** December.
6. Gupta, V. & **Vooka, P.** (2023). "*An analog interface circuit for damage assessment of structures using electro-mechanical impedance method*," 16th International Conference on Sensing Technology (ICST), Hyderabad, India.
7. Mishra, P. K., & **Bhuktare, S.** (2023). "*Strain assisted field free switching with voltage controlled magnetic anisotropy*," International Conference on Magnetic Materials and Applications (ICMAGMA), Hyderabad, India.
8. Mishra, P. K., Sravani, M., Narayana, M. V., & **Bhuktare, S.** (2023). "*Acoustically assisted energy efficient field free spin orbit torque switching of out of plane nanomagnet*," IEEE International Magnetics Conference, Sendai, Japan.
9. Rao, P. R., & Vyavahare, P. (2024). "*Distributed learning in trust-mistrust networks*," 16th International Conference on communication systems & networks (COMSNETS), January.
10. Ravi, V., Vengala, K. S., **Gorthi, S.,** & **Gorthi, R. K.** (2023). "*Lightweight learning model for speckle denoising in digital holography*," 8th International Conference on Computer Vision and Image Processing (CVIP), Jammu, India, November.
11. Sakethram, M. & **Saikrishna, P. S.** (2023). "*Fog-based distributed camera network system for surveillance applications*," IEEE International Conference on Robotics and Biomimetics (ROBIO), December.
12. Sekhar, C., Viswanath, Avinash, **Gorthi, R. K.,** & Sreeja (2023). "*TSOSVNet: Teacher-student collaborative knowledge distillation for online signature verification*," International Conference on Computer Vision Workshops (ICCVW), New Ideas in Vision Transformers.
13. Shriniwas, V. N, Kumar, A., Arshad, S., & **Gorthi, R. K.** (2023). "*The first-place solution for ICIP2023 challenge Infrared imaging-based drone detection and tracking in distorted surveillance videos*," in IEEE International Conference on Image Processing (ICIP), October.
14. Sravani, M., & **Bhuktare, S.** (2023). "*Field free spin Hall nano oscillator using the exchange bias of ferro/antiferromagnetic structure*," International Conference on Magnetic Materials and Applications (ICMAGMA), Hyderabad, India.
15. Vamshi, S. R., Satyanarayana, & **Gorthi, R. K.** (2023). "*Effective-LDAM: An effective loss function to mitigate data imbalance for robust chest X-Ray disease classification*," International Conference on Computer Vision & Image Processing (CVIP-2023), November.

Humanities and Social Sciences

1. **Bahinipati, C. S.** (2023). "*Climate change, extreme events and food security: understanding farmers' coping strategies in India*," National Seminar on "Food For All", VIT Business School, Chennai, India, 16th October.
2. **Bahinipati, C. S.** (2023). "*What are the challenges to estimating climate-related loss and damage across Indian cities*," EcoSummit 2023 on "Building a sustainable and desirable future: Adapting to a changing land and sea-scape," Gold Coast, Australia, 17th June.
3. **Bahinipati, C. S.** (2023). "*What matters to household energy conservation? technological innovations, implicit discount rate, and behavioural interventions*," presented at Y20 Consultation on 'Climate Change and Disaster Risk Reduction: Making Sustainability a Way of Life', Indira Gandhi National Tribal University, Amarkantak, India, 1st-2nd June.
4. **Bahinipati, C. S.** (2023). "*How to enhance adoption of climate-smart agricultural practices in india? institutions, incentives, and information*," Water Security and Climate Adaptation Conference, IIT Madras, India, 4th-7th October.
5. **Bahinipati, C. S.** (2024). "*Household level energy transition in urban India: Lessons from Bhubaneswar and Bengaluru*," Policy Dialogue on Energy Transitions in Eastern India: Issues and Challenges, NISER, Bhubaneswar, 23rd-24th January.
6. **Bahinipati, C. S.** (2024). "*Adoption of micro-irrigation technologies, sustainability, and farmers' wellbeing in India: evidence from the Andhra Pradesh State*," Policy Dialogue on 'PM Krishi Sinchayee Yojana: A Special Reference to Rayalaseema Region, Andhra Pradesh,' Indian Institute of Technology Tirupati, 9th, March.
7. **Bahinipati, C. S.** (2024). "*Understanding farmers' adaptation strategies to climate change and extreme events in India,* Gender and Climate Change: Issues, Policy Implications and the Way Forward', Christ University, Bengaluru, India, 6th-7th, March.
8. Biswal, D. & **Bahinipati, C. S.** (2023). "*Do climate risk management strategies improve farmers' wellbeing in India? Assessing the heterogeneous impact of crop insurance*," Ireland India Institute's Sixth Annual South Asia Conference on 'South Asia in Transformative Times', Dublin, Ireland, 22nd-24th, April.

9. Biswal, D. & **Bahinipati, C. S.** (2023). "*Whose Wellbeing Improved After Adoption of Crop Insurance in India? Assessing Benefits Across Land Holding Farmer Groups*," 3rd International Symposium on Disaster Resilience and Sustainable Development (DRSD-2023), Asian Institute of Technology Bangkok, 7th-8th, December.
10. Biswal, D. & **Bahinipati, C. S.** (2024). "*Enhancing farmers' resilience capacity to climate change in India: analysing intensification of crop insurance adoption*," INSEE XII Biennial Conference 2024, BML Munjal University, New Delhi, India, 31st January -2nd February.
11. **Dwivedi, P. S.** (2023). "*Ecological Perspectives of Theological Narratives: Reading Sita as an Embodiment of Nature*," Bharatiya Vigyan Sammelan - 2023, Science City, Ahmedabad, Gujarat, India, 21st-24th, December.
12. **Dwivedi, P. S.** (2023). "*Metaphysics of Boundary: Configuring the Bhagavadgita in the Modernist Paradigms*," International conference on Uses of Modernism, Ghent University, Belgium, 20th-22nd, September.
13. Kothakapa, G., & **Sirohi, R. A.** (2023). "*Political Economy of India & post-2011 Economic Slowdown*," 13th Annual Conference of the International Initiative for Promoting Political Economy (IIPPE), Universidad Rey Juan Carlos, Madrid, Spain, 6th-8th September.
14. Luniwal, Y. & **Bahinipati, C. S.** (2024). "*Incremental, Transformational and Maladaptation to climate change in India: A Review*," INSEE XII Biennial Conference 2024, BML Munjal University, New Delhi, India, 31st January - 2nd February.
15. Pradeep, A., & **Singh, S. K.** (2023). "Analysing the Media Portrayals of Kerala's Cyanide Jolly," International conference on Beyond the Postmodern, NIT Agartala, Tripura, India, 18th-20th December.
16. Pradeep, A., & **Singh, S. K.** (2023). "The Chronicles of an Indian Female Serial Killer," National conference on Women, Narrative, and Agency, IIT Roorkee, India, 12th-13th April.
17. Singh, M., & **Bahinipati, C. S.** (2023). "*Gender Empowerment, Information, and Attitude: Do they help to Reduce the Energy Efficiency Gap in Urban India?*" 12th Congress of Asian Association of Environmental and Resource Economics, Waseda University, Tokyo, Japan, 29th-30th August.
18. Singh, M., & **Bahinipati, C. S.** (2023). "*Gender, household investment in Appliances and Urban India: Do Education, Autonomy and Owning Property Matter?*" HDCA conference 'Vulnerability, human development and cooperative re- building in turbulent times,' Sofia University St. Kliment Ohridski, Sofia, Bulgaria, 11th-13th September.
19. Singh, M., & **Bahinipati, C. S.** (2024). "*Gender Empowerment, information and attitude: Do they help to reduce energy efficiency gap in Urban India*," INSEE XII Biennial Conference 2024, BML Munjal University, New Delhi, India, 31st January -2nd February.
20. **Singh, S. K.** (2023). "Illustrative Paradigms or Representational Dichotomies? The Village and the City in Premchand's Fiction," International conference on Metropolis and Margins, Indian Association for Commonwealth Language and Literature Studies, Janki Devi Memorial College, University of Delhi, India, 27th-29th April.
21. **Sirohi, R. A.** & Gupta, S. S. (2023). "*Decolonizing Development: Liberatory Epistemologies from India and Latin America*," 27th Annual Conference of Indian Political Economy Association, IIT Bhubaneswar, 27th-28th January.

Mathematics & Statistics

1. **Balakrishna, N.** (2024). "*Goodness of fit for time series*," Annual Conference of Kerala Statistical Association, Sri Sankara College, Kalady, Kerala, 22nd-24th January.
2. **Challa, D. P.** (2023). "*The propagation of waves by small bodies and their applications*," National conference on emerging trends of mathematics in engineering and Applied Sciences (NCETMEAS-2023), Sri Venkateswara University, Tirupati, 22th-23rd December.
3. **Challa, D. P.,** Divya, G., & Sini, M. (2023). "*The Foldy-Lax approximation of scattered field by many small cavities near the resonating frequencies for Lam\`e system*," Applied Inverse Problems (AIP – 2023), Gottingen, Germany, 4th-8th September.
4. **Das, I.** (2023). "*A spatial copula interpolation in a random field with application in air pollution data*," Third International Conference on Applications of Mathematics to Nonlinear Sciences (AMNS-2023), Pokhara, Nepal, 25th-28th May.
5. **Das, I.** (2023). "*A spatial copula interpolation in a random field with application in air pollution data*," International Conference on Stochastic Geometry Days, the Université de Bourgogne, Dijon, France, 12th-16th June.
6. **Prasad, S. A.** (2024). "*Reproducing Kernel Hilbert space and coalescence hidden variable fractal interpolation functions*," Analysis on fractals and networks, and applications, CIRM, Marseille, France, 18th-22nd March.

Mechanical Engineering

1. Achomo, M. A., **Muthukumar, P.,** & Peela, N. R. (2023). "*Hydrogen production via steam reforming of methanol (SRM) using Cu/ZnO/Al2O3 catalyst*," International Conference on Hydrogen Production (ICH2P-2023), Hamad Bin Khalifa University, Qatar, 19th-21st December.
2. Ajay, B. Y. V., Chaudhary, A., Yella, A., & **Sundar, S.** (2023). "*Measurement of vibro-acoustic noise of drum brake under various contact conditions*," INTER-NOISE and NOISE-CON Congress and Conference, Institute of Noise Control Engineering, Washington, DC, 1st February.

3. Ajay, B. Y. V., Chaudhary, A., Yella, A., & **Sundar, S.** (2023). "*Noise generated by a drum brake at various operating conditions*," INTER-NOISE and NOISE-CON Congress and Conference, Institute of Noise Control Engineering, Washington, DC, 1st February.
4. Anilkumar, S., & **Kumar, A. E.** (2023). "*Numerical study on ammonia sorption in a CaCl2-expanded natural graphite composite for refrigeration applications*," 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference, IIT Patna, India, 14th-17th December.
5. Anilkumar, S., Chandrakala, B., & **Kumar, A. E.** (2023). "*Effect of transverse fin configuration on the performance of adsorption cooling system*," 9th International Conference on Advances in Energy Research, IIT Bombay, India, 12th-14th December.
6. B. Chandrakala, Babu, S. K., & **Kumar, A. E.** (2023). "*Second law analysis of polygeneration cycle*," Heat Powered Cycles Conference, Edinburgh, United Kingdom, 3rd-6th September.
7. Babu, S. K., & **Kumar, A. E.** (2023). "*A comparative study of adsorption and resorption systems for thermochemical energy storage using halide salt pairs*," 11th International Conference on Materials for Advanced Technologies, ICMRS-ICAM & ICMAT, Sintec, Singapore, 26th-30th June.
8. Babu, S. K., & **Kumar, A. E.** (2023). "*Composites of La2Mg17-MmNi4.5Al0.5 as energy storage materials for high temperature applications*," 11th International Conference on Materials for Advanced Technologies, ICMRS-ICAM & ICMAT, Sintec, Singapore, 26th-30th June.
9. Babu, S. K., & **Kumar, A. E.** (2023). "*Thermodynamic analysis of cold storage module for mobile applications based on Ce substituted LaNi5 based alloys*," International Conference on Polygeneration, Bali, Indonesia, 26th-28th July.
10. Babu, S. K., Dashbabu, D., & **Kumar, A. E.** (2023). "*Low temperature solar thermal energy storage using LaNi5-xMx (M= Al, Fe, Ga and Zn) alloys*," International Conference on Polygeneration, Bali, Indonesia, 26th-28th July.
11. Babu, S. K., **Kumar, A. E.,** Kadam, S., & Yu, Z. (2023). "*Thermodynamic analysis of metal hydride-based polygeneration system for high temperature energy storage and cooling application*," 15th International Green Energy Conference, Glasgow, United Kingdom, 10th-13th July.
12. Basha, M. M. & **Sankar, M. R.** (2023). "*Experimental tribological study on additive manufactured Inconel 718 features against the hard carbide counter bodies*," International conference on Advanced Manufacturing and Materials Processing, 6th-8th February.
13. Basha, M. M., Basha, S. M. & **Sankar, M. R.** (2023). "*Review on surface integrity of electrochemical plasma polishing of 3D printed features*," International conference on Advanced Manufacturing and Materials Processing, 6th-8th February.
14. Chandan, P. B., Bhat, P. G., Krishna, D. V., Thet, A. A., & **Sankar, M. R.** (2023). "*Stereolithographic printing of epithelial and mucosal scaffold*," International conference on Advanced Manufacturing and Materials Processing, 6th-8th February.
15. Chandan, P. B., Bhat, P. G., P. Sirisha, Thet, A. A., & **Sankar, M. R.** (2023). "*Formulation and assessment of silica gel/hydroxyapatite slurry for 3D printing of scaffold to enhance printable time*," International conference on Advanced Manufacturing and Materials Processing, 6th-8th February.
16. Chandan, P. B., Kumar, B. R., Thet, A. A., Prasad, T. S. & **Sankar, M. R.** (2023). "*Preparation and performance evaluation of ceramic slurry containing silica gel for enhanced printable time*," International conference on Advanced Manufacturing and Materials Processing, 6th-8th February.
17. Chandrakala, B., & **Kumar, A. E.** (2023). "*Exergy analysis of single stage metal hydride hydrogen compressor*," 9th International Conference on Advances in Energy Research, IIT Bombay, India, 12th-14th December.
18. Chandrakala, B., Anilkumar, S., & **Kumar, A. E.** (2023). "*Entropy generation analysis of LaNi5 and MmNi5 alloys with partial substitution of Ni by Al*," 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference, IIT Patna, India, 14th-17th December.
19. Dashbabu, D. & **Kumar, A. E.** (2023). "*Analytical evaluation of $LaNi_{5-x}M_x$ where M = Fe, Mn and Al hydrides for hydrogen compression applications*," International Conference on Polygeneration, Bali, Indonesia, 26th-28th July.
20. Deb, S., & **Muthukumar, P.** (2023). "*Investigations on the primary air entrainment and flame stability in a partially submerged combustion-based porous radiant burner*," International Conference on Advances in Renewable and Green Energy Technology (ICARGET-2023), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India, 7th-8th December.
21. Ekka, J.P., & **Muthukumar, P.** (2023). "*Exergy efficiency and sustainability indicators of forced convection mixed mode solar dryer system for drying process*," International Conference on Advances in Renewable and Green Energy Technology (ICARGET-2023), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India, 7th-8th December.
22. Jana, S., & **Muthukumar, P.** (2023). "*Absorption and desorption studies on physically mixed La0·7Ce0·1Ca0·3Ni5 and MmNi4.5Fe0.5 for hydrogen storage application*," 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
23. Jana, S., & **Muthukumar, P.** (2023). "*Dynamic modelling and performance prediction of a compressor operated metal hydride-based cooling system*," 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.

24. Jana, S., & **Muthukumar, P.** (2024). "*Dynamic model development and performance prediction of a compressor operated metal hydride based closed cycle cooling system*," 8th National and 2nd International Conference on Refrigeration and Air Conditioning (NCRAC 2024), IIT Madras, India,13th-15th March.
25. Jana, S., Chauhan, N., **Muthukumar, P.,** & Röntzsch, L. (2024). "*Transient analysis and performance prediction of metal hydride based thermal energy storage system with additional cooling and heat upgradation*," 8th National and 2nd International Conference on Refrigeration and Air Conditioning (NCRAC 2024), IIT Madras, India,13th-15th March.
26. Karthik, A. C., **Muthukumar, P.,** & Panda, B. (2023). "*Experimental studies on lab-scale prototype of slag-blended calcium concrete module for high temperature thermal energy storage*," International Green Energy Conference (IGEC-2023), Glasgow, United Kingdom, 10th-13th July.
27. Kemprai, P. P., Murthy, K. V. R., **Muthukumar, P.,** & Ranganayakulu, C. (2024). "*Experiments on condensation heat transfer and pressure drop of low GWP refrigerant R1234yf inside a brazed plate serrated fins heat exchanger*," 8th National and 2nd International Conference on Refrigeration and Air Conditioning (NCRAC 2024), IIT Madras, India,13th-15th March.
28. **Kumar, A. E.** (2023). "*A novel in-situ polymer derived nano ceramic MMC by quest stir processing*," Research to Business (R2B) Meet on Ceramics & Advanced materials - Innovative & Emerging Materials, Southwest India Chapter of The American Ceramic Society and Indian Ceramic Society, Bangalore, Karnataka, 22nd September.
29. **Kumar, A. E.** (2023). "*Friction stir processing of squeeze cast A356 with surface compacted graphene nanoplatelets (GNPs) for the synthesis of metal matrix composite*," 8th International Conference on Nanostructured Materials by Severe Plastic Deformationm, IISc Bangalore, India, 26th February to 3rd March.
30. **Kumar, A. E.** (2023). "*Prospects for using light weight metal matrix composites in the automotive industry*," National Conference on Advanced Materials and Manufacturing Technologies (AMMT 2023), CSIR-National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram, 23rd-24th February.
31. **Kumar, A. E.** (2023). Invited Talk at 4th Global Ceramic Leadership Roundtable on "*Ceramics for frontier sectors: emerging advances and prospects*" (CerAP2024), IIT Roorkee, 11th-12th March.
32. Kumar, A. M., & **Muthukumar, P.** (2023). "*Economic and environmental performance assessment of biogas cookstove with porous radiant burner* 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
33. Kumar, A., Chandrasekaran, **Muthukumar, P.,** & Panda, B. (2023). "*Characterization studies on slag blended calcium aluminate cement concrete for high temperature thermal energy storage applications*," (Paper ID: 525), 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
34. Kumar, D, V., Anand, T. N. C., & **Avulapati, M. M.** (2023). "*Evaluation of air assisted impinging jet atomization for viscous liquids*," ILASS, Korea, 19th-21st October.
35. More, A., Parida, A., **Muthukumar, P.,** Kalita, P., & Dalal, A. (2024). "*Comparative performance analysis of finned and metal foam metal hydride reactors for efficient heating and cooling operations,*" 8th National and 2nd International Conference on Refrigeration and Air Conditioning (NCRAC 2024), IIT Madras, India,13th-15th March.
36. Muduli, R.C., Nishad, N. K., Dashbabu, D., **Kumar, A. E.,** & Kale, P. (2023). "*Evaluation of synergistic integration of nickel, porous silicon, and thermally reduced graphene oxide for hydrogen storage*," 14th International Conference on Hydrogen Production (ICH2P-2023), Doha, Qatar, 19th-21st December.
37. Naidu, V. K. P., & **Avulapati, M. M.** (2023). "*Experimental studies on the effect of micro explosion on the neighbouring droplets*," ILASS, Korea, 19th-21st October.
38. Nayanita, K., **Muthukumar, P.,** & Dalal, A. (2023). "*Performance investigation of a hybrid solar dryer integrated with electric backup heater for chilli drying*," 7th International Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
39. Parashar, S., **Muthukumar, P.,** & Soti, A. K. (2023). "*Design optimization and performance analysis of finned metal hydride reactor for large capacity hydrogen storage application*," 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
40. Parashar, S., **Muthukumar, P.,** & Soti, A. K. (2023). "*Experimental investigation on novel multi-tube metal hydride reactor for large capacity hydrogen storage applications*," International Conference on Hydrogen Production (ICH2P-2023), Hamad Bin Khalifa University, Qatar, 19th-21st December.
41. Parashar, S., **Muthukumar, P.,** & Soti, A. K. (2023). "*Experimental investigation of novel multi-tube metal hydride reactor for high temperature hydrogen storage and thermochemical energy storage*," International Conference on Advances in Renewable and Green Energy Technology (ICARGET-2023), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India, 7th-8th December.
42. Parashar, S., **Muthukumar, P.,** & Soti, A. K. (2024). "*Performance analysis of embedded multi tube metal hydride reactor for heating and cooling applications*," 8th National and 2nd International Conference on Refrigeration and Air Conditioning (NCRAC 2024), IIT Madras, India,13th-15th March.
43. Parida, A., Kumar, A., **Muthukumar, P.,** & Dalal, A. (2023). "*Experimental and numerical studies on metal hydride based embedded cooling tube reactor for controlled*

hydrogen discharge," 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.

44. Parida, A., **Muthukumar, P.,** & Dalal, A. (2023). "*Investigation of the effect of bed heterogeneities in multi stage metal hydride hydrogen compressor: An improved model*," International Conference on Advances in Renewable and Green Energy Technology (ICARGET-2023), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India, 7th-8th December.
45. Parmar, G. & **Avulapati, M. M.** (2023). "*Analyzing the effect of neighbouring droplets on the evaporation of urea-water-solution*," 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference, IIT Patna, India, 14th-17th December.
46. Praveen, B., & **Kumar, A. E.** (2023). "*Prospects for using lightweight metal matrix composites in the automotive industry*," 71st Indian Foundry Congress & Foundry Exhibition IFEX, Noida, India, 8th-10th February.
47. Ramesh, A., Rangamani, A., & **Sundar, S.** (2023). "*Influence of contact parameters on the radiated noise from an automotive drum brake*," INTER-NOISE and NOISE-CON Congress and Conference, Institute of Noise Control Engineering, Washington, DC, 1st February.
48. **Sahu, G. N.,** Otto, A., & Ihlenfeldt, S. (2023). "*Active S of low-frequency vibrations in robotic machining*," All India Manufacturing Technology, Design and Research Conference, AIMTDR 2023, Varanasi, India.
49. Schuster, A., **Sahu, G. N.,** Rentzsch, H., Otto, A., & Ihlenfeldt, S. (2023). "*Simulation tool for chatter prediction of varying tool machine configurations based on dynamic substructuring*," 19th CIRP Conference on Modeling of Machining Operations, Karlsruhe.
50. Shripad, K. M. R., & **Sundar, S.** (2023). "*Development of experimental vibro-acoustic transfer function for a system with impact*," INTER-NOISE and NOISE-CON Congress and Conference, Institute of Noise Control Engineering, Washington, DC, 1st February.
51. Sonowal, J., Kadwal, D., Anandalakshmi, R., & **Muthukumar, P.** (2023). "*Parametric studies on organic liquid desiccant-based dehumidification system for subtropical regions*," 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
52. Srinivas, M. S., Sangeeth, P., Venkaiah, N. & **Sankar, M. R.** (2023). "*State of the art on tool wear characterization in micro-milling*," International conference on Advanced Manufacturing and Materials Processing, 6th-8th February.
53. Sureandhar, G., & **Muthukumar, P.** (2023). "*Experimenting the effect of proliferation in arc rib diameter embedded in the SAH-an exergy and entropy analysis*," International Conference on Advances in Renewable and Green Energy Technology (ICARGET-2023), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India, 7th-8th December.
54. Tat, S. A., & **Muthukumar, P.** (2023). "*Experimental and numerical investigations on the thermal performance of uniform and non- uniform finned latent heat thermal energy storage systems*," 7th Int Conference on Polygeneration-ICP 2023, Bali, Indonesia, 26th -28th July.
55. Tat, S. A., & **Muthukumar, P.** (2023). "*Experimental study on the thermal performance of a high-temperature finned latent heat storage system*," International Conference on Advances in Renewable and Green Energy Technology (ICARGET-2023), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India, 7th-8th December.
56. Tirumala, T., & **Kumar, A. E.** (2023). "*Reverse cladding of 304 stainless steel to LM25 aluminium alloy through die-casting*," 77th Annual Technical Meeting the Indian Institute of Metals (IIM), KIIT, Bhubaneswar, 22nd-24th November.

Physics

1. Allabakshi, S. M., Srikar, P., **Gangwar, R. K.,** & Maliyekkal, S. M. (2023). "*Non-invasive diagnostic of nonthermal hybrid plasmas applied for water treatment applications*," Conference on Plasma Theory and Simulations (PTS 23), Jawaharlal Nehru University. Delhi, September.
2. Allabakshi, S. M., Srikar, P., **Gangwar, R. K.,** & Maliyekkal, S. M. (2023). "*Photo-plasma: A sustainable way to reduce the scavenging effect of radicals by salts in textile wastewater treatment*," 3rd Energy Security and Chemical Engineering Congress, Malaysia.
3. Allabakshi, S. M., Srikar, P., **Gangwar, R. K.,** & Maliyekkal, S. M. (2023). "*Surface dielectric barrier discharge: A potential plasma reactor system in treating textile wastewater*," *Conference on Desalination, Brine Management and Water Recycling (DeSaltM 23),* Indian Institute of Technology Bombay, 21-22 July 2023.
4. Banerjee, G. S., Sharma, A., **Deshmukh, P. C.,** & Manson, S. T. (2023). "*Transition amplitudes in length and velocity forms in the photoionization of intermediate subshells of high Z atoms*," 54th Annual Meeting of APS Division of Atomic, Molecular and Optical Physics, Washington, USA, 5th-9th June.
5. Baral, S., Jose, J., **Deshmukh, P. C.,** & Manson, S. T. (2023). "*Relativistic and correlation effects in np photoionization Cooper minima of high-Z atoms*," *XXXIII International Conference on Photonic, Electronic, and Atomic Collisions (ICPEAC)*, Ottawa, Canada, 25th July - 1st August.
6. Baral, S., Jose, J., **Deshmukh, P. C.,** & Manson, S. T. (2023). "*Relativistic and correlation effects in np photoionization Cooper minimum of high-Z atoms*," 54th Annual Meeting of APS Division of Atomic, Molecular and Optical Physics, Washington, USA, 5th-9th June.
7. Hosea, N. M., **Deshmukh, P. C.,** Jose, J., Varma, H. R., & Manson, S. T. (2023). "*Quadrupole effects in the photoionization of sodium 3s in the vicinity of dipole*

Cooper minimum", 54th Annual Meeting of APS Division of Atomic, Molecular and Optical Physics, Washington, USA, 5th-9th June.

8. Hosea, N. M., **Deshmukh, P. C.,** Jose, J., Varma, H. R., & Manson, S. T. (2023). "*Angular distribution, spin polarisation and time delay studies of the potassium 4s state in the vicinity of Cooper minimum*," XXXIII International Conference on Photonic, Electronic, and Atomic Collisions (ICPEAC), Ottawa, Canada, 25th July - 1st August.
9. Hosseini, R., Manson, S. T., & **Deshmukh, P. C.** (2023). "*Relativistic and quadrupole effects in photoionization time delay in atoms*," 54th Annual Meeting of APS Division of Atomic, Molecular and Optical Physics, Washington, USA, 5th-9th June.
10. **Modak, R.** (2023). "*Complexity growth in 1D lattice models*," Conference on soft and active matter, Indian Institute of Science, Bangalore, 21st August.
11. **Modak, R.** (2023). "*Optimal quantum resetting protocol*," Young Investigators Meet QCMT 2023, IISER Bhopal, 14th-16th December.
12. Srikar, P., Allabakshi, S. M., **Gangwar, R. K.,** & Maliyekkal, S. M. (2023). "*Spectroscopic diagnostics of nonthermal plasma using time-resolved measurements coupled with plasma population kinetic model*," Conference on Plasma Theory and Simulations (PTS 23), Jawaharlal Nehru University. Delhi, September.
13. Srikar, P., Allabakshi, S. M., **Gangwar, R. K.,** & Maliyekkal, S. M. (2023). "*Spectroscopy-based optimisation of nonthermal plasma mediated processing for effective degradation of environmental pollutant in water*," Indo-Canadian Symposium on Water Management: Sustainability & Impact of Climate Change, Dal-Housie, University Canada & IIT Tirupati, September.
14. Srikar, P., Allabakshi, S. M., **Gangwar, R. K.,** & Maliyekkal, S. M. (2023). "*Optimisation of atmospheric pressure plasma jets for efficient degradation of pesticides in water*," Conference on Desalination, Brine Management and Water Recycling (DeSaltM 23), Indian Institute of Technology Bombay, 21st-22nd July.

APPENDIX– III

Invited Lectures Delivered by IIT Tirupati Faculty Members

Chemical Engineering

1. **Kumar, S. T.** (2023). Panel Discussion on Lignin Valorization, Global Bio India Program, Organized by DBT & BIRAC, Delhi, 5th December.
2. **Kumar, S. T.** (2023). Performance of Heat Exchangers with Nanofluids, FDP - Emerging technologies in thermal energy production and storage, BVRIT, Hyderabad 13th to 17th September.
3. **Raghavarao, K. S. M. S.** (2023). Food processing: current practices and future trends, CompFlu, IIT Madras, Session Chair for "Food Processing" topic, 20th December.
4. **Reddy, A. K.** (2023). Semi-aromatic polyamide membrane in FO process: Molecular insights, Invited Talk at IIT Ropar, 26th July.
5. **Reddy, T. N.** (2023). Food science: A soft matter perspective, CompFlu, IIT Madras, 20th December.

Civil & Environmental Engineering

1. **Asaithambi, G.** (2023). "Evaluation of Traffic Control and Management measures in disordered traffic using simulation models," TiHAN Workshop on Intelligent Transportation System, IIT Hyderabad, September (Invited speaker/Online presentation).
2. **Asaithambi, G.** (2023). "Traffic Flow Models for Urban Roads under Indian Traffic Conditions", Madanapalle Institute of Engineering and Technology, Andhra Pradesh, November (Invited Talk).
3. **Asaithambi, G.** (2024). "Traffic Flow Parameters: Measurement and Applications" Narayana Engineering College, Nellore, Andhra Pradesh, February (Invited talk).
4. **Jain, S.** (2023). Distinguished Speaker and Expert Panelist for Brainstorming Session on "Transformative Transport: Non-CO2 Emissions and Climate Change," IIT Delhi, 27th September.
5. **Jain, S.** (2023). Invited Speaker (Industrial Air Pollution – Impacts and Control Measures) in One day National Workshop on "Environmental Challenges in Pharmaceutical Industries: A sustainable Management Approach," Hyderabad, 6th October.
6. **Jain, S.** (2023). Invited Speaker and Guest of Honor in the Seminar on "National Pollution Control Day," DTU, New Delhi, 5th December.
7. **Maliyekkal, S. M.** (2023). Water: The Indispensable Elixir of Life Vellore Institute of Technology, Chennai Campus, Tamil Nadu, 23rd November.
8. **Prapoorna, B. K.** (2023). "Advanced Pavement Systems: Moving from Linear to Circular Economy", Workshop on Decarbonization of India's Transportation System, Indian Institute of Technology Kharagpur, India, 21st June (Invited talk/Online Presentation).
9. **Prapoorna, B. K.** (2023). "Asphalt-Rubber Pavement Systems: Benefits & Implementation of the Green Roads in Oman", Meeting with the Ministry of Transport, Communications and Information Technology, Defense, and Environment as well as

Contractors, Sultanate of Oman, Muscat, Oman, 26th July (Invited talk/Presentation).

10. **Prapoorna, B. K.** (2023). "Infrastructure: Smooth Transition from Linear to Circular Economy", Technology Information, Technology Vision 2047, Brainstorming Workshop, Indian Institute of Technology Hyderabad, Sponsored by Forecasting and Assessment Council, Department of Science and Technology, Government of India, 1st May (Invited talk/Panel Presentation).
11. **Prapoorna, B. K.** (2023). "Integrating Mechanistic Roadway Designs with Lifecycle Assessment: Moving Towards Achieving Sustainability in Roadway Technology", Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities, MAIREINFRA 2023, Honolulu, Hawaii, USA, 18th August (Special Invited Presentation).
12. **Prapoorna, B. K.** (2023). "Multi-Parametric Delineation Approach for Homogeneous Sectioning of Asphalt Pavements", Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities, MAIREINFRA 2023, Honolulu, Hawaii, USA, 17th August (Invited talk/Presentation).
13. **Prapoorna, B. K.** (2023). Integrating Mechanistic Roadway Designs with Lifecycle Assessment: Moving Towards Achieving Sustainability in Roadway Technology", One Week Online Short-Term Course on Sustainable and Durable Green Concrete-Future and Applications, Dr. B. R. Ambedkar National Institute of Technology Jalandhar, Punjab, India, 22nd December (Invited talk/Online Presentation).
14. **Prapoorna, B. K.** (2024). "LCA-based Mechanistic Roadway Designs: A Real-time Solution for Sustainable Pavement Technologies", High-End Workshop on Innovative Solutions for Sustainable Construction using Local Materials, Visvesvaraya National Institute of Technology Nagpur, Maharashtra, India, 14th March (Invited talk/Online Presentation).

Computer Science & Engineering

1. **Badarla, V. R.** (2023). "Chief Guest Address, 'Shaping Tomorrow: Grand Challenges of Computer Science for the Next Decade', Orientation Program of CSA," Sri Venkateswara College of Engineering, Tirupati, 22nd September.
2. **Badarla, V. R.** (2023). "Network Security Challenges and Mitigation Techniques as part of FDP program on Cyber Security and BlockChain Technology," Sri Venkateswara College of Engineering, Tirupati, 22nd July.
3. **Kalidas, Y.** (2023). "Chief Guest Lecture on AI in 'Data Visualization and Dashboard Creation,' Apollo University, Chittor on 23rd June.
4. **Kalidas, Y.** (2024). "Computer Vision Algorithms for Augmented Reality," Sri Padmavathi Mahila University Tirupati, 27th February.
5. **Kalidas, Y.** (2023). "Invited talk on AI for 'Applications of IoT to Water Resources Engineering'", Sri Venkateswara University College of Engineering, Tirupati on 28th June.
6. **Kalidas, Y.** (2023). "Invited Talk on AI in Real Estate & Facility Management", CRISP 2023 Conclave, 19th May.
7. **Kalidas, Y.** (2023). "Invited talk for 'National Conference on AI Block Chain Data science ABCD 2023'", Sri Venkateswara University College of Engineering, Tirupati, 28th Jun 2023.
8. **Kalidas, Y.** (2024). "Seminar on Machine Learning at Association of Computer Engineers, SVUCE," Sri Venkateswara University College of Engineering Tirupati on 12th March.
9. **Mahendran, V.** (2023). "Network Security: Protocols and Mechanisms," ACM Summer School'23 on Cybersecurity for Women, SSN college of Engineering, Chennai on 14th June.
10. **Ramakrishna, G.** (2023). "Introduction and Trends in Machine Learning, International Conference on Emerging Trends in Engineering & Technology, Science, Management", Annamacharya Institute of Technology and Sciences, Tirupati, 4th April.
11. **Ramakrishna, G.** (2024). "Linear Modeling and Federated Learning, ATAL Faculty Development Program on Federated Learning - AI applications," Siddharth Institute of Engineering and Technology, Puttur on 12-14th February.
12. **Ramakrishna, G.** (2023). "Multi-core Algorithm for cut vertices in Dynamic Graphs", IIT Madras, 12th July.
13. **Tudu, J. T.** (2023). "Computer System Design: From Hardware to Software Systems," NIT Tirichirapally, 8th June.
14. **Vishnu, C.** (2023). "Deep Learning Related to Adversarial Signal Processing," Audisankara College of Engineering & Technology, 19th December.

Electrical Engineering

1. **Gorthi, S.** (2023). Expert talk on "Role of AI/ML in Medical Imaging with various Medical Modalities" as a part of the Faculty Development Program at NIT Warangal, 4th April.
2. **Gorthi, S.** (2023). Invited talk on "Machine Learning in Medical Imaging" as a part of Analog Devices India's (ADI) innovation day program in Bangalore,13th June.
3. **Gorthi, S.** (2023). Invited talk on "Overview of Deep Learning in Medical Imaging" as a part of International Research Workshop on Advances in Deep Learning and Applications (WADLA 3.0), organized at IIIT Sricity, 16th Decemeber.
4. **Rimalapudi, S.** (2023). Guest lecture on "Introduction to Wireless Communication" to the undergraduate students at Adikavi Nannaya University, Rajahmundry.

5. **Rimalapudi, S.** (2023). Guest lecture on "Intelligent Reflecting Surface Aided 6G Communication System," NIT, Andhra Pradesh.
6. **Rimalapudi, S.** (2023). Invited as a distinguished speaker to give a talk on Role of Physical Secrecy in 6G systems at IEEE Bharath 6G Summit held at IISc Bangalore (in association with IEEE Future Networks, IEEE Bangalore Section, and IEEE Signal Processing Society Bangalore Chapter), 22nd July.

Humanities and Social Sciences

1. **Bahinipati, C. S.** (2023). "An Introduction to Systematic Literature Review," and "An Introduction to Program Evaluation," A Short-Term Course on Research Methodology - Humanities & Social Sciences, UGC - Human Resource Development Centre, Kannur University, Kerala, 11th December.
2. **Bahinipati, C. S.** (2023). "Challenges Ahead for Loss and Damage Fund: Definition, Concepts, and Methods," Distinguished Lecture Series, International Day for Disaster Risk Reduction, Centre of Excellence on Climate Change and Disaster Resilience, Berhampur University, Odisha, 13th October.
3. **Bahinipati, C. S.** (2023). "Green Technologies and Sustainable Development: An Economic Perspective," A Short-Term Course in Green Technology for Sustainable Development, UGC-Human Resource Development Centre, Kannur University, Kerala, 11th July.
4. **Bahinipati, C. S.** (2023). "How to Enhance Adoption of Climate Smart Agricultural Practices in India? Institutions, Incentives, and Information," AFE Seminar Series, Griffith University, Brisbane, Australia, 16th June.
5. **Dwivedi, P. S.** (2024). Invited as a panel discussant on "Comparative Literature: Perspectives, Practices, Positions" at the 10th Annual Conference of Researchers at Work (Raw Con -2024), organised by the Centre for Comparative Literature, University of Hyderabad, 9th March.
6. **Vishnu, C. R.** (2024). "Literature Review and Bibliometric Analysis" Virtual Research Workshop organized by Department of Mechanical Engineering, National Institute of Technology Calicut, Kerala, 22nd-23rd March.

Mathematics & Statistics

1. **Ravinder, B.** (2024). Schur Positivity, IISER Tirupati, 09 February.
2. **Balakrishna, N.** (2023). "Models for count time series" (Online), Indian Agricltural statistics research institute, New Delhi, 10th September.
3. **Balakrishna, N.** (2023). "Stochastic Volatality models", Academic Staff College, Savitribai Phule Pune University, 6th December.
4. **Das, I.** (2024). "Multivariate Response Models in the Presence of Inliers", The FDP on Recent Developments in Statistics and its Applications in Data Science, held during 27-31 March 2024, Vellore Institute of Technology (VIT), Chennai, India, 31st March.
5. **Das, I.** (2024). "Parametric link for COM-Poisson regression model", International workshop on Stochastic Models in Data Science, Sri Padmavati Mahila Visvavidyalayam, Tirupati, India, 20th February.
6. **Lahiri, A.** (2023). "Machine learning for quantitative finance (50 hours lectures)", Indian Institute of quantitative finance, 15th April - 21st May.
7. **Mariappan, P.** (2023). "Calculus for machine learning," VIT Vellore, 23rd November.
8. **Mariappan, P.** (2023). "Smart Sorting: Machine learning for waste management", IISC Bangalore, 17th November.
9. **Mariappan, P.** (2024). "GPU Computing for Bioheat Equation", Indo-German workshop on Advances in Modeling and Computing, NIT Mizoram, 28th Februrary.
10. **Mariappan, P.** (2024). "Mathematical Modeling of Bioheat Equation", Indo-German workshop on Advances in Modeling and Computing, NIT Mizoram, 27th February.
11. **Mariappan, P.** (2024). "Mathematical Modeling of Differential Equations and its Applications in Biomedical Industry," Science Academies Lecture Workshop on Applications of Differential Equations in Engineering, PSNA College of Engineering and Technology, Dindigul, 4th March.
12. **Prasad, S. A.** (2023). "Fractal Interpolation functions for mixed objects", SPW Degree and PG College, TTD, Tirupati, 22nd December.
13. **Rajesh, S.** (2023). "Diagonalisation of matrices", Faculty development program, VIT Vellore, 28th November.
14. **Rajesh, S.** (2024). "Lim Center, Chebyshev Center, and Fixed-Point Theorems for Isometry Mappings.", IIT Ropar, 23rd February.
15. **Ravinder, B.** (2023). "One multivariable calculus in a teacher's enrichment workshop", VIT Vellore, 5th-7th June.

Physics

1. **Aravinda, S.** (2023). "Introduction to quantum computation and quantum information theory: Current status", National Institute of Engineering, Mysore, 28th November.
2. **Aravinda, S.** (2023). "Observational entropy: A thermodynamic tool to investigate quantum chaos and many-body systems". Meeting on Quantum Information Processing and Applications, Harish-Chandra Research Institute, Prayagraj, 4th – 10th December.

3. **Aravinda, S.** (2023). "Quantum thermodynamics", IISER Tirupati, 30 September.
4. **Aravinda, S.** (2023). "Role of entanglement in quantum information, quantum computation and quantum matter", SBRR Mahajana First Grade College, Mysore, 27th November.
5. **Aravinda, S.** (2023). "Time in quantum theory", Tibet House, New Delhi, 5th November.
6. **Aravinda, S.** (2024). "Introduction to Quantum Computing, Five-Day FDP on Exploring the Quantum Frontier: An In-Depth Investigation of Quantum Computing and its Revolutionary Applications", JNTUA, Ananthapuramu, 29th January - 2nd February.
7. **Aravinda, S.** (2024). "Quantum dynamics: The tale of entanglement, Combinatorial designs, and space-time duality", National workshop on quantum technologies, BHU Varansi, 1st March.
8. **Deshmukh, P. C.** (2023). "Attosecond Dynamics - The Nobel Prize in Physics 2023", MES University, Bengaluru, 24th December.
9. **Deshmukh, P. C.** (2023). "Attosecond Dynamics - Physics Nobel Prize 2023", Karnataka Chapter of the Indian Association of Physics Teachers, National College Basavangudi, Bengaluru, 7th November.
10. **Deshmukh, P. C.** (2023). "Ghost, or a witch, or a vampire - Physics Nobel Prize 2022", Rashtriya Vidyala University, Bengaluru, 8th December.
11. **Deshmukh, P. C.** (2023). "Introducing Quantum Mechanics to Highschool Students", Jaipur National University, Jaipur, 27th December.
12. **Deshmukh, P. C.** (2023). "Quantum Mechanics and General Relativity -(Tale of two revolutions – re-commenced a second time) - Discovery and Detection of Gravitational Waves", Jaipur National University, 15th September.
13. **Deshmukh, P. C.** (2023). Book talk by the author on "Foundations of Classical Mechanics" conducted by the Indian Association of Physics Teachers, 30th June.
14. **Gangwar, R. K.** (2023). "Role of Plasma Diagnostics in Developing Efficient Atmospheric Pressure Plasma Reactors for Wastewater Treatment", 38th National Symposium on Plasma Science and Technology (Plasma 2023), UPES, Dehradun, 4th-8th December.
15. **Gangwar, R. K.** (2024). "Study of Atomic and Molecular Processes in a Controlled Plasma Environment", 1st Symposium on Genesis and Evolution of Organics In Space, IIST Trivandrum, 18th-20th January.
16. **Gangwar, R. K.** (2024). Research Discussion meeting with wastewater Technology Division of NEERI-NAGPUR, Nagpur, 23rd-24th January.
17. **Koteswararao, B.** (2023). "Possible realization of floating phase in S = 5/2 frustrated spin chain compounds", Seoul National University, 10th July.
18. **Koteswararao, B.** (2023). "Unconventional ground states in highly frustrated magnets", Sri Venkateswara University, 30th June.
19. **Koteswararao, B.** (2023). "Unconventional quantum states in S = 5/2 highly frustrated magnets", NCRFM 2023, Vignan University, 25th March.
20. **Koteswararao, B.** (2024). "Possible realization of Floating phase in S=5/2 frustrated spin chains", international conference on "Highly Frustrated Magnetism", IIT Madras, 7th-13th January.
21. **Majety, V. P.** (2023). "Strong field physics", Techniques in ultrafast sciences, National Physical Laboratory, New Delhi, 24th November.
22. **Majety, V. P.** (2024). "Multiphoton processes in atoms and molecules using tRecX-haCC", 9th Topical Conference on Ultrafast Photonics and Quantum Science, Physical Research Laboratory, Ahmedabad, 15th-17th February.
23. **Manna, R. S.** (2023). "Tuning the ground state of La_2CoTiO_6 with distortion and pressure", Annual Conference on Quantum Condensed Matter (QMAT2023), National Institute of Science Education & Research, Bhubaneswar, India, 27th-30th November.
24. **Modak, R.** (2023). "Complexity growth for one-dimensional free-fermionic lattice models", Conference on soft and active matter, IISC Bangalore, 21st August.
25. **Modak, R.** (2023). "Integrability, Entanglement and Complexity", IISER Tirupati, 4th September.
26. **Sharma, A.** (2023). "Progress towards an all-optical portable atomic clock based on a trapped ion for positioning, navigation and precision timing applications", ETQT workshop, Indian Institute of Technology, Palakkad, 3rd November.
27. **Sharma, A.** (2023). "Towards a trapped ion-based all-optical portable atomic clock", International Conference on Optics, Photonics and Quantum Information, Cochin University of Science and technology, 11th-13th December.

APPENDIX– IV

Awards and Achievements

1. **Allabakshi S.M** received the “best poster award" for “Non-invasive diagnostic of nonthermal hybrid plasmas applied for water treatment applications" in Conference on Plasma Theory and Simulations (PTS 23), September 2023, JNU Delhi.
2. **Allabakshi S.M.** received the “best poster award” from the Centre of Excellence at Conference on Desalination, Brine management, and Water Recycling held on 21-22nd July 2023, at IIT Bombay.
3. **Annette Mariya Tedy** (CY21D501) received the best oral Presentation Award by Royal Society of Chemistry at Modern Trends in Chemical Sciences (MTCS-2024), organized by Department of Chemistry, IIT Tirupati, 16th-17th February 2024.
4. **Aravinda S.** has been appointed as a mentor to the quantum club at National Institute of Engineering Mysore.
5. **Chinthalapudi Naga Lakshmi** (ChE, Ph.D. scholar) received “Best Oral presentation Award” from Indian Chemical Engineering Congress (CHEMCON-2022), International Conference on Sustainability in chemical processes through digitalization, Artificial intelligence and green chemistry held on 27th - 30th December 2022 at HBTU, Kanpur.
6. **D. Mondal** and his collaborator's recent J Chem Phys paper was editor pick to be Scilight in the AIP Publishing. Reference: Exploring resetting-based effects to increase reaction speed in drift-diffusive environments, Scilight 2023, 311105 (2023).
7. **Govind Narayan Sahu** won the Best Technical Paper Award, 2023 for the paper, "Enhancing low-frequency dynamic-stiffness of robotic milling machine using active damping" presented at 9th Inter-nation and 30th All India Machine Tool Design and Research Conference (AIMTDR), IIT BHU, Varanasi, India, 8th-10th December 2023.
8. **Lusina Mantry** (CY20D503) received the Best Poster Award by in Modern Trends in Chemical Sciences (MTCS-2024), organized by Department of Chemistry, IIT Tirupati, 16th-17th February 2024.
9. **M. S.V. Naga Jyothi** received the “best presentation award” for the oral presentation at the '14th International Conference on Environmental Engineering and Applications (ICEEA 2024) on 24th-26th April 2024 at “Universidad Politecnica de Madrid”, Spain.
10. **Maayuri R** (CY21D503) received best poster award in International Conference on Organic & Medicinal Chemistry (ICOMC-2023), NIT Warangal, AP, India, 28th-30th June 2023.
11. **Madan Mohan Avulapati** received First Isambard Brunel Kingdom (IKB) fellowship 2023 By Brunel University London, UK Research fellowship for summer 2023.
12. **Manuj Sharma** (CE20D503) received 3000 euros as travel grant for presenting research work in European Geophysical Union General Assembly, Vienna, Austria, 14-19th April 2024.
13. **Manuj Sharma** (CE20D503) received travel grant for presenting research work in 20th Annual Meeting of Asia Oceania Geosciences Society, 30th July- 4th August 2023 in Singapore.
14. **Mohammad Irfan** (ChE, Ph.D. scholar) received “Best Oral presentation Award” from International Conference on Separation and Purification Technologies (ICSPT-2023) held on 7th - 8th December 2023 at IIT Patna.
15. **N. Sai Prasanna** (CH Research scholar) received the prestigious “Prime Minister Fellowship for Doctoral Research,” September 2023 - August 2026 (Supervisors: Prof. K.S.M.S. Raghavarao and Dr Nilesh Choudhary).
16. **P. Mariappan,** DAAD Research Ambassador, DAAD, 2022-2025.
17. **Prashanta Bauri** (CY22D507) received Best Poster award in Modern Trends in Chemical Sciences (MTCS-2024), organized by Department of Chemistry, IIT Tirupati, 16th-17th February 2024.
18. **Prashanta Bauri** (CY22D507) received Inspire PhD fellowship from DST India, March 2024.
19. **R. K. Gangwar** has been appointed as a member of Board of Studies at Santhiram Engineering College, Ananthapuramu.
20. **Rafna Rafeek** (CY20D504) received Best poster award in Theoretical Chemistry Symposium at IIT Madras, 11th-14th December 2023.
21. **Rafna Rafeek** (CY20D504) received Special Mention award in School on Soft and Living Matter 2023 (SLM 2023) at TIFR-ICTS, Bangalore, August 2023.
22. **Raka Ahmed** (CY18D502) received best oral presentation award in “Research Scholar Symposium” organized by IIT Tirupati, 9th May 2023.
23. **S. Uday Kumar** was awarded a gold medal in recognition of the first technology transfer of patent work at IIT Roorkee 2024.
24. **S.M. Allabakshi** received the “best oral presentation award” for presenting the thesis work from 1st institute level research scholar's symposium conducted by IIT Tirupati on May 2023, at IIT Tirupati (Supervisors: Dr S.M. Maliyekkal & Dr G. Reetesh).
25. **S.M. Allabakshi** received the “first prize” in the “best paper award” category from the Indo-Canadian Symposium on Water Management: Sustainability & Impact of Climate Change, organized by Dalhousie

University, Canada, and IIT Tirupati, held on March 6th-7th, 2023, at IIT Tirupati (Supervisors: Dr S.M. Maliyekkal & Dr G. Reetesh).

26. **S.M. Maliyekkal** and **R.K. Gangwar's** project "The "Nonthermal-Atmospheric-Photo-Plasma (NAP) reactor: wastewater to liquid fertilizer" was selected for the prestigious IIT R&D Fair 2024 (one of the selected projects from India's top 100 ranking institutes under the theme of Agriculture and Food Processing).
27. Selvakumar M., Mohanakkaviya I & Sai Prasanna N achieved recognition as one of the top 200 finalists at the National level Ideathon Competition They presented their innovative idea titled & Sustainable Green Packaging and Renewable Energy from Cheese Whey – Biorefinery at the 6th INAE – SERB – GITAM Youth Conclave 2023, held at GITAM University, Visakhapatnam on 3rd - 4 th November 2023.
28. **Sridhar Chimalakond** received "Microsoft Research Accelerate Foundation Models Grant 2023" ($20,000 Azure Credit) awarded by Microsoft Research for Research on mocktail of source code representations on 28th September 2023.
29. **Sridhar Chimalakonda** received "ACM India Eminent Speaker" awarded by ACM India on 2nd October 2023.
30. **Sridhar Chimalakonda** received "Award for Inclusion Research" ($35,000) awarded by Google Research for "Towards promoting communication, computing and collaboration skills through game + undergrad research in computing" on 3rd October 2023.
31. **Sridhar Chimalakonda** received "Chairman, AI-Assisted Software Development Group" Awarded by ISO/IEC JTC1/SC7 (Software & Systems Engineering) for Proposal on standards for AI- Assisted Software Development on 1st June 2023.
32. **Sridhar Chimalakonda** received "Google Research exploreCSR" ($32,000) awarded by Google Research for "Explore ways to create a sense of excitement computing research" on 11th October 2023.
33. **Sridhar Chimalakonda** received "IBM Academic Award" by IBM for Research on software legacy modernization & COBOL on 8th September 2023.
34. **Sumit Pareek** (CY23D004) received poster award in the research poster session during Stanford student visit at IIT Tirupati.
35. **Uthradevi** received the "First Dean's prize" for the best Ph.D. thesis entitled "A resource-efficient and waste-free point-of-use disinfection system" during 5th convocation held on 22nd February 2024 at IIT Tirupati.
36. **Vaishali Saraswat** (CH Research scholar) received a Prime Ministers Research Fellowship (PMRF) under the Lateral Entry Scheme, in Cycle 11.
37. **Vaishali Saraswat** (CH Research scholar) received the prestigious "Prime Ministers Research Fellowship (PMRF)" (Supervisor: Prof. K.S.M.S. Raghavarao and Dr Trivikram Nallamilli).
38. **Yumnam Nandan Singh** (CH Research scholar) received the prestigious "Prime Ministers Fellowship for Doctoral Research," September 2023 - August 2026 (Supervisors: Prof. K.S.M.S. Raghavarao and Dr Nilesh Choudhary).

APPENDIX– V

Membership of Professional Bodies

1. **Brindha Moorthy:** AFSTI Life Membership.
2. **Brindha Moorthy:** IICHE Life Membership.
3. **C. S. Bahinipati:** Associate Editor, SN Business and Economics Journal, Springer.
4. **C. S. Bahinipati:** Member (Elected), Executive Committee, Indian Society for Ecological Economics (INSEE): 2022-2024.
5. **C. S. Bahinipati:** Research Fellow, Earth System Governance Network, Utrecht University, Netherlands.
6. **C.S. Bahinipati:** Associate Editor, International Journal of Climate Change Strategies and Management, Emerald Publishing.
7. **C.S. Bahinipati:** Chair, Abstract Selection Committee and Member, Scientific Advisory Committee, INSEE XII Biennial Conference 2024.
8. **C.S. Bahinipati:** Member of Doctoral Advisory Committee, Ashoka Trust for Research in Ecology and Environment, Bengaluru.
9. **C.S. Bahinipati:** Member, Odisha Economic Association Extension/Extracurricular Activities (outside the Institute).
10. **C.S. Bahinipati:** Research Guide, IAS Officer Trainees, Lal Bahadur Shastri National Academy of Administration (LBSNAA), Mussoorie, India.
11. **G. Roy:** Life Member, Chemical Research Society of India.
12. **K. S. M. S. Raghavarao:** Indian Journal of Chemical Technology, Executive Editor.
13. **Nilesh Choudhary:** AFSTI Life Membership.
14. **Nilesh Choudhary:** IICHE Life Membership.
15. **P. Gandeepan:** Life Member, Chemical Research Society of India.
16. **P. Gandeepan:** Member, American Chemical Society (ACS), July 2023 – Present.

17. **P. Gandeepan:** Professional Member, Institute of Scholars (InSc), Bengaluru, India, March 2020-Present.
18. **P. V. Sampath:** Life Member, Association of Global Groundwater Scientists.
19. **P. V. Sampath:** Member, American Geophysical Union.
20. **S. Chakraborty:** RSC Advance Reviewer Panel membership 2023.
21. **S. K. Singh:** Lifetime Member, Indian Association for Commonwealth Language and Literature Studies.
22. **S. U. Kumar:** AFSTI Life Membership.
23. **S. U. Kumar:** IICHE Life Membership.
24. **T. S. Kumar:** Andhra Pradesh Pollution Control Board member (APPCB), July 2023 to June 2025.
25. **T. S. Kumar:** Indian Journal of Chemical Technology, Editorial Board Member, 3 Years.

Extracurricular Activities

1. **Anup Basak:** Reviewer for Mathematics and Mechanics of Solids; Crystals; Materials.
2. **C.S. Bahinipati:** Reviewer for Australian Journal of Agriculture and Resource Economics, Review of Development and Change, Journal of Social and Economic Development, The Indian Economic Journal, Regional Environmental Change, Environment and Development Economics.
3. **C. S. Bahinipati:** Organised International Training Workshop on "How to Measure Urban Water Security? using the Water Security Assessment Tool (WATSAT)," at Indian Institute of Technology Tirupati, 1stOctober 2023 (in collaboration with Asian Institute of Technology Bangkok, ABCD Centre & Supported by DAAD, Germany).
4. **C. S. Bahinipati:** Organised International Workshop on "Building Ideas about Justice into Policy Research," at Indian Institute of Technology Tirupati, 3rd-4th November 2023 (in collaboration with Arizona State University, USA).
5. **C. S. Bahinipati:** Organised Policy dialogue on "PM Krishi Sinchayee Yojana: A Special Reference to Rayalaseema Region, Andhra Pradesh", Indian Institute of Technology Tirupati, 9th March 2024 (in collaboration with Indian Council of Social Science Research, New Delhi).
6. **C. S. Bahinipati:** Organised Policy Dialogue on the theme "Energy Transition and Tribal Education in Eastern India: Issues and Challenges," at National Institute of Science Education and Research (NISER), Bhubaneswar, 23rd-25th January 2024.
7. **C. S. Bahinipati:** Organised Training Workshop on "Envisioning India's Low-Carbon Future: An Interactive Workshop Using the India Energy Policy Simulator," at Indian Institute of Technology Tirupati, 9th November 2023 (in collaboration with World Resources Institute, India).
8. **G. K. Rajan:** Member of Board of Studies, NIT Trichy. Reviewer for Journal of Fluid Mechanics, Physics of Fluids, Meccanica, Ocean Engineering, Journal of Engineering Mathematics.
9. **K. Manna:** External member for comprehensive examination of Ms. Silpa Sunil (20PHD0552), 14th December 2023, Vellore Institute of Technology, India.
10. **K. Manna:** Research advisory committee (RAC) member for conducting 2nd RAC presentation of Ph.D. scholar Ms. Jumana Hasin M (Roll No. 20213207) in Chemistry from IISER Tirupati on 4th December 2023.
11. **K. Manna:** Research advisory committee (RAC) member for conducting 3rd RAC presentation of Ph.D. scholar Ms. Sreejani Karmakar (Roll No. 20182407) in Physics from IISER Tirupati, 29th July 2023.
12. **M. Mohan:** Reviewer for Journals: Sadhana, Fuel, Applied Energy, Journal of flow visualisation and image processing, Energies.
13. **P. Gandeepan:** Doctoral Committee member for Comprehensive Viva Voce Exam of Mr. Sumit Kumar (19PHD0236), School of Advanced Sciences, VIT Vellore, 19th May 2023.
14. **P. Gandeepan:** Doctoral Committee member for Synopsis of Ph.D. thesis of Mr. Sumit Kumar (19PHD0236), School of Advanced Sciences, VIT Vellore, 22nd November 2023.
15. **P. Gandeepan:** Doctoral Committee member of Mr. Manikandan S. (22PHD0224), School of Advanced Sciences, VIT Vellore, 29th May 2023.
16. **P. Mondal:** Doctoral Committee member for Zeroth meeting of Mr. Akash Kumar Sahoo (23PHD0290), School of Advanced Sciences, VIT Vellore, 20th December 2023.
17. **R. Vishnu:** Department Advisory Board Member for the Department of Mechanical Engineering, KMCT College of Engineering, Calicut, since 26th July 2023.
18. **R. Vishnu:** Jury Member for the International Conference on "Role of AI in Higher Education" organized by XIME Bangalore, in collaboration with the University of Adelaide, Australia, 22nd-23rd February 2024 at Bangalore.
19. **R. Vishnu:** PhD Doctoral Committee of Ms Siva Priya (23PHD1132), VIT Business School, Vellore Institute of Technology, Chennai, since 26th January 2024.
20. **R. Vishnu:** Reviewed manuscripts for Asia Pacific Journal of Marketing and Logistics, Supply Chain Forum, Journal of International Management, and Business Process Management Journal.
21. **S. K. Singh:** Reviewer for *Fat Studies* (Taylor and Francis), *Journal of Lesbian Studies* (Taylor and Francis), *Journal of Postcolonial Writing* (Taylor and Francis), and *Journal of Homosexuality* (Taylor and Francis).

22. **S. R. Krishnan, V.P. Majety, & P.C. Deshmukh:** NPTEL course on "Fundamentals of Attosecond Science and Technology" jointly offered by IIT Madras and IIT Tirupati.
23. **Shamik Misra:** Organized an Indo-Canadian Symposium on "Water Management: Adaptation to Climate Change and Sustainability" at IIT Tirupati in collaboration with Dalhousie University and Shastri Indo-Canadian Institute.
24. **Suresh Jain:** Editor, Editorial Board of Scientific Reports, Springer Nature, September 2024.
25. **Suresh Jain:** Organised First National Consultation Workshop on Legal Environmental Assessment for Air Pollution and Health, funded by UNDP India, 31 January 2024, New Delhi.
26. **Suresh Jain:** Organised Second National Consultation Workshop on Legal Environmental Assessment for Air Pollution and Health, funded by UNDP India, 23 September 2024, IIT Tirupati.
27. **Yujendra Mitikiri:** Reviewer for IEEE Sensors, IEEE Transactions on Aerospace and Electronic Systems.
28. **Yujendra Mitikiri:** Reviewer for IEEE Transactions on Automatic Control, IEEE Sensors, IFAC World Congress.
29. **Yujendra Mitikiri:** Senior member of IEEE Control Systems Society and IEEE Robotics and Automation Society.

भारतीय प्रौद्योगिकी संस्थान तिरूपति
Indian Institute of Technology Tirupati
Yerpedu-Venkatagiri Road, Yerpedu Post, Tirupati-517619 A.P.
www.iittp.ac.in