वार्षिक प्रतिवेदन/Annual Report
2021-22

भारतीय प्रौद्योगिकी संस्थान तिरुपति
TIRUPATI

भारतीय प्रौद्योगिकी संस्थान तिरूपति
Indian Institute of Technology Tirupati


Bandhan
Rajnath Singh
Raksha Mantri
Ka
Mahotsav

Contents

Director's Report

It is a pleasure to report the progress of the Institute made during 2021-22 as the year witnessed a remarkable growth of the Institute in spite of the hindrances posed by COVID-19. We are all set to be fully functional from our permanent campus from July 2022. Currently, the Stage 1C project of the campus construction is on the verge of completion. In this stage, the buildings constructed in the academic zone include two department buildings with offices for about 100faculty members and about 50 laboratories, a central instrumentation facility, alecture hall complex and an administrative building. In the hostel zone, two hostels with 500 rooms each, a central dining facility, and sports facilities are about to be ready. Theresidential zone includes Director's bungalow that has already been occupied,168 apartments for faculty and staff, and a 20-room guest house. Two lakes spanning over 10acres of land are also being created on the campus to store water.In recognition of the sustainable construction, health and safety practices adopted at thesite, our construction projects have received several awards, including the GRIHA Council Award foran exemplary demonstration of Sustainable Building Materials/Technologies, HUDCO Awardfor sustainable construction, International Safety Award Merit 2021 from the British SafetyCouncil, RoSPA Gold Award 2020 from the Royal Society, England for the Prevention of Accidents, and the Trophy and Scroll for the category Construction Health, Safety &Environment presented at the 12th CIDC Viswakarma Awards-2021.

The Institute began its operations with B. Tech programmes in four engineering disciplines, namely, Civil Engineering, Computer Science & Engineering, Electrical engineering and Mechanical Engineering.Gradually, the Institute expanded its strength and introduced a B. Tech in Chemical Engineering, M. Tech in the disciplines of Civil Engineering, (Environmental and Water Resources Engineering, Geotechnical Engineering, Structural Engineering, and Transportation & Infrastructure Engineering), Computer Science & Engineering, Electrical Engineering (Signal Processing and Communications) and Mechanical Engineering (Design and Manufacturing), and master's programmes in Mathematics and Statistics, Chemistry, and Physics. During the academic year 2021-22, M. Tech in the area of Microelectronics & VLSI in Electrical Engineering was also launched. The curriculum has been prepared to startin the ensuing academic year a master's programme in Public Policy.

The enrolled student strength of the year 2021-22 has been 1508 which includes 924 B. Tech students, 209 M. Tech students, 95 M. Sc. students, 51 MS (by research) and 229 PhD scholars. It has often been pointed out that IITs have a skewed gender ratio. However, IIT Tirupati boasts of 22% of girl students admitted to the B. Tech programmes and overall, of 22.5% girl students enrolled in various programmes at the Institute. Catering to the needs of economically marginal groups, the Institute offers scholarships for students hailing from low-income families. With an objective of working closely with the Indian armed forces, the Institute started admitting officers from the Indian army to M. Tech programs in Electrical and Mechanical Engineering in 2020.

Since its inception, IITTirupati has been engaged in recruiting world-class faculty members to teach and carry out cutting-edge research. The Institute has appointed 105 faculty members against the sanctioned strength of 120 faculty positions. We strive to establish one of India's leading environs for teaching, research and innovation to attract top Indian and global companies to recruit its students and conduct collaborative research. Weare growing at a fast pace in terms of student and faculty strength, physical infrastructure creation, and academic and research programmes to be one of the leading institutions in the country with its ideal of global outlook and local relevance.

In the year 2021-22, the faculty members of the Institute have published 134 research articles in various journals of high repute, one book, 15 book chapters, and 12 newspaper articles. They also presented 106 research papers at national and international conferences during this period. It is worth mentioning here that the faculty members have been attracting funding for research and consultancy activities from various government bodies and industrial organisations. The Institute faculty members have been granted22 sponsored research projects worth around Rs. 21.50 Crores, and 43 industrial consultancies worth Rs. 5.50 Crores during April 2021 – March 2022.

Our faculty members have been proactive in organising seminars, conferences and workshops. The last two years diversified the range of the Institute's academic activities. Following the pandemic restrictions, the activities were realigned to cater to the needs of

teachers, practising engineers, and researchers. During the period under discussion, various departments organised five international conferences/webinars, one symposium, eight international workshops, two GIAN courses, three FDPs, one summer school, and one VRITIKA Research Internship Programme. The Institute, for the benefit of its faculty and students, invites scholars from across the world for delivering special talks on various topics. The Institute hosted 41 invited special talks, and two lectures under distinguished lecture series during the period under discussion.

To nurture collaborative academic and research activities, wehavesigned MoUs and academic associations with a number of universities, research institutes and laboratories, and industry partners. Since the inception of the Institute, we have inked around fifty Memorandums of Understanding (MoUs) with varied educational Institutions, Govt. Research and Development agencies, Public Sector Undertakings, Government bodies and Industry associates. During the year 2021-22, the Institute signed MoUs with Petroleum Conservation Research Association (PCRA), a registered society under the aegis of Ministry of Petroleum & Natural Gas, Govt. of India; CQuRE of TCG CREST; Dalhousie University, Halifax, Nova Scotia, Canada; and Hindustan Shipyard Limited, Visakhapatnam.

Apart from their academic rigour, students at the Institute are active in the overall development of their personalities. Students engage with their peers in social service, club activities, and cultural programmes, etc. The students actively participate in NSS activities and contribute their bit to society.During this year, the NSS activities include NSS Day plantation drive, Gandhi Punyaha, Poster and Video making competition, grocery distribution to the nearby villages, Swachchhata Pakhwada-2021, Pulse Polio Immunization and so on.SPIC MACAY Heritage club is actively engaged in providing the students an opportunity to engage with the Indian classical music promoting it among the youth. The club organized a Veena recital, virtual Flute concert and an in-person concert on Carnatic Music recital. The Institute has about 14 active clubs and societies under which studentsorganise various extra-mural activities. The Fitness Club organised FIT India Freedom Run, FIT India Cyclothon, Winter Tournament, Intra IIT Tournament, and International Yoga Day on the campus. Every year students organize an annual techno-cultural fest that givesthem a chance to identify their creative and analytic sides.

IIT Tirupati has a separate Career Development Centre that provides excellent placement and internship opportunities, with a strong emphasis on year-round career development and career guidance activities. The Institute witnessed a stellar placement season for the 2022 graduating batch. Around 140+ companies participated in the recruitment process and offered diverse roles for the students. Major recruiters include Microsoft, Amazon, Analog Devices, Goldman Sachs, PayTM, Texas Instruments, Synopsys, Indeed, Mathworks, IBM, Salesforce, ServiceNow, Thermax, Jio, Tata ELXSI, TCS, Optum, Publicis Sapient, Aarti Industries, Ceremorphic, ICICI Bank, Capgemini, Kyndryl, Versa Networks, Ugam Solutions, L&T Group, Deloitte, ZS Associates, Razor

Group and many others offered full-time jobs for the students. The highest CTC offered in placement 2021-22 is 69.5 LPA, while the average CTC is 15.45 LPA. It is notable achievement for a growing Institute like IITT that more than 45 students have been placed with a CTC of more than 20 LPA.

On behalf of the IIT Tirupati fraternity, I acknowledge our sincere gratitude to the Ministry of Education, Government of India, for its continued and sustained encouragement and support. The Ministers, officers and staff at MoE have always actively helped and guided us. I wish to avail this opportunity to place on record our sincere thanks to our mentor Institute IIT Madras which guided us since the inception and was always there to provide any required support.I also thank the Government of Andhra Pradesh for all the support it continues to extend in multiple ways. I wish to thank the chairman and all the members of the Board of Governors for their wise counsel, support and guidance, for enabling us to scale new heights.

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 in 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, for the overall administration and governance, the Board of Governors is responsible. Various affairs related to finance are administered and counselled by the Finance Committee, and Building and Works Committee advises the Institute on the matters related to the construction of all major capital works. This Chapter of the report details about the organisational structure of the Institute with the names of the persons involved. The chapter, further, apprises about the faculty and staff members of the Institute.

1.1 GOVERNANCE

Board of Governors

Chairman	**Shri Amit Khare,** IAS (Up to September 30, 2021) Secretary, Department of Higher Education, Ministry of Education, Government of India
	Shri K. Sanjay Murthy, IAS (From October 01, 2021) Secretary, Department of Higher Education, Ministry of Education, Government of India
Members	**Prof. K. N. Satyanarayana**, Director, IIT Tirupati
	Shri Satish Chandra, IAS (Up to November 30, 2021) Special Chief Secretary to Govt. of Andhra Pradesh Higher Education Department/ Principal Secretary (HE), Govt of Andhra Pradesh
	Shri J. Syamala Rao, IAS (from December 01, 2021) Special Chief Secretary to Govt. of Andhra Pradesh Higher Education Department/ Principal Secretary (HE), Govt of Andhra Pradesh
	Shri Rakesh Ranjan, IAS, Additional Secretary (TE), Ministry of Education, Government of India
	Shri G. Yoganand, Chairman & Managing Director, Manjeera Constructions Ltd, Hyderabad
	Prof. K. Srinivasa Reddy, Professor of Mechanical Engineering, IIT Madras
	Shri M. Raja Mahender Reddy, Managing Director, M/s. Venkateswara Pesticides & Allied Chemicals Pvt Ltd, Hyderabad
	Prof. C.P. Rao, Professor of Chemistry, IIT Tirupati
	Prof. A. Raghuramaraju, Professor of Philosophy, IIT Tirupati

Special Invitee	**Prof. K. N. Ganesh,** Director, IISER Tirupati
Member Secretary	**Shri A. V. V. Prasad,** Registrar, IIT Tirupati

Finance Committee

Chairman	**Chairman,** Board of Governors, IIT Tirupati
Members	**Director,** IIT Tirupati
	Add. Secretary (TE), Ministry of Education, Government of India
	Joint Secretary & FA, Ministry of Education, Government of India, or his/her representative
	Dean, Planning & Infrastructure, IIT Tirupati
	Prof. David Koilpillai, Professor of Electrical Engineering, IIT Madras
Member Secretary	**Registrar,** IIT Tirupati

Senate

Chairman	**Prof. K. N. Satyanarayana,** Director, IIT Tirupati
Secretary	**Shri A. V. V. Prasad,** Registrar, IIT Tirupati
Members (Deans)	**Prof. Suresh Jain,** Dean – Academic Affairs
	Dr. N. Venkaiah, Dean – Student Affairs
	Prof. A. Murali Krishna, Dean – Planning & Infrastructure
	Prof. E. Anil Kumar, Dean – Sponsored Research & Consultancy
	Prof. Sasidhar Gumma, Dean – International & Alumni Affairs
All Heads of the Department	**Prof. Sasidhar Gumma,** Chemical Engineering (Up to September 30, 2021)
	Dr. Thamida Sunil Kumar, Chemical Engineering (From October 01, 2021)
	Prof. Chebrolu Pulla Rao, Chemistry
	Dr. Abhijit Ganguly, Civil and Environmental Engineering (Up to June 30, 2021)
	Dr. B. Krishna Prapoorna, Civil and Environmental Engineering (From July 01, 2021)
	Dr. Venkata Ramana Badarla, Computer Science and Engineering
	Dr. Rama Krishna Sai Gorthi, Electrical Engineering (Up to June 30, 2021)
	Dr. N. N. Murthy, Electrical Engineering (From July 01, 2021)
	Dr. Rahul A. Sirohi, Humanities and Social Sciences
	Dr. Durga Prasad Challa, Mathematics & Statistics (Up to June 30, 2021)
	Dr. M. Panchatcharam, Mathematics & Statistics (From July 01, 2021)
	Dr. Madan Mohan Avulapati, Mechanical Engineering

	Dr. Koteswar Rao Bommisetti, Physics (Up to June 30, 2021)
	Dr. Reetesh Kumar Gangwar, Physics (From July 01, 2021)
All Professors of the Institute	**Prof. K. Krishnaiah,** Chemical Engineering (Up to June 30, 2021)
	Prof. KSMS Raghavarao, Chemical Engineering
	Prof. A Raghuramaraju, Humanities and Social Sciences
	Prof. V. Raghevendra, Mathematics & Statistics (Up to December 31, 2021)
	Prof. N. N. Kishore, Mechanical Engineering (Up to June 30, 2021)
Educationists of Repute and not Employees of the Institute	**Prof. C. Krishna Mohan,** Dept. of CSE, IIT Hyderabad
	Prof. G. Ranga Rao, Dept. of Chemistry, IIT Madras
	Prof. Rajesh Kumar, Dept. of HSS, IIT Madras
Persons from Industry, R&D	**Mr. Gala Vijaya Naidu,** President, Amara Raja Group, Tirupati
	Dr. K. Raghunath, Scientist, National Atmospheric Research Laboratory, ISRO, Gadanki, A. P.
Faculty Members from the Institute	**Dr. Rajib Biswas,** Dept. of Chemistry
	Dr. Kalidas Yeturu, Dept. of Computer Science Engineering
	Dr. Bharath Kumar C, Dept. of Humanities and Social Sciences
	Dr. Srijanani Anurag Prasad, Dept. of Mathematics and Statistics
	Dr. Mamilla Ravi Sankar, Dept. of Mechanical Engineering and Workshop I/c
	Dr. Rudra Sekhar Manna, Dept. of Physics
Invitees	**Dr. Rajesh Viswanathan,** Associate Dean - Academics, IISER Tirupati
	Dr. Bijily Balakrishnan, CCW
	Mr. K. K. Shameer, Assistant Librarian (Ex-Officio)
Special Invitees (Student Members from the Institute)	**Student General Secretary**
	Academic Affairs Secretary
	Research Affairs Secretary

Building and Works Committee

Chairman	**Director,** IIT Tirupati
Members	**Sri K Nanda Kumar,** CGM P&M, APSPDCL
	Sri Kanaka Raju, CE, CPWD, SDG Office, Chennai
	Sri S. Ramanujam, Rtd. Director, DCSEN, DAE, Mumbai
	Dr. Janmejoy Gupta, HoD, Architecture, SPA, Vijayawada
	Prof. A. Muralikrishna, Dean – Planning and Infrastructure, IIT Tirupati
Member Secretary	**Registrar,** IIT Tirupati

1.2 NEW FACULTY AND STAFF ENTRANTS

New Faculty Members who joined in 2021-2022:

Name	Designation and Department	PhD from	Previous Employment
Dr. Mitikiri Yujendra	Assistant Professor, Mechanical Engineering	The University of Florida	Research and Teaching Assistant, University of Florida
Dr. Sanchayan Nath	Assistant Professor, Humanities and Social Sciences	Indiana University Bloomington, USA	Researcher 4, Universiteit Utrecht, Netherlands
Dr. Thiyagarajan R	Assistant Professor, Mechanical Engineering	Indian Institute of Technology Madras	Postdoctoral Scholar, University of California, Los Angeles
Dr. Bibhuti Mary Kachhap	Assistant Professor, Humanities and Social Sciences	Indian Institute of Technology Dhanbad	Assistant Professor, Presidency University, Bangalore
Dr. Aravinda S	Assistant Professor, Physics	Manipal University, Manipal, Karnataka	Postdoctoral Fellow, Indian Institute of Technology Madras
Dr. Katha Anki Reddy	Associate Professor, Chemical Engineering	Indian Institute of Science Bangalore	Associate Professor, Indian Institute of Technology Guwahati
Dr. Behera Prasanna Kumar	Assistant Professor, Civil and Environmental Engineering	Indian Institute of Technology Kanpur	Adhoc Faculty, NIT Andhra Pradesh
Dr. Prasenjit Mondal	Assistant Professor, Chemistry	Indian Institute of Technology Bombay	Postdoctoral Fellow, IISER Kolkata
Dr. Nilesh Choudhary	Assistant Professor, Chemical Engineering	Academy of Scientific and Innovative Research, Pune	Postdoctoral Fellow, King Abdullah University of Science and Technology, Saudi Arabia
Dr. Sourav Chakraborty	Assistant Professor, Chemistry	Jadavpur University, Kolkata	Postdoctoral Research Associate, University of Rochester, New York, USA
Dr. Ranjan Krishna Modak	Assistant Professor, Physics	Indian Institute of Science Bangalore	Assistant Professor, Banaras Hindu University, Varanasi
Dr. Shamik Misra	Assistant Professor, Chemical Engineering	Indian Institute of Technology Bombay	Postdoctoral Research Associate, University of Wisconsin-Madison and Princeton University, USA
Dr. S. Uday Kumar	Assistant Professor, Chemical Engineering	Indian Institute of Technology Roorkee	Postdoctoral Scholar, Stanford University, California, USA
Dr. A V Rahul	Assistant Professor, Civil and Environmental Engineering	Indian Institute of Technology Madras	Postdoctoral Researcher, Gent University, Belgium

Name	Designation and Department	PhD from	Previous Employment
Dr. Shailendra Kumar Singh	Assistant Professor, Humanities and Social Sciences	Jamia Millia Islamia, New Delhi	Assistant Professor, Dhirubhai Ambani Institute of Information and Communication Technology, Gujrat, India
Dr. Venkaiah Chintalapudi	Assistant Professor, Chemistry	University of Hyderabad, Hyderabad	Postdoctoral Research Associate, University of Glasgow, Glasgow, USA
Dr. Srikrishna Bera	Assistant Professor, Chemistry	Westfalische Wilhelms Universitat Munster, Germany	Postdoctoral Fellow, Ecole Polytechnique Federale De Lausanne, Switzerland
Dr. Avadh Bihari Narayan	Assistant Professor, Civil and Environmental Engineering	Indian Institute of Technology Kanpur	Research Associate-I, Indian Institute of Technology Kanpur
Dr. Shilpak Banerjee	Assistant Professor, Mathematics and Statistics	The Pennsylvania State University, Pennsylvania, USA	Assistant Professor, Indraprastha Institute of Information Technology Delhi
Dr. Someswara Rao Sanapala	Assistant Professor, Chemistry	Indian Institute of Technology Bombay	Senior Scientist, Vaxxilon Deutschland GmbH, Germany
Dr. Aniket Uday Joglekar	Assistant Professor, Physics	The University of Chicago, Illinois, USA	Postdoctoral Researcher, Laboratoire D'annecy-Le-Vieux De Physique Theorique, France

New Staff Members who joined in 2020-2021:

Name	Designation	Department/Section
A. K. Suresh	Junior Technical Superintendent	Chemical Engineering
Chakra Varthi Kandregula	Assistant Security Officer	Security
V. Kushal Reddy	Junior Assistant	General Admin
Akkala Supraja	Junior Assistant	Registrar Office
Prattipati Vidya Sagar	Junior Assistant	Academics
Saligari Akhil Rathna	Junior Assistant	Purchase
Chintakrindi Manicharan	Junior Assistant	Stores
Upendram Jagadeswara Raju	Junior Assistant	Accounts
C. K. Venkata Mani Brahmam	Junior Assistant	Purchase
Dr. Babu Raj M.	Technical Officer	Mechanical Engineering

Name	Designation	Department/Section
Sadgurumoorthy Narni	Assistant Executive Engineering	Engineering Unit
G. Venkata Subba Reddy	Horticulture Officer	Engineering Unit
Nunsavathu H Rao Naik	Junior Technical Superintendent	Mechanical Workshop
Thaddi Sai Praveen	Junior Technician	Chemistry
Velakara Pavan Kumar	Junior Assistant	Establishment
Dr. Sruthi Kodidini	Medical Officer	Health Centre
V. Dinesh Kumar	Junior Assistant	Accounts
Umesh Kumar Singh	Assistant Registrar	Hindi Cell
Vadapalli Durga Rama Pavan	Junior Technical Superintendent	Physics Lab
RajanBabu Lankapalli	Deputy Registrar	Finance & Accounts
Ramesh R.	Assistant Registrar	Purchase
Gorapalli Sravya	Junior Technician	Electrical Engineering
Chaitanya Kotagiri	Executive Engineer	Engineering Unit
P. Mallikarjuna	Assistant Executive Engineering	Engineering Unit
T. Sathish Kumar	Technical Officer	Electrical Engineering

1.3 FACULTY PROFILE

IIT Tirupati completed its fifth round of recruitment for the various departments in 2021, and with the joining of the new recruits the total faculty strength reached 105. Special recruitment drive has already been initiated to recruit the faculty from various reserved categories. It will help the Institute maintain the optimum faculty-student ratio.

Department of Chemical Engineering

The Department of Chemical Engineering, instituted in 2018, offers both undergraduate and postgraduate programmes. The undergraduate curriculum attempts to achieve a balance between fundamental courses and industry-oriented design courses. This helps students appreciate each course's relevance and relate its concepts to application in the process industry. At the postgraduate level, the department currently offers MS (by research) and Ph.D. programmes. The faculty members in the department are actively engaged in various research areas such as Food Technology, Colloids and Interfaces, Nanomaterials, Advanced Separations, Catalysis, Microfluidics, Corrosion Engineering, and Machine Learning for Process Systems.

Faculty Members

Professor

Name and Qualifications	Major Areas of Specialisation
Dr. Sasidhar Gumma, Ph.D. (Cleveland State University) Head of the Dept. (Up to September 30, 2021)	Metal-organic frameworks, Adsorption
Dr. KSMS Raghavarao, Ph.D. (Institute of Chemical Technology, Mumbai)	Food Process Engineering; Separation Processes.

Associate Professor

Dr. T. Sunil Kumar, Ph.D. (University of Notre Dame, USA) Head of the Dept. (From October 01, 2021)	Microfluidics and Corrosion Simulation
Dr. Katha Anki Reddy, Ph.D. (Indian Institute of Science, Bangalore, India)	Energy and Environmental Sciences, Granular Physics.

Assistant Professor

Dr. Anil B. Vir, Ph.D. (Indian Institute of Technology Madras)	Microreactor and multiphase reaction
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. Trivikram Nallamilli, Ph.D. (Indian Institute of Technology Madras)	Colloid and interfacial Phenomena, Soft matter and Food physics
Dr. Nilesh Choudhary, Ph.D. (Academy of Scientific and Innovative Research (CSIR-NCL))	Multi-scale molecular simulation for appliedmaterials and complex systems
Dr. Shamik Misra, Ph.D. (Indian Institute of Technology Bombay)	Process systems engineering, Renewable energy, and sustainability.
Dr. S. Uday Kumar,Ph. D (Indian Institute of Technology Roorkee)	Nanobiotechnology and Biomaterials

DST-INSPIRE Faculty

Dr. K. Krishnaiah, Ph.D. (Indian Institute of Technology Madras)(Up to June 30, 2021)	Chemical Reactor Analysis and Design, Fluidization

Department of Chemistry

The Department of Chemistry at IIT Tirupati started functioning in 2015. The department offers Ph.D. and M.Sc. programmes in Chemistry. Besides, it offers core and elective courses in Chemistry and allied areas for B.Tech and M.Tech students. Research is carried out in all major areas of chemical sciences. The faculty members at the department specialise in Theoretical and Computational Chemistry,

Inorganic Chemistry and Organic Chemistry. The department has been actively involved in establishing an advanced research facility that houses various state-of-the-art equipment and characterization tools for cutting-edge research. The department already has a well-equipped laboratory facility for B. Tech students, a new laboratory facility is ready on the temporary campus for the M.Sc. practical classes, and new research laboratories for the Ph.D students to conduct their experimental research.

Faculty Members

Professor

Name and Qualifications	Major Areas of Specialisation
Dr. Chebrolu Pulla Rao Ph.D. (Indian Institute of Science, Bangalore) Head of the Dept.	Bioinorganic chemistry including Chemosensors Materials for water purification and in drug delivery, including anticancer agents

Associate Professor

Dr. Gouriprasanna Roy, Ph.D. (Indian Institute of Science, Bangalore)	Chemical Biology, Bioinorganic Chemistry

Assistant Professor

Dr. Arun Kumar Manna, Ph.D. (JNCASR, Bangalore)	Theoretical and Computational Chemistry
Dr. Debashis 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 Kumar Biswas, Ph.D. (Indian Institute of Science, Bangalore)	Theoretical and Computational Chemistry
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. SrikrishnaBera, Ph.D. (Westfälische Wilhelms-Universität, Münster, Germany)	Reaction Development, Asymmetric Synthesis
Dr. Venkaiah Chintalapudi, Ph.D. (University of Hyderabad, Hyderabad)	Total synthesis of bioactive natural products, Asymmetric catalysis

DST-INSPIRE Faculty

Dr. Kumar Swamy Reddy N., Ph.D. (Indian Institute of Technology Madras)	Synthetic Organic Chemistry and Chemical Biology
Dr. Somrita Ray, Ph.D. (Visva-Bharati University, West Bengal)	Theoretical Chemistry

Department Of Civil And Environmental Engineering

The Department of Civil and Environmental Engineering is one of the first four departments that were set up in 2015 with the Institute. The department offers numerous courses at the undergraduate level to introduce students to academic research and themes relevant to the civil engineering industry. Most of the courses are structured in a problem-solving or a design-based approach, which are currently the industry's key demands. Undergraduate research is encouraged by the Institute by providing B. Tech students the option of working on research projects with their faculty as a part of their curriculum. In addition to M.S. and Ph.D programmes, the department offers M. Tech programmes in Environmental &Water Resources Engineering, Structural Engineering, Transportation and Infrastructure Engineering, and Geotechnical Engineering.

Faculty Members

Professor

Name and Qualifications	Major Areas of Specialisation
Dr. K.N. Satyanarayana, Ph.D. (Clemson University, USA), Director, IIT Tirupati	Construction Project Management
Dr. A. 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. Abhijit Ganguly, Ph.D. (Universite Libre de Bruxelles, Belgium) Head of the Dept. (Up to June 30, 2021)	Nondestructive Testing and Evaluation
Dr. B. Krishna Prapoorna, Ph.D. (Arizona State University, USA) Head of the Dept. (From July 01, 2021)	Transportation Engineering

Assistant Professor

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. 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

Name and Qualifications	Major Areas of Specialisation
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
Dr. Behera Prasanna Kumar, Ph.D. (Indian Institute of Technology Kanpur)	Durability of concrete structures, Corrosion of reinforcing steel
Dr. A. V. Rahul, Ph.D. (Indian Institute of Technology Madras)	Concrete 3D printing, Rheology of cement-based material
Dr. Avadh Bihari Narayan, Ph.D. (Indian Institute of Technology Kanpur)	Remote sensing, Geodesy

Department of Computer Science & Engineering

The Department of Computer Science and Engineering at IIT Tirupati, established in 2015, offers B. Tech., M.Tech., M.S., and Ph.D. The undergraduate degree offered by the department gives ample importance to fundamentals and state-of-the-art technologies by offering courses such as Machine Learning, Deep Learning, Artificial Intelligence, etc. The faculty members of the department, whose interests cover a wide range of fields in Computer Science (broadly in the verticals of Systems, Theory and Data Science), constantly work towards providing better education while working at premier levels in their respective fields like Algorithmic Engineering, Big Data Technologies, Cloud Computing, Delay Tolerant Networks, Internet of Things, Machine Learning, Software Engineering, etc. Courses in the curriculum cover basics and advanced levels and have been planned to nurture innovation, ethics, and societal interaction. Each programme follows a rigorous and diversified course curriculum emphasing fundamentals, project-driven, and industry-relevant courses. The M.Tech. programme in CSE focuses on Data Science and Systems. The department is actively engaged in research in the areas of algorithms, machine learning, reinforcement learning, computer networks, software engineering, parallel computing, computer organisation and architecture, theoretical computer science, and mathematical modelling.

Faculty Members

Associate Professor

Name and Qualifications	Major Areas of Specialisation
Dr. Venkata Ramana Badarla, Ph.D. (Indian Institute of Technology Madras) Head of the Dept.	Wireless Networks, Cloud Computing, IOT

Assistant Professor

Dr. Ajin George Joseph, Ph.D. (Indian Institute of Science, Bangalore)	Reinforcement learning, Stochastic approximation algorithms

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. Kalidas Yeturu, Ph.D. (Indian Institute of Science, Bangalore)	Machine Learning, Big Data Technologies
Dr. V. Mahendran, Ph.D. (Indian Institute of Technology Madras)	Delay-Tolerant Networks, Software Defined Networks and IOT
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. G. Ramakrishna, Ph.D. (Indian Institute of Technology Madras)	Algorithmic Engineering
Dr. Sridhar Chimalakonda, Ph.D. (Indian Institute of Information Technology Hyderabad)	Software Engineering, Computing for Education
Visiting Faculty	
Dr. G. Ravi Prakash Iyer, Ph.D. (University of California, Berkeley)	Multidisciplinary Systems Design & Optimization
Dr. Konda Reddy Mopuri, Ph.D. (Indian Institute of Science, Bangalore)	Deep Learning, Computer Vision
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, established in 2015, offers B. Tech, M. Tech, M.S. and Ph.D. programmes. The department is actively involved in research in the areas of signal processing, machine learning, medical imaging, nanoelectronics, device modelling, semiconductor devices, digital design and cyber security, power electronics, power systems and smart grids, industrial automation, robust & optimal control, electronic instrumentation, physical layer secrecy, performance analysis of networked systems and distributed algorithms on networks. The department offers a two-year M.Tech programme in signal processing & communication. The programme consists of theoretical courses in advanced topics in signal processing and communication along with practical laboratory sessions. The department has a well-equipped signal processing and communication laboratory.

Faculty Members

Professor

Name and Qualifications	Major Areas of Specialisation
Dr. M. V. Kartikeyan, Ph.D. (Institute of Technology BHU, Varanasi)	High-power Millimeter/THz Wave Engineering, Sources and Allied Components; RF Circuits, Antennas and Systems (RF-CAAS)

Associate Professor

Dr. N. N. Murty, Ph.D. (Institute of Technology BHU, Varanasi) Head of the Dept. (From July 01, 2021)	Defect identification and characterisation in semiconductors (Diamond, SiC)
Dr. Rama Krishna Sai Gorthi, Ph.D. (Indian Institute of Technology Madras) Head of the Dept. (Up to June 30, 2021)	Signal/Image Processing, Computer Vision and Pattern Recognition & Machine Learning

Assistant Professor

Dr. Abhishek Kumar Jha., Ph.D. (Indian Institute of Technology Kanpur)	RF and Microwaves, Applied Electromagnetics
Dr. K P Naveen, Ph.D. (Indian Institute of Science, Bangalore)	Performance Analysis of Wireless Networks
Dr. Parthajit Mohapatra, Ph.D. (Indian Institute of Science, Bangalore)	Advanced communication techniques for future wireless networks, Physical Layer Secrecy
Dr. Pooja Vyavahare, Ph.D. (Indian Institute of Technology Bombay)	Distributed function computation and optimisation, Analysis of communication networks
Dr. Prasanth 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. Srujana Kagita, Ph.D. (Indian Institute of Technology Delhi)	RF and Microwave Components and Antennas
Dr. Subrahmanyam Gorthi, Ph.D. (Swiss Federal Institute of Technology, Switzerland)	Medical Image Analysis
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. Vikram Pudi, Ph.D. (Indian Institute of Technology Madras)	Digital Design, Cyber Security and Cryptography

Department of Humanities and Social Sciences

The Department of Humanities and Social Sciences at IIT Tirupati, established in 2015, offers elective courses in the areas of Economics, English, Philosophy, Finance, and Organisational Behaviour for all engineering disciplines in Undergraduate programmes. The department also offers compulsory courses in the area of English and Professional Ethics. In addition, proficiency courses in foreign languages such as Spanish, German, Sanskrit, and Japanese are offered to students in the first year of their B. Tech programme. The department is going to launch its first PG programme called Master of Public Policy (MPP). The faculty members are actively engaged in research in the areas of Social and Political Philosophy, Contemporary Indian Thought, Development Economics, Climate Change Economics, Environmental Economics, Natural Resource Management, Behavioural Economics, Indian Theories of Language and Literature, Comparative Literary Studies, Conflict Literature, Gender Studies, Empirical Asset Pricing, Financial Engineering and Risk Management, Organisational Leadership, Sustainable HRM, Decent Work and Work Engagement. The faculty members are actively involved in organising several workshops/ seminars and conferences.

Faculty Members

Professor

Name and Qualifications	Major Areas of Specialisation
Dr. A. Raghuramaraju, Ph.D. (Indian Institute of Technology Kanpur)	Social and Political Philosophy

Associate Professor

Dr. Bharat Kumar, Ph.D. (University of Hyderabad)	Social and Political Philosophy, Contemporary Indian Thought

Assistant Professor

Dr. Rahul A. Sirohi, Ph.D. (University of Illinois at Urbana Champaign)Head of the Dept.	Development Economics, Comparative political economy of Asia and Latin America, Applied Microeconomics
Dr. Bibhuti Mary Kacchap, Ph.D. (Indian Institute of Technology (ISM), Dhanbad	South Asian Literature and Cultural Studies
Dr. Chandra Sekhar Bahinipati, Ph.D. (Madras Institute of Development Studies, Chennai)	Economics of Climate Change, Environmental Economics, Natural Resource Management, Development Economics
Dr. Prabha Shankar Dwivedi, Ph.D. (Dr. H. S. Gour Central University, Sagar)	Comparative Literary Studies, Indian Theories of Language and Literature, and Indic Religions
Dr. Saranya Kshatriya, Ph.D. (Indian Institute of Technology Madras)	Empirical Asset Pricing, Financial Engineering and Risk Management
Dr. Sanchayan Nath, Ph.D. (Indiana University Bloomington, USA)	Sustainability, Public Policy and Governance

Name and Qualifications	Major Areas of Specialisation
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

Department of Mathematics and Statistics

The Department of Mathematics and Statistics at IIT Tirupati started in 2015. The department offers mathematical, statistical and computing courses for all engineering disciplines of IIT Tirupati at undergraduate, postgraduate and research levels. The department specialises in the areas of Pure and Applied Mathematics, Industrial Mathematics &Statistics, Machine Learning and Data Science. The faculty members of the department are engaged in various research areas of mathematics and statistics, including Representation Theory, Analytic Number Theory, Fractals, Fixed Point Theory, Partial Differential Equations, Numerical Analysis, Inverse Problems, Industrial Mathematics, Mathematical Modelling, Generalized Linear Models, Machine Learning, Statistical Signal Processing, Statistical Finance, and Environmental Statistics. The department currently offers M.Sc. (Mathematics and Statistics) and Ph.D. programmes.

Faculty Members

Name and Qualifications	Major Areas of Specialisation
Assistant Professor	
Dr. Durga Prasad Challa, Ph.D. (Johannes Kepler University & RICAM, Linz, Austria) Head of the Dept. (Up to June 30, 2021)	Forward and Inverse Scattering Problems, Scientific Computing, Cloaking and Effective Medium Theories
Dr. M. Panchatcharam, Ph.D. (Indian Institute of Technology Madras & TU Kaiserslautern, Germany) Head of the Dept.(From July 01, 2021)	Numerics for PDEs, Computational Fluid Dynamics
Dr. Ananya Lahiri., Ph.D. (Indian Institute of Technology Kanpur)	Statistics and Probability
Dr. Ishapathik Das, Ph.D. (Indian Institute of Technology Bombay)	Generalised Linear Models, Machine Learning
Dr. Krishna Kishore, Ph.D. (Indiana University, Bloomington)	Automorphic representations
Dr. S. Rajesh, Ph.D. (Indian Institute of Technology Madras)	Fixed-Point Theory
Dr. B. Ravinder, Ph.D. (The Institute of Mathematical Sciences, Chennai)	Representation theory of Lie algebras, Combinatorics
Dr. Srijanani Anurag Prasad, Ph.D. (Indian Institute of Technology Kanpur)	Fractals, Functional Equations

Name and Qualifications	Major Areas of Specialisation
Dr. Sumit Giri Ph.D. (The Institute of Mathematical Sciences, Chennai)	Analytic and Additive Number Theory, Elliptic curves over finite fields.
Dr. Shilpak Banerjee, Ph.D. (The Pennsylvania State University, USA)	Ergodic Theory, Dynamical Systems
Visiting Faculty	
Dr. V. Raghavendra, Ph.D. (Indian Institute of Technology Kanpur)(Up to December 31, 2021)	Inverse Scattering Theory

Department of Mechanical Engineering

The Department of Mechanical Engineering, established in 2015, offers B.Tech, M.Tech. (in Design and Manufacturing), and PhD programmes. The department offers undergraduate courses titled 'Engineering Drawing' and 'Engineering Mechanics' to all the engineering disciplines of IIT Tirupati. The department is active in research in the areas of applied solid mechanics, dynamics, thermal and fluid engineering, materials research, and manufacturing engineering. The faculty members of the department are engaged in research in the areas of solid mechanics and design, thermal and fluid engineering, and manufacturing engineering and materials research. Also, a wide range of advanced courses are offered in line with the current research topics relevant to the department and interdisciplinary research. The department is highly active in organising symposiums, seminars, and workshops to train the faculties and students from the Institute and other institutions, thus promoting research collaboration. The faculty members from the department effectively collaborate with industries, research organisations, and other universities on problems relevant to society and industries.

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
Associate Professor	
Dr. Mamilla Ravi Sankar, Ph.D. (Indian Institute of Technology Kanpur)	Advanced Materials and Manufacturing, Ultra-Precision Machining
Dr. N. Venkaiah, Ph.D. (Indian Institute of Technology Madras)	Computational Metrology, Machining, Optimisation Techniques.
Assistant Professor	
Dr. Madan Mohan Avulapati, Ph.D. (Indian Institute of Science, Bangalore) Head of the Dept.	Liquid atomisation, Combustion, Alternative fuels for IC engines and gas turbines

Name and Qualifications	Major Areas of Specialisation
Dr. Ajay Kumar, Ph.D. (Indian Institute of Science, Bangalore)	Metal Casting, Metal Forming, Materials Processing and Mechanical Behavior 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. Degala Venkata Kiran, Ph.D. (Indian Institute of Technology Bombay)	Welding science and technology
Dr. Girish Kumar Rajan, Ph.D. (Pennsylvania State University, USA)	Fluid Mechanics and Applied Mathematics
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
Dr. P. Venkataraman, Ph.D. (Nanyang Technological University, Singapore.)	Hydraulic fracturing, Multiscale modelling
Dr. Mitikiri Yujendra, Ph.D. (University of Florida, Gainesville)	Robotics, controls, analog circuits
Dr. Thiyagarajan R, Ph.D. (Indian Institute of Technology Madras)	Robotics and automation, Dynamics and control of field and service robots, Mechatronics, Additive manufacturing
Visiting Faculty	
Dr. N. N. Kishore., Ph.D. (Indian Institute of Technology Kanpur) (Up to June 30, 2021)	Composite Materials, FEM and Non-Destructive Testing

Department of Physics

The Department of Physics offers courses at the undergraduate, postgraduate and research levels. In the academic year 2020-21, the department launched M.Sc. in Physics with an initial intake of 15 students. 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 invited talks during the academic year 2021-22. Different research and teaching laboratories are being set up in the department with the Institute funding and various external grants. Some of our faculty members are part of the joint IIT Tirupati - IISER Tirupati center for Atomic, Molecular and Optical Science and Technologies (CAMOST) which was inaugurated in August 2020.

Faculty Members

Assistant Professor

Name and Qualifications	Major Areas of Specialisation
Dr. B. Koteswara Rao, Ph.D. (Indian Institute of Technology Bombay) Head of the Dept. (Up to June 30, 2021)	Strongly Correlated Electron Systems, Geometrically Frustrated Magnets
Dr. Arijit Sharma, Ph.D. (Raman Research Institute, Bengaluru)	Experimental Atomic Physics and Quantum Optics, Precision Laser Spectroscopy
Dr. Reetesh Kumar Gangwar, Ph.D. (Indian Institute of Technology Roorkee) Head of the Dept.(From July 01, 2021)	Atomic and Molecular Physics, Plasma Physics
Dr. Rudra Sekhar Manna, Ph.D. (Goethe University Frankfurt, Germany)	Experimental 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
Dr. Ranjan Krishna Modak, Ph.D. (Indian Institute of Science, Bangalore)	Theoretical Condensed Matter Physics
Dr. Aniket Uday Joglekar, Ph.D. (University of Chicago)	Astroparticle Physics, Beyond the SM Physics.
Dr. Aravinda S, PhD, (Poornaprajna Institute of Scientific Research, Bengaluru)	Quantum information and computation, Quantum Foundations.

Adjunct Faculty

Dr. P.C. Deshmukh, Ph.D. (Nagpur University)	Photo absorption processes in free/Confined atoms
Dr. T. S. Natarajan, Ph.D. (Indian Institute of Technology Madras)	Conducting Polymer, Polymer nanofibers

1.4 TECHNICAL AND ADMINISTRATIVE STAFF

Technical Staff

IIT Tirupati completed its fourth round of recruitment for technical staff in the year 2020-2021. Along with regular, some ad hoc staff members were also engaged to assist the faculty members in regular course work and conduct experiments in laboratories effectively. The department-wise list of the technical staff is given below:

Name	Designation	Department
Dr. R. Mallikarjun	Junior Technical Superintendent	Chemical Engineering
Dr. T. Balaram	Junior Technician	Chemical Engineering

Name	Designation	Department
Mr. A K Suresh	Junior Technical Superintendent	Chemical Engineering
Dr. Jagadeesh M	Junior Technical Superintendent	Chemistry
Dr. Sanyasinaidu G	Junior Technical Superintendent	Chemistry
Mr. AjmeeraNagu	Junior Technician	Chemistry
Mr. Thaddi Sai Praveen	Junior Technician	Chemistry
Dr. Suneel Kumar M	Technical Officer	Civil Engineering
Mr. S. Ruthrapathi	Junior Technical Superintendent	Civil Engineering
Mr. M. Sunil Kumar	Junior Technician	Civil Engineering
Mr. Priyangan A.	Junior Technician	Civil Engineering
Mr. Sivanathan M	Junior Technician	Civil Engineering
Mr. Nagarajan R.	Junior Technical Superintendent	Computer Science Engineering
Mr. P. Vamshi Seshasayan	Junior Technical Superintendent	Computer Science Engineering
Mr. Abhijith P. M.	Junior Technician	Computer Science Engineering
Mr. D Ravi Kumar	Junior Technical Superintendent	Electrical Engineering
Mr. K Homprakash	Junior Technical Superintendent	Electrical Engineering
Mr. K N Dwarakanatha	Junior Technical Superintendent	Electrical Engineering
Mr. Kumar Bellikatti	Junior Technical Superintendent	Electrical Engineering
Ms. GorapalliSravya	Junior Technician	Electrical Engineering
Mr. Y Suravardhana Reddy	Junior Technical Superintendent	Electrical Engineering
Mr. P. Dasthagiri	Junior Technical Superintendent	Mechanical Engineering
Mr. B. Ramesh Kumar	Junior Technical Superintendent	Mechanical Engineering
Mr. S. Venkata Narayana	Junior Technical Superintendent	Mechanical Engineering
Mr. Saichaitanya P.	Junior Technical Superintendent	Mechanical Engineering
Mr. M. Ramesh	Junior Technician	Mechanical Engineering
Dr. Babu Raj M	Technical Officer	Mechanical Engineering
Mr. Ramesh Krishnan A	Junior Technical Superintendent	Workshop
Mr. Bijoy U.	Junior Technician	Workshop
Mr. Parthiban K.	Junior Technician	Workshop

Name	Designation	Department
Mr. Rohith K.	Junior Technician	Workshop
Mr. Sabarinathan T	Junior Technician	Workshop
Mr. Vijayaraj V.	Junior Technician	Workshop
Mr. Nunsavathu H Rao Naik	Junior Technical Superintendent	Workshop
Dr. Mohana Priya P.	Junior Technical Superintendent	Physics
Mr. Udaya Kumar V.	Junior Technical Superintendent	Physics
Mr. T. Satish Babu	Junior Technician	Physics

ADMINISTRATIVE STAFF

In the year 2020-2021, the Institute conducted the third round of recruitment for administrative staff. Recently retired staff members from ISRO and IIT Madras have also been engaged at IIT Tirupati on a contract basis to facilitate the smooth functioning of the system. In addition, some staff members have also been recruited on an adhoc basis to support administrative work in the Institute. Following is a section-wise list of all the administrative staff members at IIT Tirupati during 2021-2022:

Administration

Name	Designation	Name	Designation
Mr. A. V. V. Prasad	Registrar	Mr. GandhapudiMunivinay	Junior Assistant
Mr. Chaman Mehta	Deputy Registrar	Mr. Md. Abdul Rafi SK	Junior Assistant
Mr. V. Adinarayana	Project Advisor	Mr. Mohammad IshaqAlikhan	Junior Assistant
Mr. SahadParammal	Junior Superintendent	Mr. P. Midhun Kumar	Junior Assistant
Mrs. Sandhya Y.	Junior Superintendent	Mr. Udaiyakumar R.	Junior Assistant
Mr. Ameer Zerwani	Junior Assistant	Mr. Vamsi Kiran V.	Junior Assistant
Mr. Badireddi Prasad	Junior Assistant	Mr. Venkateswara Rao D	Junior Assistant
Mrs. G Haritha	Junior Assistant	Mr. V. Kushal Reddy	Junior Assistant
Mr. Hemanth Kumar S. G.	Junior Assistant	Ms. AkkalaSupraja	Junior Assistant

Academic Affairs

Mr. Chaman Mehta	Deputy Registrar	Mr. S. L. Pradeep Valan	Junior Superintendent
Mr. Arun Kalyan Kuppannagari	Assistant Registrar	Mr. R. Lokesh	Junior Assistant
Mr. Amit Kumar Goswami	Junior Superintendent	Mr. Prattipati Vidya Sagar	Junior Assistant

Finance and Accounts

Name	Designation
Mr. T. Siva Kumar	Project Advisor
Mr. Madhu N	Assistant Registrar
Mr. Vijay Y.	Junior Superintendent
Mr. G. Ramoji Rao	Junior Assistant
Mr. V. Dinesh Kumar	Junior Assistant
Mr. Upendram Jagadeshwara Raju	Junior Assistant
Mr. RajanbabuLankapalli	Assistant Registrar

Centre for Sponsored Research and Consultancy

Dr. Ambrish Saxena (Up to May 24, 2021)	Chief Manager
Dr. K. Tiruppathi (From November 01, 2021)	Chief Manager
Mr. Arun Narayanan P. J.	Project Manager
Mr. Vamsi Paladugu	Project Engineer

Electrical Engineering

T. Sathish Kumar	Technical Officer
Ms. Sheela Reddy	Assistant Registrar
Mr. L. Sankar Naidu	Junior Assistant
Mr. Y. Vamsi Krishna	Junior Assistant
Mr. Velakara Pavan Kumar	Junior Assistant

Computer Centre

Mrs. Aswini R.	Junior Technical Superintendent
Mr. G. Ramesh	Junior Technical Superintendent
Mr. M. Venkat Reddy	Junior Technical Superintendent
Mr. Senthil T.	Junior Technical Superintendent

Establishment

Mr. S. K. Sahoo	Deputy Registrar
Ms. Sheela Reddy	Assistant Registrar
Mr. L. Sankar Naidu	Junior Assistant
Mr. Y. Vamsi Krishna	Junior Assistant
Mr. Velakara Pavan Kumar	Junior Assistant

Engineering Unit

Mr. P.P. Chowdary	Senior Project Advisor
Mr. V.S.D.Raja	Project Advisor
Mr. RSK Chaitanya	Executive Engineer
Mr. Sadgurumoorthy Narni	Assistant Executive Engineer
Mr. Chaitanya Subba Reddy	Junior Engineer - Electrical
Mr. G. Venkata Subba Reddy	Horticulture Officer
Mr. Senthamil Selvan A.	Junior Engineer
Mr. R. Niranjan	Senior Technician
Mr. G. Ravi	Junior Technician
Mr. Muthu Karuppasamy.S.	Project Officer
Ms. ArunaSowdambigai	Project Associate

Health Centre

Dr. K. Venkata Ramarao	Medical Officer
Dr. Sruthi Kodidini	Medical Officer
Mr. J. Sesha Naidu	Staff Nurse
Ms. Pakala Nagamani	Staff Nurse
Mr. K Kishore Kumar	Staff Nurse

Hostels

Mr. A S Kalyana Ramakrishnan	Manager
Mr. Aari Kranti Kumar	Junior Executive
Mr. K. S. Janakiraman	Senior Project Assistant

Hindi Cell

Umesh Kumar Singh	Assistant Registrar

International and Alumni Affairs

N.B. Harshavardhan Reddy	International Officer

Purchase and Stores

Name	Designation
Mr. S. K. Sahoo	Deputy Registrar
Mr. Harikrishna Reddy	Assistant Registrar
Ramesh R	Assistant Registrar
Mr. N. Gnanasekhar	Junior Assistant
Mr. S. Anjaneyulu	Junior Assistant
Mrs. B. Silpa	Junior Assistant
Mr. A. Jayagopal	Junior Assistant
Saligari Akhil Rathna	Junior Assistant
Chalapaka Kanaka Venkata Mani Brahmam	Junior Assistant
ChintakrindiManicharan	Junior Assistant

Security

ChakravarthiKandregula	Security Officer

Library

Name	Designation
Mr. Shameer K. K.	Assistant Librarian
Mrs. Fathima Azra Fazal	Junior Technical Superintendent

Placement

Mr. Pushpak Kumar	Placement Officer

NSS

Mr. Mahesh Kumar Mulakala	NSS Program Officer

Sports

Dr. Iyappan I.	Physical Education Officer
Mr. Vasudeva Rao V.	Physical Training Instructor

2. Academic Programmes

Presently, the Institute offers admissions to the B. Tech programme in the following disciplines:

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

During the academic year 2021-22, the Institute launched M. Tech programmes in the areas of Microelectronics & VLSI in Electrical 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 (Signal Processing and Communications) and Mechanical Engineering (Design and Manufacturing) were started in the previous academic years. A total of 81 students were admitted to the M. Tech programme during the aforementioned academic session. The Institute also started M.Sc. programmes in Physics and Chemistry during the academic year 2020-21 while the M. Sc. in Mathematics and Statistics was launched a year before during the 2019-20 academic year. A total of 43 students have been admitted in the M. Sc. programmes. Further, with focus on research, 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. The present section of the report details about the student statistics and fellowships available.

2.1 STUDENT STATISTICS

B. Tech Programme

In the academic year 2021-22, 228 students joined the Institute against 237 sanctioned seats. Out of total of 228 students admitted, 179 were boys, and 49 were girls. IIT Tirupati takes pride in claiming to retain the maximum percentage (22%) of girl students admitted to the B. Tech programme of the Institute among all the IITs in the country. The overall percentage of the girl students registered under various programmes of the Institute is 22.5%. 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	
2017	45	10	-	-	29	3	17	1	6	3	114
2018	67	14	-	-	40	8	23	5	12	2	171**
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****

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

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

MS (Research) Programme

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

Year	Boys	Girls	Total
2017	10	1	11
2018	9	2	11
2019	8	2	10
2020	9	4	13
2021	8	7	15

PhD Programme

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

Year	Boys	Girls	Total
2018	23	12	35
2019	32	14	46
2020	46	17	63
2021	40	17	57

Table 2.6: Details of the students enrolled in the Institute

Programmes	Boys	Girls	Total
B. Tech	745	179	924
M. Tech	170	39	209
M.Sc.	59	36	95
MS (Research)	36	17	51
PhD	162	67	229
Total	**1172**	**336**	**1508**

2.2 FINANCIAL ASSISTANCE AVAILABLE

B.Tech Scholarship

The scholarships available to the students admitted to the B. Tech Programme in the Institute include Institute Merit-cum-Means (MCM) Scholarship, SC/ST Scholarship and Institute Free 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:

Sl.No.	Type of Scholarship	Details of Scholarship	No. of Students				
			2017	2018	2019	2020	2021
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	28	42	48	29	48

Sl.No.	Type of Scholarship	Details of Scholarship	No. of Students				
			2017	2018	2019	2020	2021
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	10	3	-	-	-
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	3	10	17	13	-
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	12	17	16	9	-

M.Sc Scholarship

Sl.No.	Type of Scholarship	Details of Scholarship	No. of Students		
			2019	2020	2021
1.	Merit Scholarship	▪ Rs. 1000/- per month and exemption of tuition fee	48	29	48
2.	Free Studentship	▪ Exemption of tuition fee	-	-	-
3.	50% Free Studentship	▪ Exemption of 50% tuition fee	17	13	-

Fellowship 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, and PhD scholars get a fellowship (HTRA) of Rs. 31,000/month for the first 2 years, and Rs. 35,000/month from the 3rd year.

3. Academic Infrastructure

Since its inception, improving academic infrastructure has been one of the primary goals of IIT Tirupati. In line with the same, the Institute created the necessary infrastructure, including classrooms, laboratories and central library on its temporary campus to meet the expectations and requirements of the students in the preliminary stage. The Institute has constructed a number of facilities on its permanent campus in Stages 1A and 1B of the first phase construction. All engineering laboratories, workshops, a multipurpose building (consisting of class rooms, library, computer centre, and health centre) was 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. Four well-equipped laboratories for Physics, Chemistry, Electrical Engineering and Computer Science and Engineering are functional on the temporary campus of the Institute. In addition, the temporary campus is being primarily used for office space for administration and faculty cabins. This section of the report provides a glimpse of the central facilities and laboratories created in the Institute.

3.1 CLASSROOMS

The temporary campus building of the Institute housed two 60-seater and two 30-seater classrooms with all the necessary furniture. On the permanent campus, classroom facilities functional include two 120-seater, four 60-seater, thirteen 40-seater and 25-seater classrooms along with one 60-seater classroom with studio type recording facility.

With the pandemic outbreak, the Institute has created online teaching infrastructure to facilitate the classes for the students from home. In this regard, the Institute has purchased 4K PTZ Cameras, and 4K Streaming switches for live streaming. In addition, 55-inch smart LED Display, Interactive Projector, 24-inch Wacom Display, Smart Digital Podium has been procured to facilitate online teaching.

All the classrooms are equipped with desktop computers with Internet access, projectors, screens and audio systems. The classrooms are appropriately treated for improved acoustics. In addition, a 120-seater electronic virtual classroom with video conferencing facilities with a 1 Gbps bandwidth connection to the National Knowledge Network (NKN) is already in use for the purpose of holding interactive classes and invited talks in the temporary campus building. The undergraduate classroom teaching shifted completely to the permanent campus during the 2019-20 year.

3.2 COMPUTING & NETWORK FACILITIES

The Computer Center (CC) caters to the students, faculty, and staff of IITT by providing various computational and IT related facilities including, but not limited to, internet connectivity through LAN and Wi-Fi, email, VPN, virtual machines, HPC, software licenses, website maintenance, and process automation. The computer center is responsible for the central computing and networking infrastructure at IITT. IITT has a state-of-the-art data center facility where computing, networking, and telecom infrastructure is hosted along with associated administrative and academic applications. The primary focus of the computer center is on high availability, scalability, automation, and security.

3.2.1 Data Centers

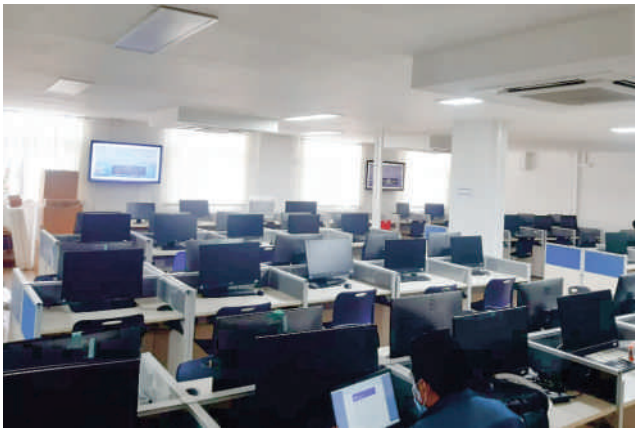
The Computer Center will soon move to the newly constructed Department Building-2 where there is a dedicated space allocated for two data centers. The first data center (DC1) will be located on the ground floor covering an area of 815 sft. It will host the computing infrastructure related to the ongoing research projects of the faculty members. The second data center (DC2) will be located in a space of size 2140 sqft on the first floor, and it will host the IT infrastructure related to the HPC, Institute cloud and the departments' servers. The DC2 can host as many as 40 smart racks and is expected to meet the space requirements for the next 10 years. As part of current expansions, it is planned to commission 10 Smart Racks in this state-of-the-art DC2 to host institute and departments' IT infrastructure, and also expand the institute virtualization and HPC infrastructure to meet the growing demands of the research activities.

The campus wide network is being set up currently on the permanent campus with an objective of a minimum of 10G backbone network connectivity for the campus from Day 1, and scalable to 25G in future. There are four zones on the campus, namely Academic zone, Residential zone, Hostel zone, and the existing South campus zone. Except the south campus zone, each zone is connected to the Data Center 2 (DC2) via a 144 core Optical Fibre Cable (OFC) ring. The south campus zone is connected to DC2 via a 48 core OFC ring. The core capacity of OFCs being laid is sufficiently large enough to cater the connectivity needs of the future expansions for the next 20-25 years. The networking infrastructure being set up aims at enabling fault tolerant connectivity for critical infrastructure through High Availability (HA) functionality. Further, it offers wireless connectivity with the latest wifi technology (WiFi6) catering to the needs of both high user density, and high end-to-end bandwidth scenarios. To enhance the bandwidth and offer redundant connectivity, in addition to the existing 1 Gbps primary Internet link, an additional 1 Gbps internet link is being set up.

3.2.2 Computer Laboratories

The computers vertical is responsible for managing the hardware such as the computers, printers, audio, video equipment. The team is involved in maintaining the computer laboratories of CC, classroom AV setup, video conferencing facilities, printer services, and desktop/laptop computers issued to the faculty and staff members. The team also provides support to organise institute-wide events, workshops, conferences, talks, recruitment interviews, etc.

The Computer Center currently has three laboratories. In addition, three more computer labs are being set up in the Department Building - 2 each with a capacity of 65, 58 and 28 respectively, which lead to the combined seating capacity of 250 computers across all the computer labs. The new CC labs being set up will have state-of-the-art audio and video infrastructure to conduct the laboratory sessions, online demonstrations, and competitive exams etc.



A view of CC Laboratories

3.2.3 Networking Infrastructure

The Institute has a 1 Gbps internet ILL connection from NKN (National Knowledge Network). In addition, a 100 Mbps backup ILL is also available to connect crucial IT infrastructure. The total bandwidth is shared between the temporary campus and the permanent campus. The temporary campus and nearby hostels, guest houses are connected through wireless Point-to-Point (P2P) connection. Our temporary campus is equipped with 1G network infrastructure, and transit is equipped with 10G passive network infrastructure. The academic and administrative buildings are provided with wired and Wi-Fi-based wireless connectivity, and all hostels are equipped with Wi-Fi based connectivity.

The CC provides Internet services to all the users. The network setup includes 2 Cisco core switches - 3850 and 9407, Cisco catalyst layer two switches, Juniper router, Sophos-330 XG firewall. In the permanent campus, all the Cisco wireless routers are integrated with Cisco wireless controller Cisco 5520. Each building in the permanent campus is connected with a 12 core OFC connection. Users can avail internet facility using either of the following two channels:

1. Wired Internet Services are made available to all the eligible users across the IITT campus.
2. Wireless Internet Services: IITT campus is also enabled with Wi-Fi. The Wi-Fi services are made available to all the academic and administrative buildings and the student hostels.

The entire network is monitored and managed through network management software. Perimeter-level security is managed through a firewall solution from Sophos.

The vertical also takes care of analog and digital telephony services. The services are being provided using the Opens cape X8 System. The vertical also oversees the surveillance system, which covers all the important places in and around the campus for monitoring and recording the footage in the Institute server.

In addition, Edu roam service that offers seamless internet connectivity to students, researchers, and staff is available in the institute.

Sophos-330 XG firewall and network rack

IP PBX Setup

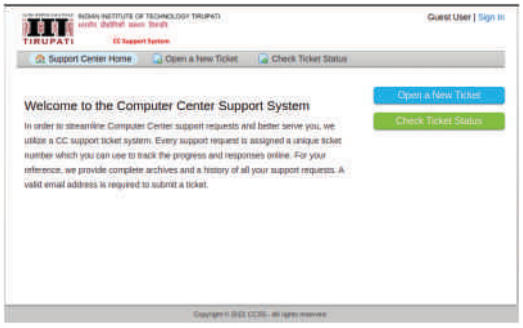
3.2.4 Software Vertical

The software vertical oversees the institute's software procurement, installation, and maintenance. It supports the institute with different licensed software to avoid pirated or unlicensed versions of the software. As part of the policy, the institute provides essential software to faculty and staff such as Windows OS, PDF Editor, Microsoft Apps, and Kaspersky Antivirus, and Microsoft Apps for Students. In addition, CC provides the software licenses to software such as 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.

In addition, the vertical develops and maintains the websites and portals, including but not limited to institute website, department websites, intranet portal, admissions, course proposal, CSRC, feedback, services, recruitment etc. The vertical also looks after the institutional email services to the institute community.

3.2.5 Ticketing System

To timely serve various service requests from the stakeholders, the Computer Center has implemented a ticketing system - CC Support System (ccss.iittp.ac.in).



Software Support System

3.2.6 High Performance Computing and Cloud Infrastructure

The CC-Systems vertical offers cloud computing and HPC services to the users of the institute. A Private Cloud Data Centre has been established to facilitate the provisioning of Infrastructure as a Service (IaaS) by offering customized virtual servers/machines for various departments requiring heavy to moderate computing infrastructure with 24x7 operational availability. The data center is built using the VMware virtualization platform on HP, Supermicro servers and HP 3PAR SAN storage.

The Computer Centre has set up an HPC cluster, Lotus, to carry out research and academic activities. The cluster is built using Supermicro high-end servers, storage and Infiniband Network along with required software components. The lotus cluster uses PBS Pro as a job scheduler and has 24 CPU compute nodes + 2 GPU nodes. Each node has 24 cores and 96 GB RAM. Total available disk space in /home and /storage is 1.3 TB and 100 TB, respectively. Currently, 10 GB in /home and 2 TB in /storage are allocated to each user. The cluster has seven queues - cpu15d, cpu7d, cpu3d, cpu2d, cpu1d, cpu1h, and gpu4d, with appropriate resources grouped together.

Smart Racks with HPC and GPU clusters

VMware virtualization Setup

Racks hosting Project Servers/Workstations

Also, the CC-Systems vertical has recently set up a GPU cluster, Orchid, using the unused workstations and servers to support the ongoing research activities. The orchid cluster currently has one master node and 4 GPU nodes. Each node has 20 CPU cores, 128 GB memory, and 3 Nvidia GeForce GTX 1080Ti 11GB GPUs totaling 80 CPU cores, 512GB RAM, and 12 GPUs. We plan to increase the nodes in the coming days. The orchid cluster uses the PBS Pro as the job scheduler. Currently, there is one queue with a maximum wall time of 10 days.

CC-Systems vertical also hosts the servers/ workstations/compute setup procured using project funding. It takes responsibility in providing necessary infrastructure such as rack space, network connections and comfort cooling.

3.2.7 Workflow and Office Automation

The Institute aims to achieve operational efficiency, transparency and accountability by enabling its activities (workflows) using appropriate information technology and process documentation. This vertical takes care of all the activities related to the workflow system. As per Government of India General Financial Rules (GFR) and rules of the Institute, recently an IT firm has been identified to implement the workflow system for IITT. In this process, it has zeroed in on twelve modules, which includes a. Finance, Accounts, and Audit, b. Stores, purchase and Inventory Management, c. Human Resources, d. Academics, e. Placements, Student Affairs, Hostel Management, f. Health Centre, g. Library Management, h. Engineering Unit, i. International and Alumni Affairs, j. System Administration and Integration, k. General Administration, and l. SRC-Projects and CEP. The CC is taking all necessary steps to commission the workflow system in the next few months in the Institute.

3.3 SCIENCE LABORATORIES

For the first-year undergraduate, postgraduate and PhD students, Physics and Chemistry laboratories have been developed with the state-of-the-art facilities. During the year 2021-22, 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 experiences 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 established in 2020 equipped with modern facilities for conducting MSc practical course, Master's project work and the PhD research.

Major equipment available in the chemistry laboratory

- Computing Facility: 7 Workstations each having Dual Socket with 20 processors & 128 GB RAM, running at a clock-speed of 3.1 GHz.
- 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
- Freezer (-20 °C)
- Freezer (-80 °C)
- Industrial Refrigerator (2 nos, 0 °C)
- Syringe Infusion Pump
- Type I & III Water Purifying System
- CO_2 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

Chemistry Lab

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 and computational physics are being developed with financial support from the Institute and external agencies.

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.

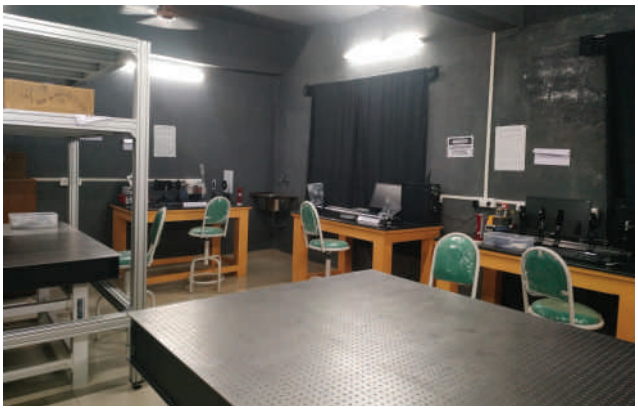
The available equipment are as follows:

- 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

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.

Physics Laboratory I: View of arrangement of various general physics experiments

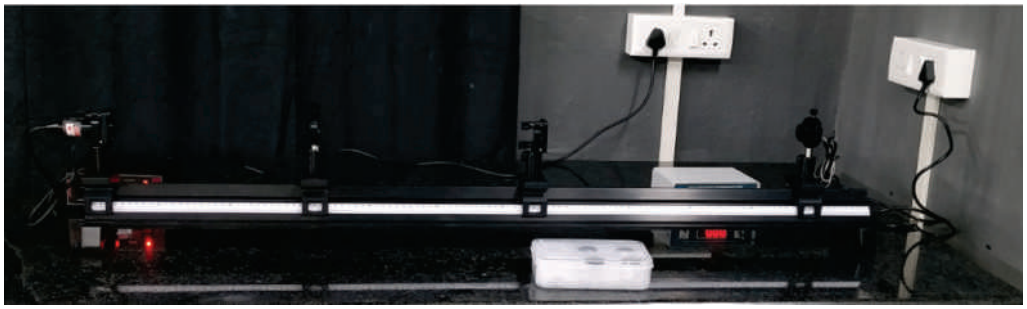


PG Physics Lab II: View of the dark room housing the optics and atomic and molecular physics experiments

Major Equipment Installed

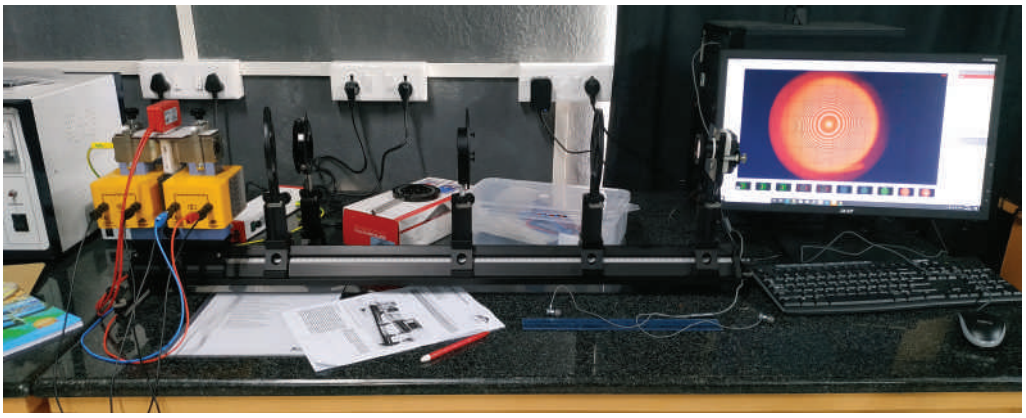
The following are the major equipment installed:

1. Single Slit Diffraction and Heisenberg's Uncertainty Principle Setup consists of a diode laser, and photodetector mounted on a sliding rail. It is used to study diffraction patterns from various single slits. Slits widths can be calculated by analysing the patterns. The system is equipped with a micrometer translation stage to control the distances between various optical elements. The equipment can also be used to verify the uncertainty principle.



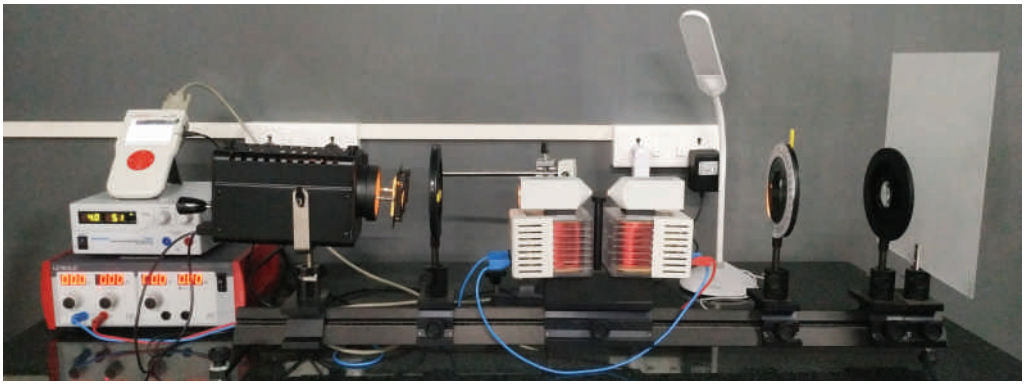
Single slit diffraction setup

2. Zeeman's effect apparatus consists of a Fabry-Perot etalon, a mercury lamp, an electromagnet, and a photodetector mounted on a sliding rail. The magnetic field can be varied, and the splitting of mercury atomic levels due to Zeeman's effect can be observed. The setup can be used to determine the polarisation state of the individual Zeeman components.



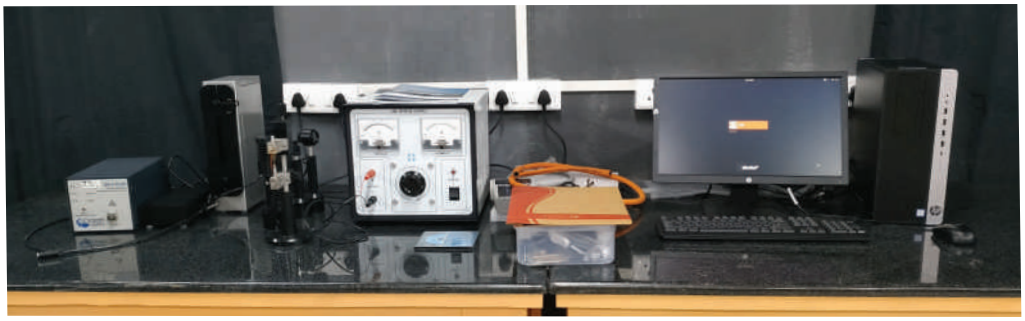
Zeeman effect apparatus

3. Faraday Effect setup



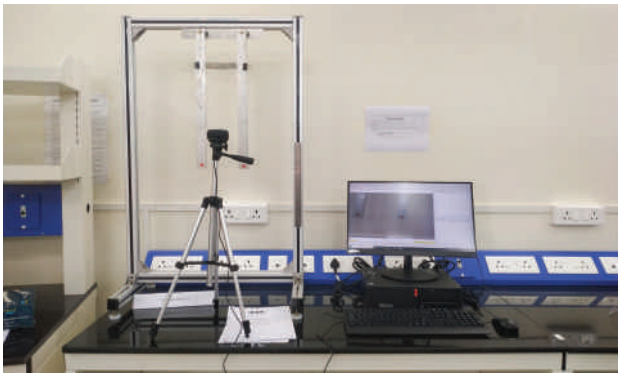
Faraday Effect setup

4.UV-VIS Spectroscopy of atoms and molecules



UV-VIS emission and absorption spectroscopy of gas and liquid phase systems

5.Coupled Pendulum set up

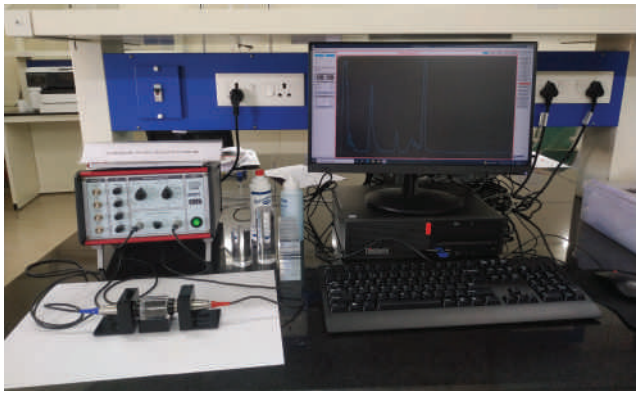


Coupled Pendulum setup along with a high-resolution camera

6. Millikan's Oil Drop apparatus

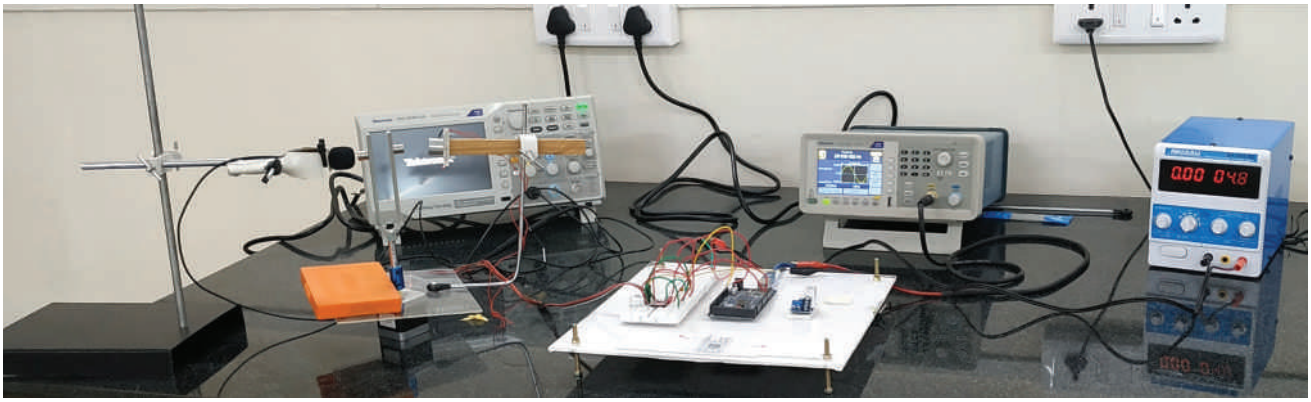
Millikan's Oil Drop apparatus to determine the charge of an electron

7.Ultrasonic waves in solids



Ultrasonic waves in solids apparatus with various acrylic solids

8.Radiation from Tuning Fork

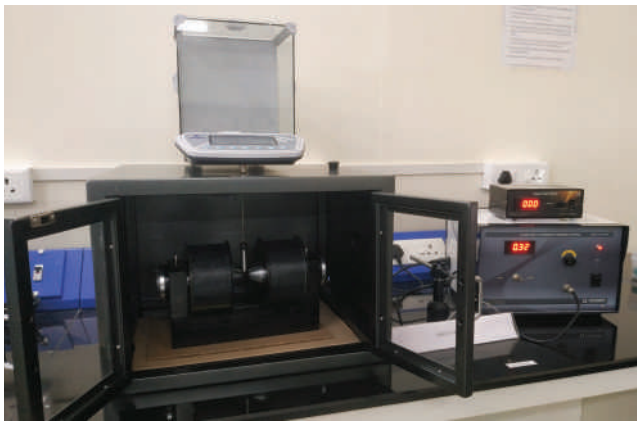


Radiation from Tuning Fork setup

9.Hall Effect Apparatus

Hall effect apparatus for metals

10.Gouy's Method for Magnetic Susceptibility



Gouy's balance for measurement of the Magnetic Susceptibility

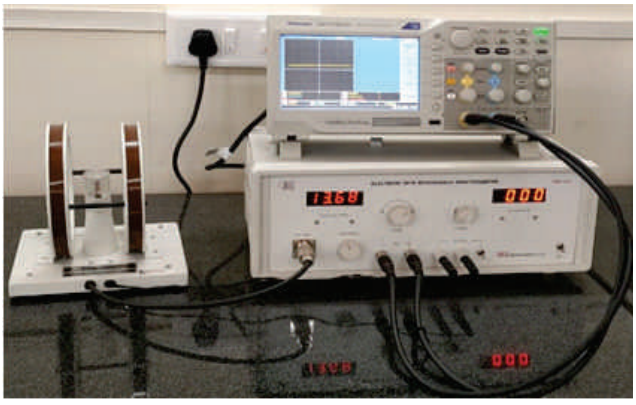
11. Apparatus to measure heat capacity of solids

Apparatus to measure the heat capacity

12. Electron Spin Resonance (ESR):

The setup consists of an RF oscillator, a Helmholtz coil, a digital storage oscilloscope and the sample - Diphenyl Picryl Hydrazyl (DPPH).

The Electron Spin Resonance (ESR) setup with Helmholtz coil and digital oscilloscope

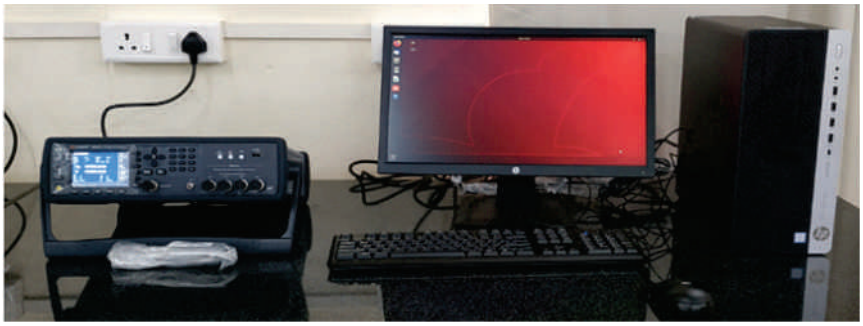


13. Ferromagnetic Hysteresis Apparatus:

The setup consists of transformer coils with a ferromagnetic core and a power supply and can be used to study the ferromagnetic hysteresis curve.

Ferromagnetic hysteresis apparatus

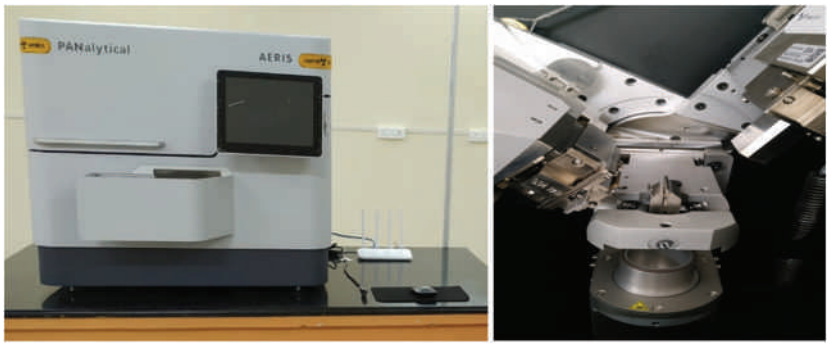
14. LCR Meter for the dielectric constant measurement



LCR meter for the dielectric constant measurement

Advanced Physics Laboratory

1. Benchtop X-ray Diffraction (XRD): A benchtop X-ray diffractometer (XRD) is used to characterise the structural properties of different varieties of solid crystalline materials. It is a widely used technique and is required by various departments. The instrument has been installed at the Advanced Physics Laboratory. It serves both the purposes of teaching and research for our Institution's internal users and opens the services for external users from other academic institutions and industries. It measures the X-ray diffraction pattern for the different varieties of materials such as single-crystalline, poly-crystalline, nano-crystalline solid samples. The measurement can be carried from the 2 theta angles from 0° to 90° with a maximum resolution of 0.005°. X'Pert HighScore Plus software can be used to analyse the data with access to the crystallographic open database (COD). It has a 600 W copper X-ray source and is capable of providing large intensities. Its fast scan mode drastically reduces data acquisition time without compromising data quality.



The Benchtop Aeris Panalytical X-ray diffractometer (Left), inner view of the diffractometer having the X- ray source, sample stage and detector (Right)

3.4 CENTRAL WORKSHOP

The Central Workshop is located in the Lab-2 building on the permanent 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. The Central Workshop consists of the following sections:

1. Manual Injection moulding M/c
2. Air compressor
3. Air Dyer
4. Pneumatic training kit
5. Electro- Pneumatic training kit
6. Hydraulic training kit
7. Electro- Pneumatic training kit
8. Hydraulic training kit
9. Welding Simulator
10. Switch Module
11. Lamp Module
12. Tube light module
13. MCB & ELCB Module
14. Conductor module
15. OLR Module
16. Push button Module
17. Welding

In the first year of the B. Tech programme, workshop training sessions for all Engineering branches are held in the Central Workshop. In the odd semester, the Central Workshop hosts various machining processes like Lathe, Milling, carpentry, Sheet Metal, Foundry and Fitting for the students. While in the even semester, the students undergo training in basics of Electrical, Electronics, Instrumentation and Communication. The workshop also has Pneumatics and Hydraulics training kits and welding simulator to train the students. The Central Workshop is also equipped with various power tools like Sander, Zig saw, Planar and power saw. The students learn the welding process through a Welding simulator where students can feel the actual welding through the simulation before they actually perform it. This helps the students to practice welding many times without wasting the electrode as well as self-learning techniques. The Arc welding facility in the Central Workshop is equipped with a welding booth where the booth is isolated. There is an in-built vacuum system, which sucks the welding smoke and provides the Workshop environment pollution-free. The safety of the students is given a high priority. Therefore, while conducting the different experiments, machinery work and welding processes, safety goggles, masks, leather apron, face shield and leather gloves are provided. The Central workshop facilities are also by utilised various scholars for their research works on machining and fabrication of their setup.

A View of Carpentry & Fitting Shop, Central Workshop

A View of Pneumatic & Hydraulic Training Kit

A View of Lathe Machines, Central Workshop

A View of Milling Machines, Central Workshop

3.5 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 2021-22 are hereunder:

3.5.1 Chemical Engineering Laboratories

The first phase of Laboratories for B. Tech/MS & Ph.D. programs in the Department of Chemical Engineering at IIT Tirupati was inaugurated by the Institute's Director Prof. K. N. Satyanarayana in 2022. The event was graced by eminent professors of Chemical Engineering like Prof. K. Krishnaiah (IIT Madras & IIT Tirupati), Prof. D. P. Rao (IIT Delhi) and Prof. T. Renganathan (IIT Madras). It was organized by the faculty, staff and students of the Chemical Engineering Department headed by Dr. T. Sunil Kumar.

3.5.1.1 Chemical Engineering Lab 1

This laboratory is equipped with fluid mechanics, heat transfer, process control and computational resources. The equipment housed in the lab include Double Pipe Heat Exchanger, Shell and Tube Heat Exchanger, Packed & Fluidized bed, Terminal Settling Velocity Apparatus, Heat conduction in composite slab, Heat conduction in Thin Rods, U-tube manometer dynamics apparatus and Computers of high-end processing speed for CFD simulations.

3.5.1.2 Chemical Engineering Lab - 2

Equipped with Electrochemical Workstation, Light Microscope, Microfluidics Starter Kit, Digital Viscometer, UV-Vis Spectrophotometer, Centrifuge, Automatic Rotovap System, Hot air Oven, Shakers, Assorted glassware for experiments, pH meter, Liquid conductivity meter, Moisture analyzer, Digital weighing balances, Water Purifier, Gel Electrophoresis System and Computers of high processing speed for data processing. The department also produces high purity oxygen in their mini oxygen plant.

3.5.2 Civil and Environmental Engineering Laboratories

The Civil 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. The following are laboratories that facilitate the teaching 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

3.5.2.1 Structural 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

A view of table top structural Engg. Lab

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

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.

High capacity Electro-mechanical UTM in Structural Engg lab

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.

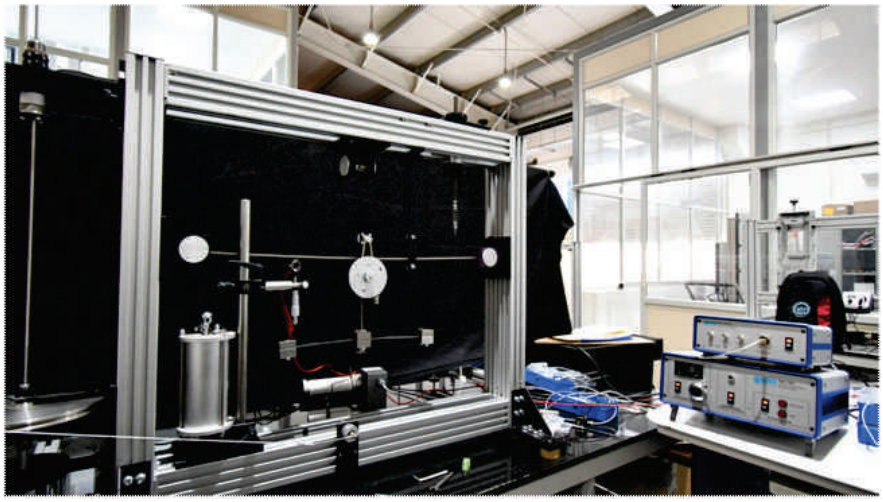
1. A view of Electromechanical 5kN Actuator mounted in load frame
2. 2.5kN Electromechanical UTM

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
- 350 kN bending test frame.
- 15 kN & 500 kN frame for mortar test

Family of Compressive Testing Machine



Universal Vibration Apparatus

3.5.2.2 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 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

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

3.5.2.3 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, etc.

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

A) *2000 kN Load Controlled Compression Testing Machine*

B) *Automated aggregate bin*

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

3.5.2.4 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.

▲ *Automated direct shear apparatus*

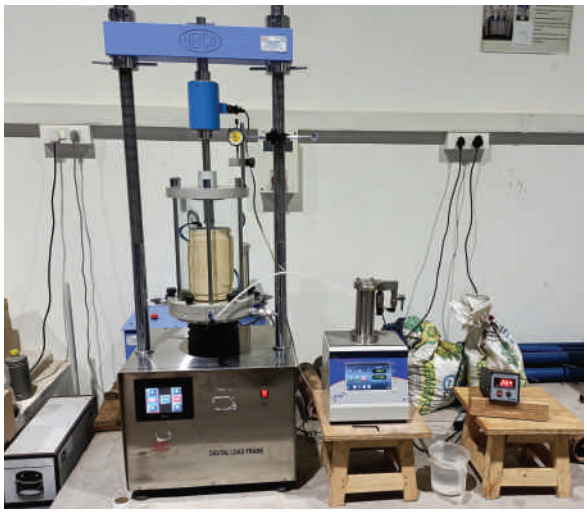
◂◂ *3-gang Oedometer setup*

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.

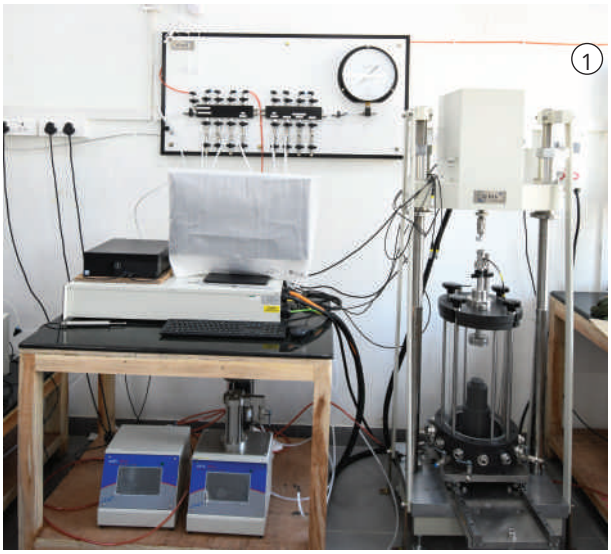
Automated stress-path static triaxial apparatus with permeability measurement

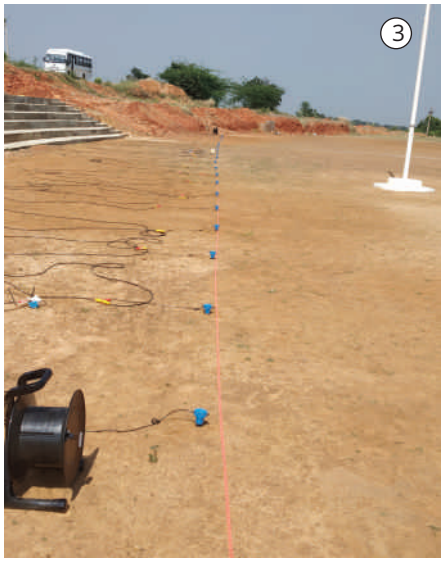


100 kN load frame for large size triaxial testing

Automated Cyclic Triaxial Equipment

- to determine the maximum dry density and optimum moisture content of soils for ear





1. Automated electro-mechanical 20 kN actuator cyclic triaxial apparatus with bender element facility
2. *Automated double-wall chamber unsaturated triaxial apparatus with 50 kN load frame*
3. *MASW setup with 24-channel seismograph to measure in-situ shear wave velocity*

3.5.2.5 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 offer engineering solutions to address diverse industrially and socially relevant environmental problems.

Environmental Engineering Laboratories

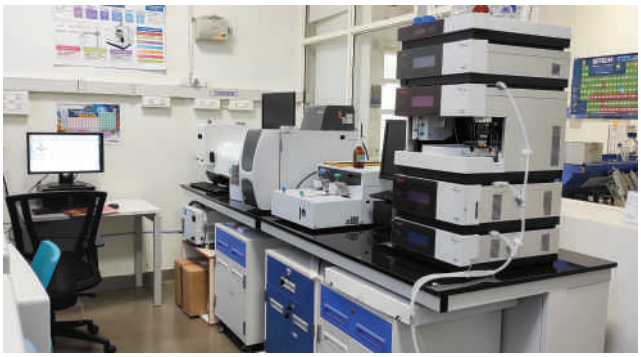
Advanced Instrumentation Facility

- Air and Water Quality Laboratory
- Microbiology Laboratory

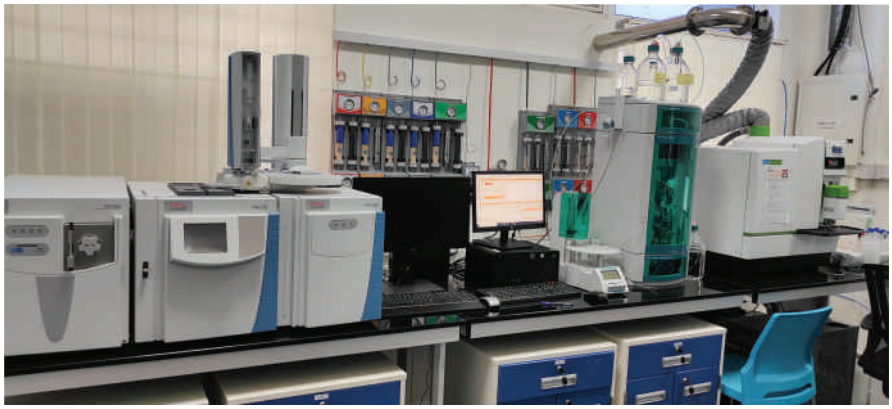
A View of Environmental Engineering Wet Lab

Major Analytical Instrumentation Facilities

- UV/Vis Spectrophotometer
- Fluorescence Spectrophotometer
- Inductively Coupled Plasma Mass Spectrometer (ICP-MS)
- Gas Chromatography – Triple Quadrupole Mass Spectroscopy (GCMS- MS)
- Single zone tube furnace
- High-Performance Liquid Chromatography
- Ion Chromatography
- Total organic carbon analyser with a solid sample module
- Digital storage oscilloscope
- FT-IR
- Fluorescence microscope
- Respirable dust PM10 sampler
- Fine particulate PM 2.5



A View of Environmental Engineering Wet Lab



3.5.1.6 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.

View of few equipment in Hydraulics & Water Resources Lab

Rainfall Simulator

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.

3.5.2.7 Surveying Laboratory

The Surveying Laboratory is equipped with a wide range of instruments available for conducting the 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.

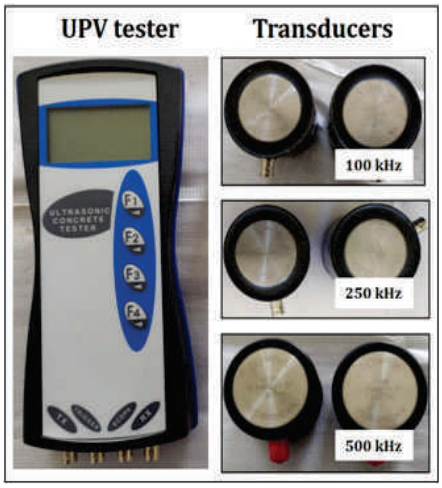
3.5.2.8 Seismological Observatory Station

The observatory station is established by the National Center 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.

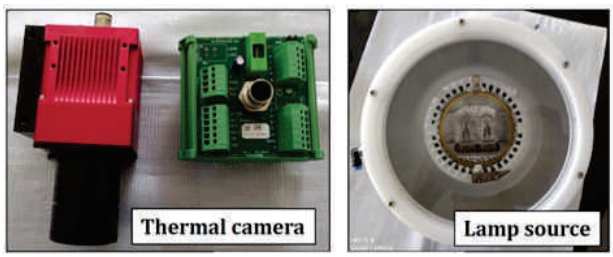
Few Glimpses of the Seismological Observatory Station Setup

3.5.2.9 Non-destructive Testing 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.



Ultrasonic pulse velocity



Infrared thermography

Laser vibrometer

Oscilloscope

3.5.3 Electrical Engineering Laboratory

The Department of Electrical Engineering at IIT Tirupati has set up state-of-the-art lab facilities to provide practical exposure to students. Through these laboratories, over the course of their B. Tech curriculum, students get exposed to various aspects of Electronics, Signal Processing and Communication, Power Systems, and Control and Instrumentation, providing an overall exposure to the broad area of Electrical Engineering. The details of the specific laboratories are as follows:

3.5.3.1 Signal Processing Laboratory

Signal Processing Laboratory is used to demonstrate the principles learned in the following courses, viz., digital signal processing, machine learning, wireless communication, medical imaging, etc. This laboratory is equipped with the following scientific equipment:

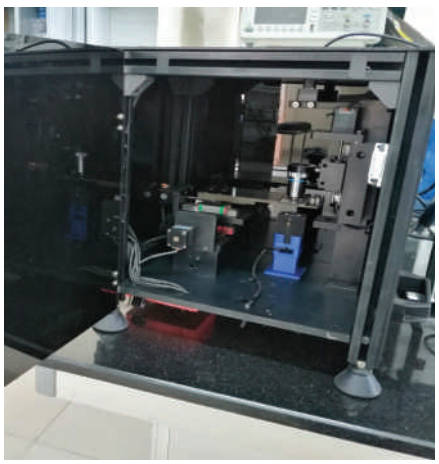
The Signal Processing lab is used for conducting digital signal processing, machine learning, wireless communication, medical imaging and many more core/elective courses. The key equipment in this lab are:

1. 30 GPU Workstations with four RTX 2080 Ti Graphics Cards in each
2. 3D fringe projection Profilometry System
3. Cytocube Model-R, portable slide profiler with software
4. GigE Vision and Stereo Vision Cameras
5. 20 ADSP KIT ADZS-SC589-EZLITE sponsored by ADI
6. 12 TMS320C6748 by Texas Instruments

Asus Z10PE-D8 Workstations (Available - 26)

Supermicro Workstations (Available - 4)

3D Fringe Projection System



Cytocube Model-R portable slide profiler

3.5.3.2 Advanced Electrical Engineering Laboratory

The Advanced Electrical Engineering Laboratory is a multidisciplinary laboratory for guiding final year Electrical Engineering students. The laboratory is equipped with equipment to introduce students to advanced topics in interdisciplinary engineering areas such as Internet of Things, Robotics, Cloud Computing, Advanced Electro-hydraulics, Advanced Electro-Pneumatics, and Programmable controllers for industrial automation, Renewable Energy systems (Solar and Wind).

3.5.3.3 Machines Laboratory

The Electrical Machines laboratory is equipped with various electrical machines (DC and synchronous machines), transformers (single-phase and three-phase) along with resistive load bank, rectifiers, DC/AC drives to experimentally demonstrate the working principle of these machines to teach our undergraduate students as well to conduct the research in this area.

3.5.3.4 Integrated Electronics Laboratory

The Integrated Electronics laboratory is well equipped with 30 workbenches consisting of a Tektronix function generator, Digital Storage Oscilloscope, a power supply, and a computer. This facility is used for hardware and software laboratory courses for both Electrical and Computer Science Engineering students starting from the third semester along with all the five branches in the 1st year as a part of workshop practice. This laboratory is equipped with all the basic electronics equipment required for B.Tech. courses like mixed-signal oscilloscopes, multimeters, LCR meters along with three National Instruments Engineering Laboratory Virtual Instrumentation Suite ELVIS III boards and Analog System Lab Pro-Development kits developed by Texas Instruments. In addition, the department has also procured FPGA boards (Zynq-Zybo 7000 series board) which can be used for both basic B.Tech introductory laboratory courses and advanced VLSI design courses and projects. The laboratory also has software tools like OrCAD schematic capture and PSPICE, which are very helpful in analysing transistor and OpAmp amplifiers characteristics, DC analysis, AC analysis and transient analysis of any circuit (either passive or active).

3.5.3.5 Semiconductor Devices Laboratory

Semiconductor devices lab at IIT Tirupati under the EE department is being established with an aim to complement the existing solid-state devices related courses. The lab recently got equipped with the following instruments:

Thermal evaporator (for metals and organics)

Variable temperature Hall measurement system

Alpha spectrometer

In addition, the instruments available in the lab are the following:

Substrate Cleaning: Class 100 compatible Polypropylene wet chemical bench, Ultrasonicator, Programmable hot plate with a magnetic stirrer, Oven (up to 250 C) and UV/Ozone cleaner

Thin Film deposition: DC/RF sputtering unit (chiller included), Spin-coating unit

Electrical/Optical characterisation: Semiconductor Parameter Analyser with High-power (up to 1100 V) SMU, Mercury Probe, Optical microscope

Bonding & Packaging: Manual wire bonder

These equipment sets are being used to conduct research in wide bandgap semiconductor devices and thin-film sensors collaborating with other R&D labs such as CSIR-CEERI, Pilani.

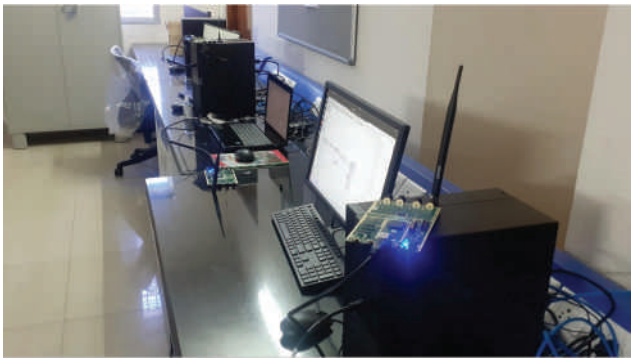
3.5.3.6 Wireless Communication and Network Laboratory

The Wireless Communicate and Network (WCN) Lab at IIT Tirupati was established in the summer of 2020. The WCN lab is equipped with Universal Software Radio Peripheral - Software Defined Radio (USRP-SDR) kit and high-end computing facilities to support academic requirements and to carry out research work. The current facilities are being used to carry out advanced experiments for the graduate level. Besides teaching, these sets of equipment are also being used for research and development purposes. The current facilities can be used to carry advanced research for present and next-generation wireless networks such as 5G and communication beyond 5G.

Wireless Communication and Network (WCN) Laboratory

Major equipment procured in this financial year are as follows:

1. USRP B210 SDR Kit (10 quantities)
2. USRP N210 SDR Kit (4 quantities)
3. DELL Optiplex 7070 Desktop (6 quantities)
4. DELL Optiplex 5070 Desktop (7 quantities)
5. Dell Optiplex 5080 Desktop (3 quantities)



USRP-SDR Kit Setup with Desktop

A View of the Lab: Equipped with high end computing facilities and SDR Kit

3.5.1 Mechanical Engineering Laboratories

The mechanical engineering laboratories cater to the practical experience provided to undergraduate and postgraduate students and 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. The laboratories which have been developed in the year 2021-2022 are hereunder:

3.5.4.1 Applied Mechanics Laboratory

In the applied mechanics laboratory, the students perform experiments related to basic principles of solid mechanics, fluid mechanics, and dynamics. Students from both Civil and Mechanical Engineering departments conduct their experiments on these equipment 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.

3.5.4.1.1 Fluid Mechanics Laboratory

The Fluid Mechanics Laboratory is designed to fortify students' theoretical knowledge which they learn in Fluid mechanics course. 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

3.5.4.1.2 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.

Rockwell Hardness Tester

Thick Cylinders

3.5.4.1.3 Dynamics Laboratory

Dynamics laboratory consists of bearing friction setup, a setup for determining the dynamic forces in a reciprocating engine, gyroscope, flywheel, a setup of a disc rolling on an inclined plane, worm and wheel apparatus.

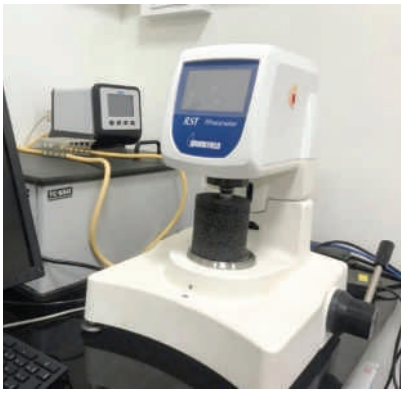
3.5.4.2 Applied Thermal Engineering Laboratory:

Applied Thermal Engineering Laboratory has been set up to provide hands-on experience to students on thermal engineering concepts such as Internal Combustion Engines, refrigeration and air conditioning, fuel property measurements. The laboratory consists of the following experimental setups:

1) Two-cylinder CRDi Diesel engine setup
2) Single cylinder petrol engine setup with open ECU
3) Bomb calorimeter
4) Vapour compression refrigeration system
5) Air conditioning trainer setup
6) Dunuoy Ring tensiometer
7) Rheometer

Two-cylinder CRDi Diesel engine setup

Bomb calorimeter



Rheometer

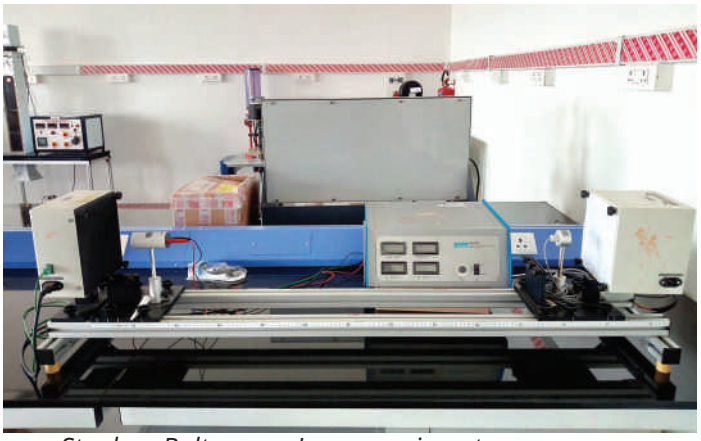
Gas Sorption Analyser

3.5.4.2.1 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 students' 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



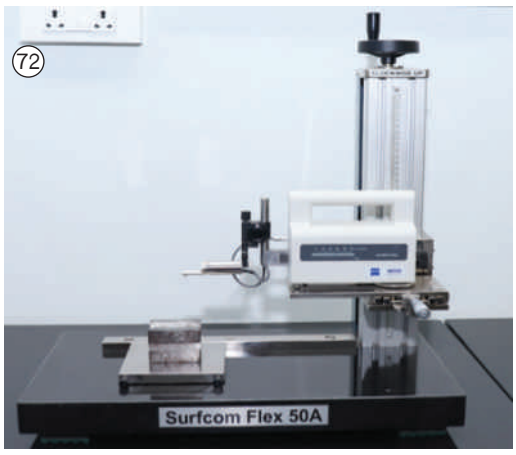
Stephen Boltzmann Law experiment

Thermal conductivity measurement setup

3.5.4.3 Metrology Laboratory:

Metrology Laboratory 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 basic measurement tools (e.g., Vernier, micrometer etc.) to advanced equipment (e.g., 3D scanner, CMM) to meet the present-day Industry requirements. Also, we had equipment like Autocollimator, height gauge, surface roughness tester. 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 students' theoretical knowledge, which they learned in the Metrology course. The laboratory consists of the following experimental setups.



Surface Roughness Tester

Digital Height gauge

3.5.4.4 Machine Tools Laboratory

Machine tools laboratory has been set up for the students to perform experiments related to the advanced machining process. This laboratory has advanced machines like CNC Lathe, CNC Milling, CNC Wire cut EDM, CNC milling, CNC lathe and 3D Printer. 3D Printer lab has been set up so that the students can give CNC Program through Master Cam, AutoCAD Software.

The Machine Tools Laboratory is designed to strengthen students' theoretical knowledge, which they learned in the Manufacturing course. The laboratory consists of the following experimental setups.

1) 3D PRINTER
2) CNC WIRE CUT EDM
3) CNC MILLING
4) CNC LATHE

CNC WIRE CUT EDM

CNC MILLING

3.5.4.5 Joining and Metallography (JAM) Laboratory

JAM lab is developed to train undergraduate and postgraduate students on the latest joining processes and metallographic studies. JAM lab is being used actively by five Ph.D. and four M. Tech. students who are pursuing their research there. The JAM lab consists of the below-mentioned equipment:

A view of joining and metallography (JAM) laboratory

S.No	Joining facilities	Metallography facilities
1	Shielded Metal Arc welding process	Precision cutting machine
2	Gas Tungsten Arc welding process	Hot mounting press
3	Robotic Gas metal arc welding process	Double disc polishing machine
4	Submerged arc welding process	Single disc automatic polishing machine
5	Down drought tables	Stereomicroscope
6		Upright metallurgical microscope
7		Heat treatment furnace (1200^{0}C)
8		Heat treatment furnace (1600^{0}C)
9		Melting furnace (1500^{0}C)

3.5.4.6 Spray 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 etc. The Spray research lab consists of the below mentioned list of equipment:

S. No	Facility/ Equipment
1	High Imaging systems (Photron SAZ and Photron SA1.1) including long distance microscope and lenses
2	Particle Image Velocimetry Setup (TSI)
3	Spraytec from Malvern with 0.1 to 900 um measurement range
4	High pressure liquid and gas supply systems with flow controllers (max. 3 MPa)
5	High pressure high temperature spray chamber (up to 60 bar and 800K)
6	Spray tower with optical access
7	Schlieren Imaging setup

3.5.3.7 Foundry Laboratory:

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 materials development such as alloys, composites, metal foams, composite foams and high entropy alloys etc. Foundry 4.0 Student Activity Center (F4SAC) was also started in association with Indian Institute of Foundrymen (IIF) Chennai and Andhra Chapter on 9th October 2021.

3.5.3.8 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:

1. Z-CAST PRO Stress

o Flow Simulation

o Solidification Simulation

o Heat Stress Simulation

2. 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 and higher accuracy results. AFDEx is a general-purpose metal forming simulator, which meets the requirements of intelligent bulk-metal-forming (BMF) simulation (BMFS**).**

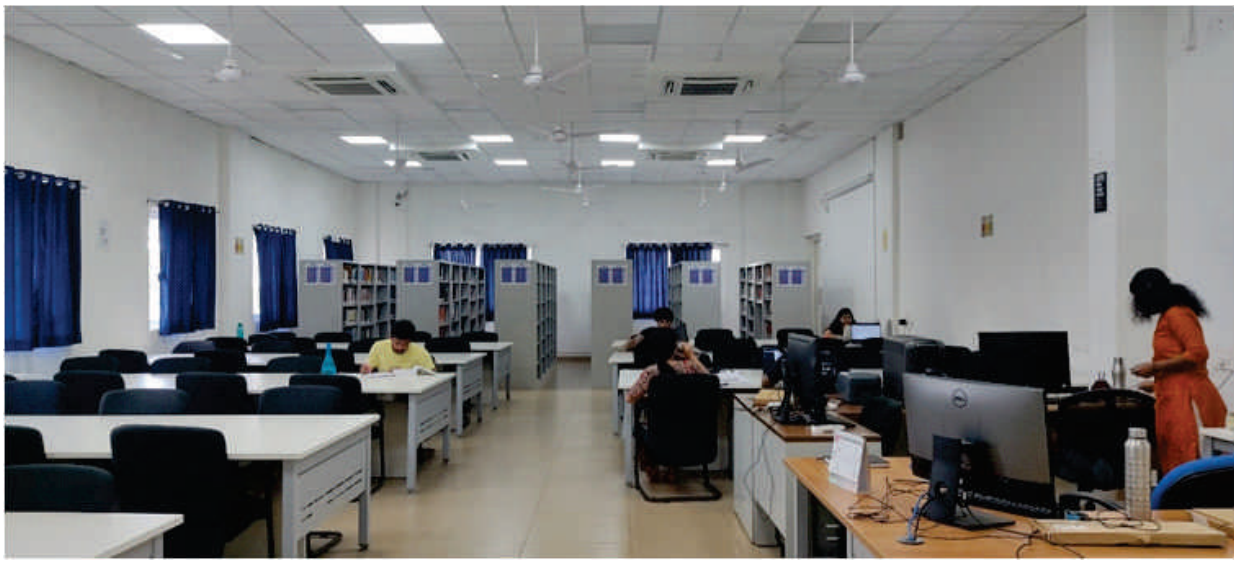
3. VCNC PRO – CNC Simulation Software

4. QFORM Software

QForm is a professional engineering software for simulation, analysis and optimization 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.

3.6 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 towards supporting both the educational and research functions of the institution.



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 uses KOHA for library management and daily operations. The OPAC allows users to search for books and check their transaction details. The library has RFID technology to enhance circulation services and enable users to issue, return, and renew themselves. 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 plagiarism-checking software (Urkund/Ouriginal). 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.

During this period, the central library added 489 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	8190
CD-ROM	80
Newspapers (Print)	06
e-Books	592
e-Journals	8000+
Print Journals	10+
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 in South India.

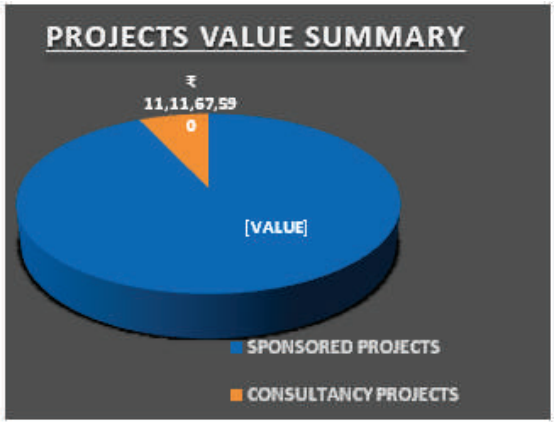
4. Sponsored Research Projects and Industrial Consultancies

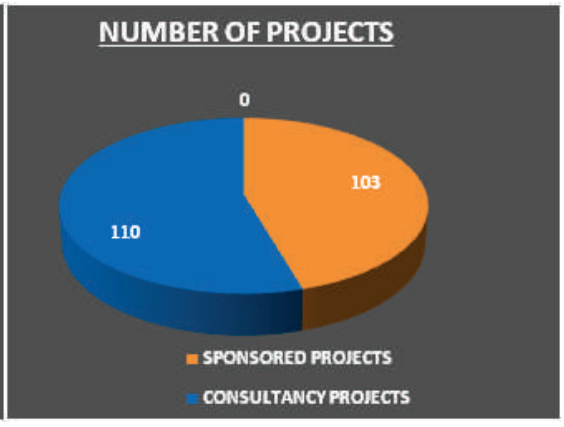
4.1 CENTRE FOR SPONSORED RESEARCH AND CONSULTANCY

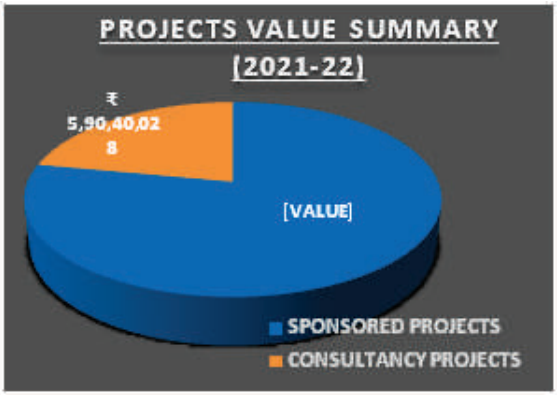
IIT Tirupati right from its establishment in 2015 initiated interaction with industries, research organisations, other academic institutions and governmental agencies for taking up the sponsored research projects and consultancies. To promote sponsored research, industrial consultancy, and innovations at the Institute,a dedicated centre called Centre for Sponsored Research and Consultancy (CSRC) was set up in the year 2017. This Centre is responsible for the promotion, facilitation, coordination, and adminisration of all the research andinnovation related activities.

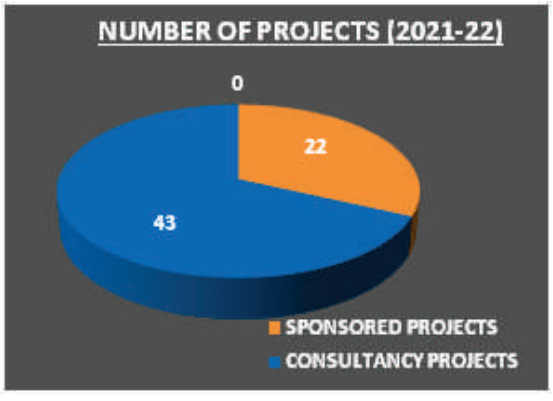
4.1.1 Sponsored Research Project and Industrial Consultancy

Faculty members of the Institute are actively engaged in research carrying out sponsored projects and industrial consultancies. A total of 103sponsored research projects and 110 industrial consultancies worth Rs. 160.00 crores have been received by the Centre for Sponsored Research and Consultancy sincethe inception. During the year 2021-22, the Centre received 22 sponsored research projects worth Rs. 21.00 crore (approx.)and 43 consultancies worth Rs. 6.00 crore (approx.). Research potential of the Institute can well be understood by looking at the total number of sponsored research projects, and consultancies received in such a short span of time.









4.1.2 Innovation and Startup Promotion

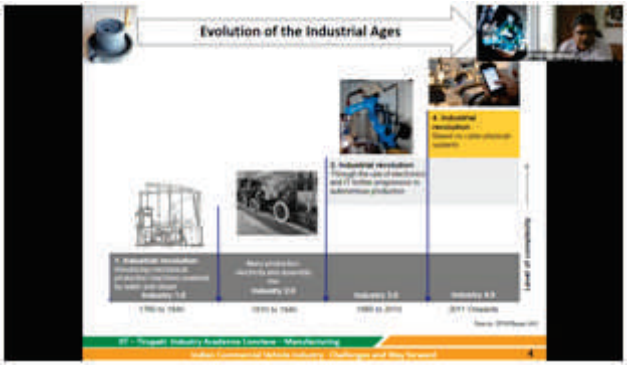
IIT Tirupati has prepared and implemented Innovation and Business Incubation Policy for the promotion of startups and innovation at the Institute. CSRC has formeda Section-8 Company called "IIT Tirupati Innovation & Incubation Foundation". In accordance with the approved Innovation and Business Incubation Policy, the first Board of Directors (BoD) have also been appointed by the Director. A draft Memorandum of Association, Articles of Association and other related documents have also been submitted to the Ministry of Corporate Affair (MCA), Govt. of India. Only the approval from the Ministry is awaited. The Institute initiated this process for the incorporation of this company to promote the innovations and entrepreneurship on the Institute campus.It intends to provide start-ups with necessary guidance, expert-networking, required infrastructure to materialise the ideas into prototypes and product development, facility & technology supports for testing and validation, necessary mentoring support, links of investors for funding, etc. Further, IIT Tirupati Innovation and Incubation Foundation aims to help the technology-based start-up business ventures with all the necessary resources/supports to evolve and grow into mature business ventures, promote a culture of innovation and entrepreneurship on the campus, build and nurture an innovation and entrepreneurial ecosystem, support creation of technology driven IP centric startups in the focus areas, working closely with the industry, government agencies, etc. Some of the faculty members have already started their start-up companies for converting their innovative ideas into prototype models, and products.

4.1.3 Industry Relations

CSRC has fully focused on creating an industry vibrant eco-system inside the campus to address various problems faced by industries. In order to buildgood industry connections, CSRC has started conducting domain focused Industry-Academia Conclaves which aims to strengthen the Institute-Industry relations. In line with the same, CSRC organised a one-day online Industry-Academia Conclave focused on Automotive Manufacturing Program on 7th January 2022. Four faculty members from the Department of Mechanical Engineering and eight eminent industry experts presented their research activities and exchanged their ideas in the Conclave.

Few images of welcome address, Institute growth and achievements presented by the Director Prof. K. N. Satyanarayana

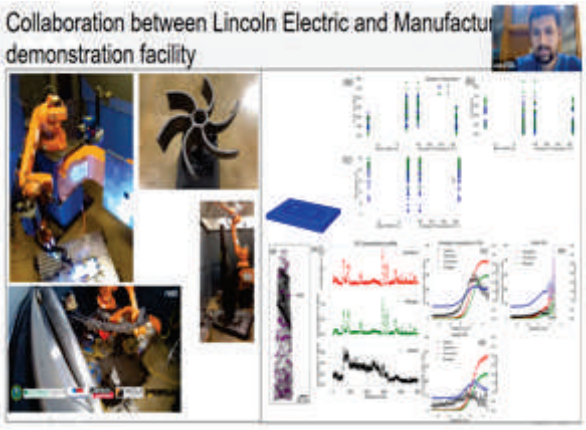
A total of 44 participants inclding 23 industry experts from around 15 companies such as M/s Ashok Leyland; M/s Mercedes Benz Research and Development, India; M/s Trivision Composite Technologies; M/s Kyndryl; M/s AMSPL; M/s Adroitec; M/s Breaks, India; M/s Schaeffler; M/s Nile limited; M/s Power Global; M/s Daimler; M/s Synergies-castings; M/s KK Engineering, etc. attended this Conclave.



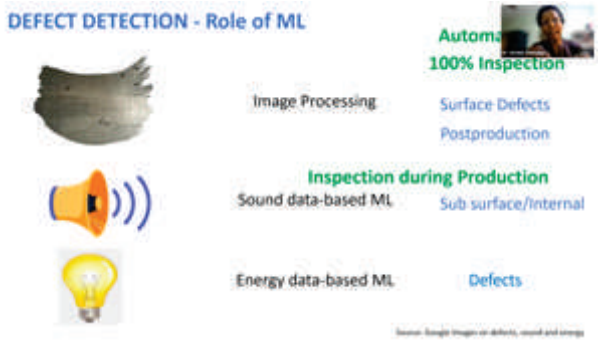
Dr. Palavesa Murugan, Head - Change Mgmt. Committee, M/s Ashok Leyland

Dr. Sunil Yallapragada, MD, M/s TriVision Composite Technologies Pvt. Ltd.

Mr. Sharoop Chand, CEO, M/s Adroitec Information System Pvt. Ltd. presentation



Dr. Niyanth Sridharan, Head of R&D, M/s Lincoln Electric India presentation



Dr. Sheela Siddappa, Principal Data Scientist, M/s Kyndryl presentation

Shri. Rajiv Dhawan, Asst. Regional Manager Sales, M/s AMSPL presentation

As an outcome of this initiative, now IIT Tirupati is closely working with the these organisations to address various Industry related issues for the benefit of industry and academia both.

4.1.4 Sponsored Research Projects (received during 2021-22)

1. Ajay Kumar: "Functionally Graded Polymer Derived Ceramic Surface Nano Composites using Solid-State Additive Friction-Stir Manufacturing (AFSM)," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.29.30 Lakh, January 2022 – January 2024.
2. Ajay Kumar: "Mechanical and Microstructural Behaviour of Laser based Direct Energy Deposited and Wire arc Additive Manufactured Ti-6AL-4V Components," funded by Aeronautics R&D Board (ARDB), amount sanctioned-Rs.37.91Lakh, February 2022 – February 2025.
3. Arijit Sharma: "Development of a Deterministic Single Photon Source for Quantum Networking Applications," funded by I-HUB Quantum technology foundation, amount sanctioned-Rs.12.60 Lakh, March 2022 – February 2024.
4. Arijit Sharma: "Towards Development of Fluorophores of Predictable Fluorescence: A Comprehensive Investigation of Fluorescence Characteristics of Fluorescein," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.24.37 Lakh, March 2022 – March 2025.
5. Dr. Vignesh V: "Cyber Physical Modelling and Detection of Cyber Attacks in a WADC for Smart Grids," funded by Central Power Research Institute, amount sanctioned-Rs.22.11 Lakh, February 2022 – February 2023.
6. KalidasYeturu: "Design and Development of Disaster Response Dashboard for India," funded by Facebook India online service, amount sanctioned-Rs.26.00 Lakh, March 2022 – March 2025.
7. Krishna Kishore: "Inner Cohomology of GL_n," funded by Science and Engineering Research Board-SERB, amount sanctioned-Rs.6.60 Lakh,February 2022 – February 2025.
8. Krishna Prapoorna: "Development of Encapsulated Asphalt-Rubber PAVEment (EARPAVE) Product for Road Applications," funded by Petroleum Conservation Research Association (PCRA), amount sanctioned-Rs.42.54 Lakh, July 2021 – July 2023.
9. Krishna Prapoorna: "National Facility for Accelerated Testing of Pavements and Vehicle Dynamics (NATPaVeD)," funded by the Ministry of Road Transport & Highways (MoRTH), amount sanctioned-Rs.1297.00 Lakh, December 2021 – December 2024.
10. KSMS Raghavarao: "PM FME CIC," funded by Andhra Pradesh Food Processing Society, amount sanctioned-Rs.260.75 Lakh, May 2021 – May 2026.
11. Machavaram Venkata Kartikeyan: "The Analysis and Simulation of Beam-Wave Interaction for Dual Mode Dual Harmonic Gyrotrons with the Design of Specific Modules," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.61.81 Lakh, March 2022 – March 2025.
12. Mamilla Ravi Sankar: "Finishing of 3D Printed High Aspect Ratio Complex Internal Conformal Cooling Channels using Economic Polymer Rheological Abrasive Semisolid Medium," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.31.54 Lakh, January 2022 – January 2025.
13. Mamilla Ravi Sankar: "Material and process development for additive manufacturing and post-processing of tools made of modified hot work tool steel (ModAMtool)," funded by the Department of Science & Technology, amount sanctioned-Rs.69.60 Lakh,March 2022 – March 2025.
14. Mamilla Ravi Sankar: "Teachers Associateship for Research Excellence (TARE)," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.10.05 Lakh, December 2021 – December 2024.

15. Nabil M: "Process Topology based Computational Methods for Sensor and Actuator Placement in Large Scale Systems," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.24.51 Lakh, January 2022 – January 2024.
16. Rajib Biswas: "Theoretical Investigation of Bio-inspired Channel Based Membrane for Water Purification." funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.21.19 Lakh, March 2022 – March 2025.
17. Rajib Biswas: "Theoretical Spectroscopic Investigation of the Microscopic Origin of Chaotropicity and Kosmotropicity of Osmolytes," funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.54.20Lakh, December 2021 – December 2024.
18. Ranjan Krishna Modak: "Many-body Quantum Engines." funded by Science and Engineering Research Board- SERB, amount sanctioned-Rs.13.53 Lakh,January 2022 – January 2024.
19. Roshan Srivastav: "Modeling Forest Phenological Parameters from Time Series Remote Sensing Data," funded by Space Applications Centre, ISRO, Ahmedabad, Gujarat, amount sanctioned-Rs.21.25 Lakh, July 2021 – March 2024.
20. Sridhar Chimalakonda: "A Virtual AR/VR Museum for Science and Technology Literacy." funded by the Department of Science & Technology, amount sanctioned-Rs.25.31 Lakh, February 2022 – February 2024.
21. Uday Kumar Sukumar: "Track and Trigger: Ultrasound-responsive mesoporous Mn@Silicanano capsules for MRI-guided intranasal delivery of therapeutic microRNAs and TK-p53-NTR triple suicide genes therapy against GBM," funded by the Department of Biotechnology, amount sanctioned-Rs.42.50 Lakh, February 2022 – February 2027.
22. Venkatraman Pandurangan: "Machine Learning in Mechanics: Current Status and Future Prospects," funded by the Department of Scientific & Industrial Research, amount sanctioned-Rs.7.07 Lakh, March 2022 – March 2023.

4.1.5 Industrial Consultancies (received during 2021-22)

1. A Murali Krishna: "Support in carrying of landslide and Geotech related geohazard risk assessment tool development along hydrocarbon pipeline section IP-1G DHUMREWADI TO RT-GOA P/L (89KM)," funded by Geo Climate Risk Solutions Pvt. Ltd. (GCRS), Visakhapatnam, amount sanctioned-Rs.2.50Lakh, November 2021– February 2022.
2. A Murali Krishna: "Validation of the ground improvement requirement for the proposed warehouse construction at the proposed container terminal in kodakarai, Chennai.," funded by Ocean lifespaces India private limited, amount sanctioned-Rs.2.95 Lakh, January 2022– February 2022.
3. Ajay Kumar: "Development of titanium envelope forging for compressor aero-foils," funded by Gas Turbine Research Establishment (GTRE), amount sanctioned-Rs.45.25 Lakh, February 2022– February 2024.
4. B Janaki Ramaiah (PI) and Dr. A Murali Krishna (Co-PI): "Geotechnical investigations of foundations soil along the proposed bund alignment of SS tank at Mangalampaducheruvu, Sullurupeta, Nellore District, Andhra Pradesh," funded by Public Health Department, Govt. of Andhra Pradesh, amount sanctioned-Rs.33.00Lakh, March 2022– May 2022.
5. B Janaki Ramaiah (PI) and Dr. A Murali Krishna (Co-PI): "Slope stability analysis of the side slopes of Trial Race Channel of PolvaramHydro Electric Project,Polavaram Irrigation Project, Andhra Pradesh," funded by Mega Engineering and Infrastructures Limited, amount sanctioned-Rs.5.90 Lakh, January 2022– February 2022.

6. B Janaki Ramaiah: "Geotechnical investigations of foundations soil along the proposed earthen bund alignment of Summer Storagetank at Juvvalapalem irrigation tank, Naidupeta, Nellore District, Andhra Pradesh, Govt of Andhra Pradesh," funded by Public Health Department, Govt. of Andhra Pradesh amount sanctioned-Rs.33.00 Lakh, March 2022– April 2022.
7. B Janaki Ramaiah: "Holistic seepage analysis of the upstream and downstream cofferdams of the polavaram irrigation project considering the riverbed levels after scouring," funded by Megha Engineering and Infrastructure Ltd., amount sanctioned-Rs.7.67 Lakh, October 2021 – December 2021.
8. B Janaki Ramaiah: "Laboratory testing of plastic concrete cylindrical speciment of the diaphragm cut off wall at the SPVB reservoir," funded by Mega Engineering and Infrastructures Limited, amount sanctioned-Rs.5.66 Lakh, January 2022– February 2022.
9. B Janaki Ramaiah: "Seepage analysis and slope stability analysis of downstream cofferdam at the deepest scour portion of Polavaram irrigation project, Andhra Pradesh," funded by Megha Engineering and Infrastructures limited, amount sanctioned-Rs.8.26 Lakh, July 2021- December 2021.
10. B Krishna Prapoorna: "LCA of Rubber Tries and Associated," funded by Tinna Rubber and Infrastructure Limited, amount sanctioned-Rs.6.55 Lakh, March 2022- March 2023.
11. B Krishna Prapoorna: "Mix design of DBM2, DAC1 and DAC2 of Arakkonam Airport," funded by NCC Limited, amount sanctioned-Rs.2.95Lakh, February 2022- August 2022.
12. B Krishna Prapoorna: "Mix Design of PQC of Arakkonam Airport," funded by NCC Limited, amount sanctioned-Rs.1.18 Lakh, February 2022– August 2022.
13. B Krishna Prapoorna: "Resilient modulus testing on DBM from NH275 sections," funded by DilipBuildcop Limited, amount sanctioned-Rs.1.42Lakh, October 2021 – May 2022.
14. B. Janaki Ramaiah (PI) and A Murali Krishna (Co-PI): "Laboratory testing of undisturbed soil samples from High-speed rail project-package C4 from Vapi to Vadodara, Gujrat," funded by L&T Geostructure Private Limited, amount sanctioned-Rs.11.89 Lakh, April 2021 – June 2021.
15. B. Janaki Ramaiah (PI) and Dr. A Murali Krishna (Co-PI): "Dynamic analysis of earthen embankment of Isarda Dam, Rajasthan," funded by Water resource department, Rajsthan, amount sanctioned-Rs.11.80 Lakh, October 2021.
16. B. Janaki Ramaiah (PI) and Dr. A Murali Krishna (Co-PI): "Geotechnical investigations on the excavated soil below the proposed earthen bund of SS tank at Karanamgunta for its stability as a cut-off-trench material," funded by Rural water supply and sanitation, Govt of Andhra Pradesh, amount sanctioned-Rs.2.95 Lakh, September 2021– November 2021.
17. B. Janaki Ramaiah (PI) and Dr. A Murali Krishna (Co-PI): "Providing expert opinion on the soil stabilization based on the soil for the site proposed for construction of 25 MLD capacity capacity sewage treatment plant at thukivakam, Tirupati," funded by Tirupati Smart City Corporation Ltd, amount sanctioned-Rs.1.00 Lakh, August 2021.
18. B. Janaki Ramaiah (PI) and Dr. A Murali Krishna (Co-PI): "Soil classification tests on disturbed samples from four boreholes drilled along the proposed bund alignment of SS Tank at Mangalampaducheruvu, Mangalampadu, Sullurupeta, Nellore District, AP," funded by Public Health and muncipal Engineering Department, Govt of Andhra Pradesh, amount sanctioned-Rs.4.72 Lakh, August 2021– October 2021.

19. B. Janaki Ramaiah: "Laboratory testing of plastic concrete specimens prepared from thespoil concrete of four panels at downstream cofferdam of polavaram irrigation project, Andhra Pradesh," funded by Water resource department, Govt of Andhra Pradesh, amount sanctioned-Rs.5.51 Lakh, October 2021 – December 2021.

20. B. Janaki Ramaiah: "Perupadi reservoir of phase I, Package 1-Stability analysis," funded by Water resource department, PIPLMC Division, AP, amount sanctioned-Rs.4.72 Lakh, June 2021 – September 2021.

21. B. Janaki Ramaiah: "Stability analysis of ECRF Dam in Gap-1 area as per the carried-out investigation and available input at Polavaram irrigation project, Andhra Pradesh," funded by Indo Canadian Consultancy Services ltd., amount sanctioned-Rs.7.08 Lakh, September 2021– December 2021.

22. B. Janaki Ramaiah: "Stability analysis of right-side slopes of spill channel of the Polavaram irrigation project, AP," funded by Megha Engineering and Infrastructures limited, amount sanctioned-Rs.4.72 Lakh, May 2021 – November 2021.

23. B. Janaki Ramaiah: "Stress deformation analysis of plastic concrete diaphragm cutoff wall in the distressed zone from chainage 1600 m to 1700m of earth dam of SPVB reservoir at B Mattam in Kadapa District, Andhra Pradesh," funded by Megha Engineering and Infrastructure Ltd., amount sanctioned-Rs.14.75 Lakh, September 2021– October 2021.

24. B. Janaki Ramaiah: "Stress deformation analysis of the existing concrete diaphragm seepage cut-off wall for Isarda dam under static and seismic loading conditions," funded by Om Metals Infra Ltd., amount sanctioned-Rs.4.72 Lakh, October 2021 – November 2021.

25. Chandra Sekhar Bahinipati: "A synthesis of the challenges and opportunities faced by India in accessing socio economic impacts from climate change," funded by Organisation for Economic Co-operation and Development, amount sanctioned-Rs.1.05 Lakh, April 2021 – May 2021.

26. KalidasYeturu: "A software platform for explaining ability driven anomaly detection," funded by Toshiba Software India Pvt Ltd (TSIP), amount sanctioned-Rs.11.55 Lakh, May 2021-March 2022.

27. M Nabil: "Data Science Project Initiatives," funded by Gnanam Institute for Training in Advanced Analytics Private limited, amount sanctioned-Rs.1.50 Lakh, October 2021 – March2022.

28. M Nithyadharan (PI) and Dr. Bijily Balakrishnan (Co-PI): "Third party" Design stability and structural safety certificate" for proposed India International Convention and expo centre-Phase I," funded by Larsen and Toubro Construction Building and Factories, amount sanctioned-Rs.19.47 Lakh, September 2021– December 2021.

29. M Nithyadharan: "Testing of rebars (Tensile Test) of 25mm, 32 mm dia.," funded by Megha Engineering and Infrastructures limited, amount sanctioned-Rs.0.075 Lakh, June 2021.

30. Rama Krishna Gorthi: "Fruit measurement software development project," funded by ChifuAgritech Private Limited, amount sanctioned-Rs.11.24 Lakh, August 2021 – July 2022.

31. RomanbabuOinam: "Vetting of Structural design and drawing of multilevel parking with multiplex in tirupati under the implementation of smart city mission," funded by Live Architecture and designs, amount sanctioned-Rs.2.02 Lakh, April 2021 – May 2021.

32. Roshan Karan Srivastav: "Vetting of structural design and drawing of technical facility structure, DRDO," funded by Thaparsons K V shipping agents pvt Ltd, amount sanctioned-Rs.1.77 Lakh, November 2021 – December 2021.

33. Sasidhar Gumma: "Process consultancy services for medical oxygen plants", Karakambadi, Tirupati," funded by Tata Advanced Systems limited, amount sanctioned-Rs.166.4 Lakh, June 2021-December 2022.
34. Sasidhar Gumma: "Development of process parameters for PSA based Medical oxygen plants," funded by Vertus life sciences private limited, amount sanctioned-Rs.15.00 Lakh, December 2021.
35. Shihabudheen M Maliyekkal: "Improvement of existing effluent treatment facility at Amara raja Batteries Limited," funded by Amararaja Batteries Pvt Ltd., amount sanctioned-Rs.4.19 Lakh, September 2021– October 2021.
36. Shihabudheen M Maliyekkal: "Improvement of existing effluent treatment facility at Amara raja Batteries Limited," funded by Amara Raja Batteries Limited, amount sanctioned-Rs.5.81 Lakh, February 2022– March 2022.
37. Shihabudheen M Maliyekkal: "Water sample analysis," funded by RWS&S Srikalahasthi, amount sanctioned-Rs.0.24 Lakh, November 2021.
38. Sridhar Chimalakonda: "An Approach for generation of source code centric knowledge graphs," funded by Robert Bosch Engineering and Business solutions Private limited, Visakhapatnam, amount sanctioned-Rs.14.98 Lakh, December 2021– December 2022.
39. Sridhar Chimalakonda: "Discovering energy-hungry patterns in machine learning driven software systems," funded by Accenture LLP, amount sanctioned- $25000, July 2021.
40. Sridhar Chimalakonda: "Online facilitation of Debugging Skills through Game Based Learning," funded by Commonwealth Educational Media Centre for Asia, amount sanctioned-Rs.8.70 Lakh July 2021- December 2021.
41. Sridhar Chimalakonda: "Towards comprehending COBOL programs through knowledge graphs, Tirupati," funded by Exafluence Inc, amount sanctioned- $25000, October 2021– October 2022.
42. Suresh Jain: "Lead emission study during manufacturing of lead acid batteries at four plants ARGC Chittoor AP," funded by Amararaja Batteries Pvt Ltd, amount sanctioned-Rs.4.00 Lakh, April 2021 – May 2021.
43. Suresh Jain: "Study on lead emissions during the manufacturing of lead acid batteries at ARBL, Karakambadi, Tirupati," funded by Amararaja Batteries Pvt Ltd, amount sanctioned-Rs.8.00 Lakh, May 2021-July 2021.

4.1.6 Patents Filed and Granted(during 2021-22)

1. Shihabudheen M Maliyekkal: "Integrated design for automated Capacitive Deionization (CDI) System," Indian patent granted in the year 2021.
2. Shihabudheen M Maliyekkal,M.Nityadharan, AbinAzis, Shibil A.G; Afrah H; Sonali S; Uthra K.: "Method of preparing an environmental-friendly bio-inspired sealant composite and uses thereof" Indian patent published in the year 2021.
3. Dr. Sunil Kumar Thamida, V.R. Srikumar; VasudharaniDevanathan&Harshini Chakravarthy: "A thermal air sterilizer for air laden with coronavirus" Indian patent published in the year 2021.
4. Dr. Sunil Kumar Thamida, DevarahalliMudligiriyappa Naveen Giri, Gooty Venkata Sumanth, Gandluru Krishna Tejaand Sudhakar Kaligithi: "An apparatus and a method of conversion of biomass to glucose" Indian patent published in the year 2021.

5. Dr. Sunil Kumar ThamidaDevarahalliMudligiriyappa Naveen Giri, Gooty Venkata Sumanth, Gandluru Krishna Teja, Sudhakar KaligithiGooty and Vijaya Srikar: "A system for continuous fermentation of fermentable sugars into alcohol" Indian patent filed in the year 2021.
6. Dr. Ajay Kumar and Tumula Tirumala: "A Processfor Surface Coating Through Casting with Sheet Inserts" Indian patent filed in the year 2021.

5.Memorandums of Understanding Signed By IIT Tirupati

MoUs and academic associations with universities, research institutes and laboratories, and industries of international repute are prioritized to nurture collaborative educational and research activities. IIT Tirupati has inked Memoranda of Understanding with many institutions in India and abroad that aim to uphold institutional collaborations of mutual interest at various levels such as exchange visits of faculty, students, and research staff, joint conferences and workshops, and student internships.

Since its inception, IIT Tirupati has inked around fifty Memorandums of Understanding (MoU) with Educational Institutions, Govt. Research and Development agencies, Public Sector Undertakings, Government bodies, and Industry associates. Following are details of MoUs that were signed during the year 2021-2022.

5.1 PETROLEUM CONSERVATION RESEARCH ASSOCIATION (PCRA)

An MoU was signed between IIT Tirupati and Petroleum Conservation Research Association (PCRA), a registered society under the aegis of Ministry of Petroleum & Natural Gas, Govt. of India on May 12, 2021 to develop an Encapsulated AsphaltRubber PAVEment (EARPAVE) mixture and establish specifications vital for producing an enduring asphalt mixture suitable as maintenance strategy for pothole patching, new pavement construction, with unconventional surface layers.

5.2 ANDHRA PRADESH POLLUTION CONTROL BOARD

An MoU was signed between IIT Tirupati and Andhra Pradesh Pollution Control Board, Govt. of Andhra Pradesh on May 29, 2021 to carry out the air pollution studies for the Municipal Corporation of Guntur, Nellore, and Ongole.

5.3 CQURE OF TCG CREST

An MoU was signed between IIT Tirupati and CQuRE of TCG CREST for Joint Doctoral Programme on Quantum Sciences and Technologies on August 12, 2021, which would facilitate students from one Institute to credit courses offered at the other Institute. In addition, both Institutes shall encourage academic collaborations. The MoU aims for joint research projects in the areas of quantum computing, quantum communication, quantum technologies, etc., in the future.

5.4 RUHVENILE BIOMEDICAL OPC PRIVATE LIMITED

M/s Ruhvenile Biomedical OPC Private Limited and IITT have decided to collaborate for developing electricity-free chemical oxygen generators as an alternative way to generate medical oxygen, i.e., generation of oxygen chemically rather than the isolation of it from the air. The MoU was signed on November 17, 2021.

5.5 DALHOUSIE UNIVERSITY, HALIFAX, NOVA SCOTIA, CANADA

IIT Tirupati signed an MoU with Dalhousie University, Halifax, Nova Scotia, Canada on November 24, 2021, to promote academic collaboration between the two institutes in areas of mutual interest. Some key areas included are Precision Agriculture, Water Technologies, and Food Systems. The scope of the collaboration under this MoU includes faculty and students exchange, mutual recognition and accreditation of courses, joint project development for external funding and development and delivery of courses, among others.

5.6 CENTRAL POWER RESEARCH INSTITUTE

An MoU was signed between IIT Tirupati and Central Power Research Institute on January 20, 2022 for the project on "Cyber Physical modelling and detection of Cyber-attacks in a WADC in smart Grid".

5.7 HINDUSTAN SHIPYARD LIMITED, VISAKHAPATNAM

An MoU was signed between Hindustan Shipyard Limited, Visakhapatnam, and IIT Tirupati on March 02, 2022 and the same was exchanged in the presence of Honorable Minister of Defence Shri Rajnath Singh during DEFEXPO-2022, BHANDHAN event in Gandhinagar, Gujarat. IITT and HSL collaborated for developing futuristic technologies and innovative ideas in welding Technology related to ship building applications.

6. Research Publications and Achievements

IIT Tirupati fosters a rich academic environment, where faculty members and students are actively engaged in innovative teaching-learning activities contributing to the technical growth of the nation. Institutes like IITs are well known for their research contributions; in this line, IIT Tirupati faculty members are vigorously involved in the research and development of technological advancements. Being a new Institute, IIT Tirupati is busy creating world-class research facilities on campus. All the Institute faculty members are also engaged in quality research publication and presentation of their research outputs at the prestigious conferences of international repute. The research contribution in terms of publication, conference participation, and research projects undertaken are highlighted in the present chapter of the report:

6.1 RESEARCH PUBLICATIONS

During the period April 2021 – March 2022, a total of 134 research articles in various journals of high repute, one book, 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.

6.2 CONFERENCE PROCEEDINGS/PRESENTATIONS

The faculty members of IIT Tirupati are actively engaged in presenting their research outputs in the conferences/seminars of international repute. IITT faculty members presented 106 research papers in conferences/seminars during the year 2021-22. Please refer to appendix – II for more details on the conference proceedings and presentations.

6.3 INVITED LECTURES DELIVERED BY THE IITT FACULTY MEMBERS

The Institute faculty members are invited to deliver special talks/lectures to various academic institutions in India and abroad. During this period, 148 lectures were delivered by IITT faculty members. Please refer to appendix – III for more details on the invited talks delivered by the Institute faculty members.

6.4 AWARDS AND ACHIEVEMENTS

Unperturbed by the restrictions in movement and the general constraints of the pandemic, our faculty, staff and students have maintained their academic consistency. They have received academic distinctions, honours and awards, and memberships on editorial boards of journals and prestigious international societies. Please refer to appendix – IV for more details on the invited talks delivered by the Institute faculty members.

6.5 MEMBERSHIP OF PROFESSIONAL BODIES AND EXTENSION/ EXTRA - CURRICULAR ACTIVITIES

The faculty members of the Institute hold the memberships various professional bodies that contribute to the growth of their respective fields. The faculty members are also actively contributingto the extension and extracurricular activities in their respective disciplines that help academia variously. Please refer to appendix– V for more details on the membership of professional bodies, and extension and extracurricular activities of the Institute faculty members.

7. 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 five international conferences/webinars, one symposium, eight workshops, two GIAN courses, three FDPs, one summer school, and one VRITIKA Research Internship Programme. 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 41 invited special talks, and two lectures 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 sixth batch of students at the onset of the new academic year.

7.1 ACADEMIC ORIENTATION PROGRAMME

The Institute conducted its 7th Orientation Programme (Online) on November 26, 2021, to induct the 2021-2025 batch of B. Tech students. Also, Orientation Programmes were conducted on August 13, 2021, to induct the 2021-2023 batch of M.Tech and M.Sc students and MS/PhD scholars admitted during July-Dec 2021 semester. 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.

7.2 CONFERENCES/WEBINARS/SYMPOSIUMS/WORKSHOPS ORGANISED

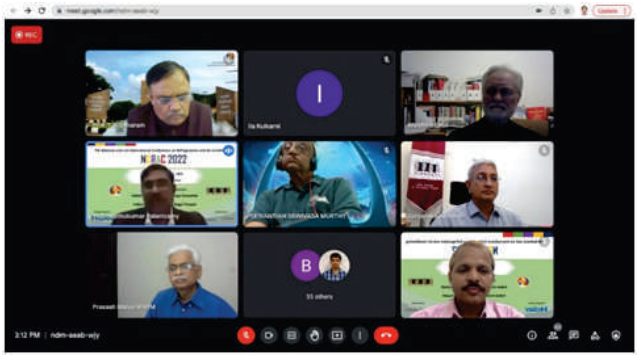
International Conference on Climate Change in India

An international conference on “Methodological Challenges in Assessing the Socio-economic Losses and Damages from Climate Change in India” was jointly organised by Indian Institute of Technology Tirupati, Organisation for Economic Cooperation and Development (OECD), and National Institute of Disaster Management (NIDM), on May 25, 2021.

International Conference on Resource Sustainability

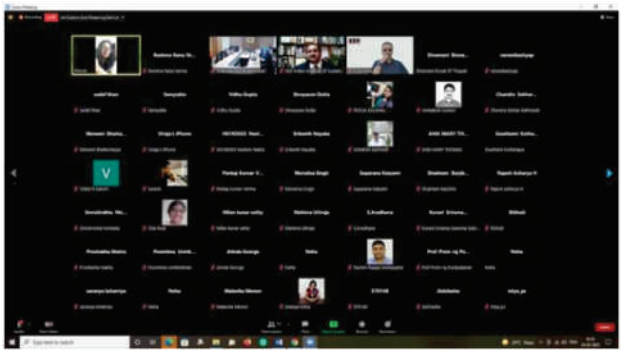
IIT Tirupati hosted an International Conference on “Sustainable Pavement Technologies (icRS SPT 2021)”, sponsored by the International Resource Sustainability group during May 26-27, 2021. Dr. Krishna Prapoorna, Dept. of Civil and Environmental Engineering, served as the Chairman of the conference.

International Conference on Refrigera - tion and Air Conditioning



Prof. E. Anil Kumar organized the 7th national and 1st international conference on Refrigeration and Air conditioning in collaboration with the Department of Mechanical Engineering, IIT Guwahati from February 24 to 26, 2022.

International Conference on Climate Change



Dr. Chandra Sekhar Bahinipati and Dr. Rahul A. Sirohi from the Department of Humanities and Social Sciences organised an International Conference in online mode on 'Tackling Climate Change through Urban Resilience: Role of Institutions and Public Policies in Canada and India', during March 24-25, 2022. Scholars from India and abroad joined for a very fruitful discussion on the impact of climate change and the role of public policies in mitigating those changes.

Symposium on Physical-Chemistry Physical-Biology

A 5-Day online symposium on "Physical-Chemistry Physical-Biology" was organised by Dr. Rajib Biswas, Dept. of Chemistry, IIT Tirupati, along with Dr. Suman Chakrabarty and Prof. Ranjit Biswas from SNBNCBS Kolkata, and Prof. Rajarshi Chakrabarti and Prof. Anindya Dutta from IIT Bombay as coordinators. Prof. Biman Bagchi, IISc Bangalore, mentored the event. A total of 34 invited lectures were delivered by the leaders and young faculty members working in this area. More than 1000 participants were registered for the symposium.

Webinar on Impacts of Climate Variability

A 1-Day webinar on "Impacts of Climate Variability on Sustainable Water Resources Planning and Management" was organised by the Dept. of Civil and Environmental Engineering, IIT Tirupati, in collaboration with S.V. University, Tirupati. The webinar was held on July 28, 2021. The talks were attended by more than 200 students and researchers from across the country.

Workshop on Academic and Research Writing

A 5-Day online workshop on "Capacity Building through Academic and Research Writing," funded by ATAL Academy of AICTE, New Delhi, was hosted by the Dept. of Humanities and Social Sciences during September 10-14, 2021. Around 90 participants attended the workshop and listened to the informative talks of 15 resource persons from various other IITs and central universities, including an expert from abroad. Dr. Prabha Shankar Dwivedi from the Dept. of Humanities and Social Sciences was the coordinator of the workshop.

Workshop on Representation Theory

A 6-Day online workshop on "Representation Theory of Affine Lie Algebras," funded by DST, was hosted by the Dept. of Mathematics and Statistics, IIT Tirupati, during December 13-18, 2021. About 110 participants registered for the workshop. The resource persons for the workshop included Prof. K. N. Raghavan (IMSc), Dr. Sachin S. Sharma (IIT Kanpur), and Prof. S. Viswanath (IMSc).

Workshop on Advanced Manufacturing

A 5-Day online workshop on Advanced Manufacturing of Biomedical Devices for Precision Health Technologies, funded by ATAL Academy of AICTE, New Delhi, was hosted by the Dept. of Mechanical Engineering during September 10- 14, 2021. Around 110 participants attended the workshop and listened to the informative talks of 15 resource persons from various other IITs and central universities, including an expert from abroad. Dr. Mamila Ravi Sankar from the Dept. of Mechanical Engineering was the coordinator of the workshop.

International workshop on Spacetime Duality in Quantum Circuits

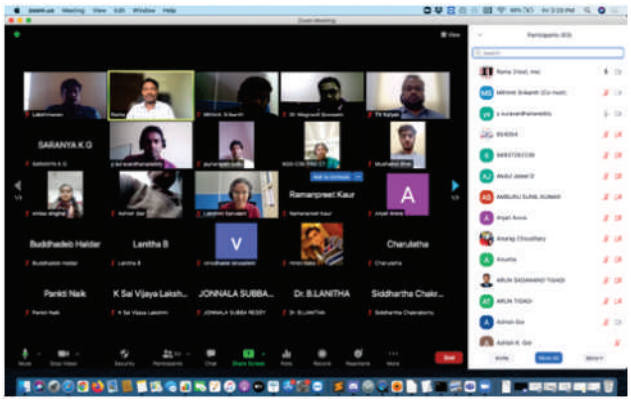
The Department of Physics under the guidance of Dr. Aravinda S (IIT Tirupati) and Prof. Arul Lakshminarayan (IIT Madras) organised a virtual international workshop on "Spacetime Duality in Quantum Circuits" on 10-11 November 2021. The workshop brought together some of the pioneers in the area and highlighted recent progress and future directions in such spacetime dual models.

Workshop on Machine Learning

A One Day Workshop on Machine Learning with Scikit Learn on 16 August 2021 was organised by P. Mariappan in the Department of Mathematics and Statistics for the Kathmandu University, Dhulikhel Nepal, in the virtual model.

Workshop on Computer System Design

A 5-Day online workshop on "Computer System Design" funded by ATAL Academy of AICTE, New Delhi was hosted by the Dept. of Computer Science and Engineering during January 3-7, 2022. Around 100 participants attended the workshop and learnt the fundamental concepts of designing a computer system. Seven resource persons from various IITs delivered the lectures. Dr. G. Ramakrishna from the Dept. of Computer Science and Engineering was the coordinator of the workshop.



Workshop on Advanced Manufacturing of Biomedical Devices for Precision Health Technologies

A 6-Day online workshop on "Advanced Manufacturing of Biomedical Devices for Precision Health Technologies" funded by ATAL Academy of AICTE, New Delhi, was hosted by the Dept. of Mechanical Engineering during January 24-29, 2022. Around 100 participants attended the workshop. Dr. M. Ravi Sankar from the Dept. of Computer Science and Engineering was the coordinator of the workshop.

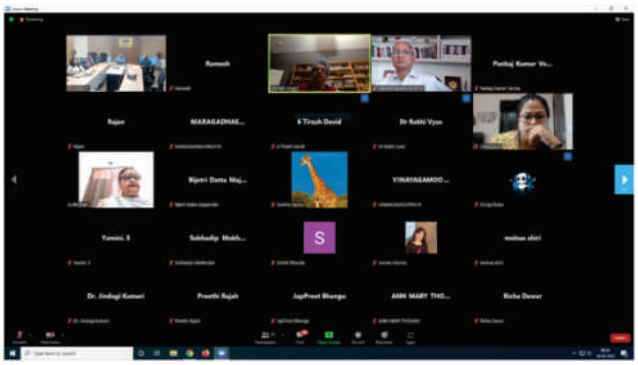
International Workshop on Public Policy

Dr. R.A. Sirohi, and Dr. C.S. Bahinipati organised an International Workshop on 'Public Policies for the Post-Pandemic Era', in online mode, during February 24-25, 2022.

Online GIAN Course on Cross Environmental Ethics: Challenges and Potential

A GIAN course on "Cross Environmental Ethics: Challenges and Potential", was hosted in online mode by Dr. Bharath Kumar, on 05, 06, 12, 13, 19, 20, 26, and 27 March 2022, at the Indian Institute of Technology Tirupati. Prof. Monika Kirloskar Steinbach, Professor of Philosophy at VU University Amsterdam, was the teaching faculty for the course. As many as 80 participants from all over the country participated in the course.

Online GIAN Course on Migration and Citizenship: Comparative Perspectives on African American and Asian American Literatures



A GIAN course on "Migration and Citizenship: Comparative Perspectives on African American and Asian American Literatures", was hosted in online mode by Dr. Prabha Shankar Dwivedi, on 14, 15, 16, 17, 21, 22, and 23 March 2022, at the Indian Institute of Technology Tirupati. Prof. Amritjit Singh, Langston Hughes Emeritus Professor of English and African Studies at Ohio University in Athens, Ohio, was the teaching faculty for the course. As many as 36 participants from all over the country participated in the course.

ATAL FDP Programmes

ATAL FDP on “Building and Sustaining Technology Ventures Building and Sustaining Technology Ventures” was organised during 16-20 August 2021.

ATAL FDP on "Processing of Novel Materials for Defence and Aerospace Applications” was organised during 6-10 December 2021.

ATAL FDP on “Advanced Manufacturing of Biomedical Devices for Precision health technologies” was organised during 13-17 Dec 2021.

VRITIKA Research Internship Programme

The one-month Vritika Research Internship Programme sponsored by the Science & Engineering Research Board (SERB), Department of Science and Technology (DST), Govt of India, under Accelerate Vigyan Vritika scheme was organised at IIT Tirupati by Dr. Ajay Kumar from January 03, 2022 to February 28, 2022.

Summer School on Machine Learning

The Department of Computer Science and Engineering, IIT Tirupati, organised a practice-oriented 5-day 2nd Summer School on Machine Learning during July 26-30, 2021.

7.3 INVITED TALKS HOSTED BY IIT TIRUPATI

1. Bishal Bharadwaj (PhD Candidate, School of Chemical Engineering, The University of Queensland, Australia) delivered a lecture on "Tackling plastic pollution in South Asia: Lesson from Nepal" on April 20, 2021.
2. Dr. Adarsh Ganesan, National Institute of Standards and Technology, USA, delivered a talk on "Phononic Frequency Combs for Condensed Matter Physics and Quantum Information Science", at a seminar organised by the Department of Physics, IIT Tirupati, September 23, 2021.
3. Dr. Akshaya Kumar, Assistant Professor, Indian Institute of Technology Indore, delivered a lecture on "Cinema after Film: Digital disruption in the Bhojpuri speaking region" on 2nd March 2022.
4. Dr. Alex Thomas, Assistant Professor, School of Arts and Sciences, Azim Premji University, Bangalore, India, delivered a lecture on "Macroeconomics: An Alternative Approach", on September 24, 2021.
5. Dr. Ariel Ortiz-Bobea, Associate Professor, Charles H. Dyson School of Applied Economics and Management, Cornell University Ithaca, New York, delivered a talk on "Historical and future impacts of anthropogenic climate change on US agricultural productivity" on 11th February 2022.
6. Dr. Bejoy K Thomas, Associate Professor, Department of Humanities and Social Sciences, IISER, Pune, "From growth to de-growth: the normative challenge in development" on June 18, 2021.
7. Dr. David A. Fleming Munoz, Senior Research Economist, CSIRO, Australia, delivered a lecture on "Economic Vulnerability to Decarbonisation" on July 9, 2021
8. Dr. Gopal Sarangi, Assistant Professor, TERI School of Advanced Studies, New Delhi, India, delivered a talk on "Transitioning towards a Sustainable Energy Regime in India: Dichotomies and Distortions" on 11th January 2022.
9. Dr. Hernan Bejarano, Assistant Professor at the Center for Economic Research and Teaching (CIDE), Mexico, "Experimental economics: history, concepts, taxonomy, and current applications" on June 11, 2021.
10. Dr. Laura Bakkensen, Associate Professor at the University of Arizona's School of Government and Public Policy, "Climate Shocks, Cyclones, and Economic Growth:Bridging the Micro-Macro Gap", on June 30, 2021.
11. Dr. Maria Bach, Assistant Professor, Fellow of the Teaching and Learning Center, American University of Paris, France, delivered a lecture on "Relocating Development Economics: How Indian Economics redefined development from and at the margins, 1870-1905" on April 29, 2021.
12. Dr. Namrata Chindarkar, Associate Professor and Chairperson, JSW School of Public Policy, IIM Ahmedabad, India, delivered a lecture on "Access to Improved Sanitation and Dietary Diversity", on November 26, 2021.
13. Dr. R. Thiyagarajan, Assistant Professor, Department of Mechanical Engineering, delivered a lecture on "Next-generation of Field and Service Robots Specific focus on underwater robots," on October 13, 2021.
14. Dr. Ram Fishman, Assistant Professor of Public Policy, Tel Aviv University, Israel, "Irrigation and the Spatial Pattern of Structural Transformation in India" on May 14, 2021.
15. Dr. Rijo M. John, Adjunct Professor, Rajagiri College of Social Sciences, Kochi, Kerala, India, delivered a lecture on "The story of Covid-19 in India: a pandemic of mismanagement and misinformation" on May 7, 2021.

16. Dr. Sanat Tiwari, Indian Institute of Technology, Jammu, delivered a talk on “Collective modes in strongly coupled dusty plasmas”, at a seminar organized by the Department of Physics, IIT Tirupati, October 25, 2021.

17. Dr. Sattwick Dey Biswas, Research Fellow, Institute of Public Policy, National Law School of India University Bangalore, India, delivered a talk on "Mysteries of valuation: Few thoughts on valuation (of land) and compensation during expropriation" on 6th January 2022.

18. Dr. Sayan Dey, Postdoctoral Fellow, Wits Centre for Diversity Studies, University of Witwatersrand and Kashyapi Ghosh, Ph.D. Scholar, IIT Tirupati, India, had a conversational discourse on “Food Dialogue”, on October 23, 2021.

19. Dr. SharachchandraLele, Distinguished Fellow in Environmental Policy & Governance, Centre for Environment & Development, Ashoka Trust for Research in Ecology and the Environment (ATREE), & Adjunct Faculty, Department of Humanities and Social Sciences, Indian Institute of Science Education & Research (IISER) Pune delivered a talk on" Exploring the Normative and Theoretical Foundations of Environmental Public Policy" on 18th February 2022.

20. Dr. Sudipta Dutta, IISER Tirupati delivered a talk on “Tunable magnetic states in two-dimensional materials”, at a webinar organised by CAMOST, IIT Tirupati, October 29, 2021.

21. Dr. Sukanya Das, Associate Professor, Department of Policy and Management Studies, TERI School of Advanced Studies, New Delhi, India, delivered a lecture on “Implementation and challenges for applying stated preference techniques specifically in the context of developing countries”, on December 2, 2021.

22. Dr. Tarun Menon, Assistant Professor, National Institute of Advanced Studies Bengaluru, India, delivered a talk on "How Evidence-Based Is Evidence-Based Policy?" on 21 January 2022.

23. Dr. Raghu Murtugudde, Visiting Faculty, Climate Studies, Indian Institute of Technology Bombay, delivered a talk on "What Can You Do About Climate Change? " on 28January 2022.

24. Dr. Vikas Kumar, Distinguished Scientist, Former Director, DMRL/DRDO, Hyderabad, delivered a lecture on “Structure Integrity of Defence Platforms: An Integrated Approach from Concept to Deployment” on October 6, 2021.

25. Dr. Yugank Goyal, Associate Professor, Public Policy Department of Social Sciences Flame University, Pune, India, delivered a talk on "Who moved my vote: Data Analysis of Indian Elections" on 5 February 2022.

26. Mr. AchalKhare, Former Managing Director, National High-Speed Rail Corporation Ltd., delivered a lecture on “Mumbai-Ahmedabad High-Speed Rail Project: New Technologies, Opportunities and Innovations” on July 28, 2021.

27. Prof. Anirban Mukhopadhyay, IMSc, Chennai delivered a lecture on “Turan-Kubilius inequality for numbers and polynomials” on 24th March 2022.

28. Prof. Anupam Kumar Singh, IISER Pune delivered a lecture on “Word Maps on Groups” on 3rd March 2022.

29. Prof. Arvind Sharma, Birks Professor of Comparative Religion, McGill University, Montreal, Canada, “Some Intellectual Consequences of British Rule Over India” on April 16, 2021.

30. Prof. Ganesh Shivakoti, Visiting Professor at Arizona State University, USA, “Long-term Performance of Innovative Development Interventions: Lessons from an Irrigation Experiment in Nepal” on July 23, 2021.

31. Prof. Keshab Das, Gujarat Institute of Development Research, Ahmedabad, India, delivered a lecture on “State Capital, and Industrialism: The Indian Context”, on September 17, 2021.
32. Prof. Krishna Maddaly, Department of Mathematics, Ashoka University, delivered a talk on “Eigenvalue Statistics for Random Matrices and Operators” on 17th February 2022.
33. Prof. Parthanil Roy, Indian Statistical Institute Bangalore delivered a lecture on “How to tell a tale of two tails?” on 31 March 2022.
34. Prof. Prem Devanbu, Department of Computer Science, University of California, Davis delivered a talk on ""Naturalness and Bimodality of Code: A Research Overview" on 25th March 2022.
35. Prof. Rajendra K. Bordia, George J. Bishop, III Professor of Materials Science and Engineering Clemson University, Clemson, SC, delivered a lecture on “Enabling Role of Ceramics in Realizing Carbon Neutral Energy,” on September 15, 2021.
36. Prof. Seppo A Korpela, Ohio State University, delivered the Institute Lecture on 'Fossil Fuels and Fate of Industrial Civilization', at seminar organised by the Dept. of Mechanical Engineering, IIT Tirupati, on February 9, 2022.
37. Prof. ShataLaisram, Professor of Mathematics & Associate Dean, Indian Statistical Institute, delivered a lecture on "On a Conjecture of Erdos on Squares in Arithmetic Progression" on 24th February 2022.
38. Prof. ShataLaisram, Professor of Mathematics & Associate Dean, Indian Statistical Institute, delivered a lecture on “On a Conjecture of Erdos on Squares in Arithmetic Progression” on 24th February 2022.
39. Prof. Subir Kumar Saha, Department of Mechanical Engineering, IIT Delhi, “MuDRA: Connecting Engineering Minds with Society” on April 21, 2021.
40. Prof. T. S. Mahesh, Indian Institute of Science Education and Research, Pune, delivered a talk on “Ongoing Revolution in Information Science: From Bits to Qubits”, at a seminar organized by the Department of Physics December 6, 2021.
41. Prof. V. Ramgopal Rao, Director, IIT Delhi, delivered a lecture on “Connecting Academic R&D with Product Innovation: A few Case Studies and a way forward,” November 29, 2021.

7.4. DISTINGUISHED LECTURE SERIES

1. Professor Bhikhu Parekh, Emeritus Professor at the University of Hull, UK, delivered a lecture on 'Constitutional Articulation of the Role of the Indian State' on September 8, 2021.
2. Shri Gurcharan Das, Author, Public Intellectual, Ex-CEO of Procter & Gamble India and Managing Director, Procter & Gamble Worldwide (Strategic Planning) delivered a lecture on 'Making a Life vs Making a Living' on November 24, 2021.

7.5. OTHER ACADEMIC ACTIVITIES

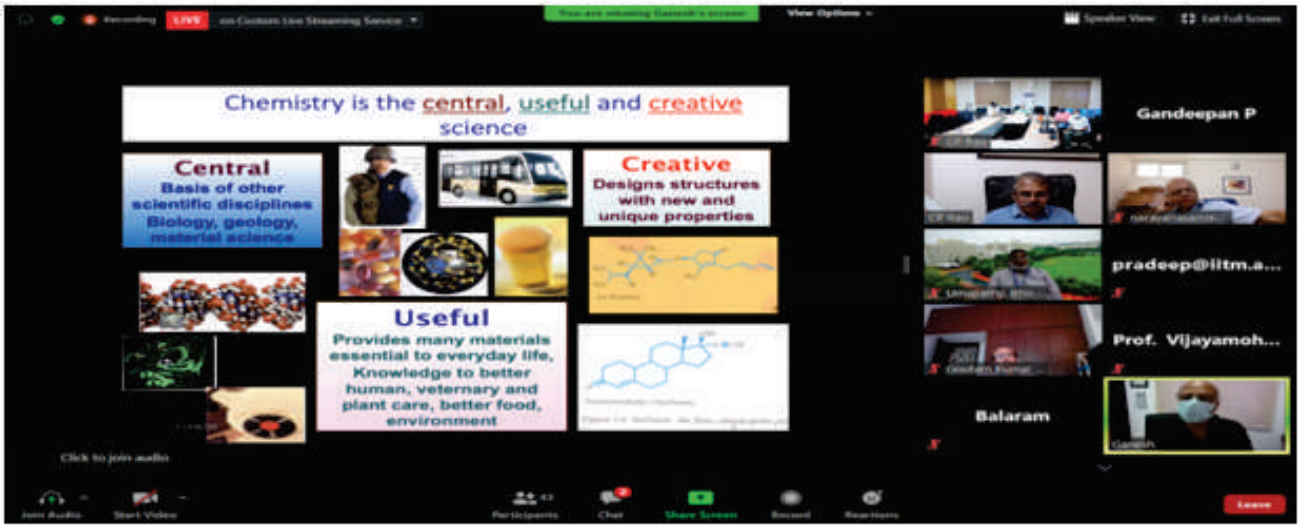
First Anniversary Colloquium Series by CAMOST

To commemorate the nucleation of CAMOST, Centre for Atomic, Molecular and Optical Sciences & Technology, the centre conducted CAMOST Anniversary Week Colloquium Series (16-20 August 2021). Five eminent scientists working on Quantum Science and Technologies and Plasma Science delivered lectures at this event. The details are as follows:

Speaker	Affiliation	Date	Title of the talk
Prof. G. Ravindra Kumar	TIFR Mumbai	16.08.2021	Physics of extreme states created by tabletop lasers
Prof. R. Vijayaraghavan	TIFR Mumbai	17.08.2021	How to build a quantum computer?
Prof. Urbasi Sinha	RRI Bangalore	18.08.2021	Photonic quantum science and technologies
Prof. Dmitry Budker	JGU Germany & UC Berkeley	19.08.2021	The perfect defect: Physics and sensing applications of the NV centers in diamond
Prof. Peter Bruggeman	University of Minnesota	20.08.2021	Low-temperature plasma – A perspective

National Science Day Celebrations

The Department of Chemistry, IIT Tirupati, took an initiative to impart chemistry knowledge to the local school and college students on National Science Day, 2022. The UG and PG students and faculty members of chemistry from IISER Tirupati, and the students (Grade VIII and above) from local schools participated in this one-day event on 26th February 2022. Prof. K. N. Ganesh, Director, IISER Tirupati, graced the occasion and delivered a popular science lecture, followed by an online demonstration of interesting chemistry experiments conducted by IIT Tirupati PG students. A science quiz was organised for the students.



8.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. During the period under discussion, the Institute organised its second and third joint convocation. This section of the report details the various events organised by the Institute during the year 2021-22.

The Second and Third Joint Convocation

The 2nd and 3rd Joint Convocation of IIT Tirupati was held on its permanent campus at Yerpedu on September 25, 2021. The occasion was graced by the presence of Mr. B. Santhanam, CEO, Saint Gobain, Asia-Pacific and Chairman & MD, Saint Gobain India Ltd as the chief guest, and Shri Amit Khare, IAS, Secretary (Higher Education), Government of India and Chairperson, Board of Governors of IIT Tirupati. Director Prof. K. N. Satyanarayana welcomed the guests and presented a report of the progress made by the Institute during the past years. The chief guest Mr. B. Santhanam delivered an inspirational convocation address and congratulated the graduands. The Chairman (BoG), Shri Amit Khare, congratulated the graduating students, and expressed his delight on the progress made by the Institute in such a short span of time.

A total of 208 B. Tech, 99 M. Tech, 9 M. Sc., and 11 M. S. (by research) degrees were awarded. In addition, the first PhD degree of the Institute was also awarded during the convocation ceremony. A total of 188 graduands received the degrees in person, while the rest of the graduands received the degrees online. The efforts and achievements of exceptional students were also recognised by awarding them with the President's Prize, Governor's Prize, Institute Prize, Amara Raja Prize, ITC. Ltd. Prize, and Aarvee Associates Prize.

75th Independence Day

IIT Tirupati celebrated the 75th Independence Day on August 15, 2021, on its permanent campus. The celebrations began with the hoisting of the national flag by Director Prof. K. N. Satyanarayana, followed by the national anthem. The Director addressed the gathering of the faculty, staff and students. Students organised diverse cultural events relating to national unity and love for the country. An official YouTube account for cultural programmes, "IITT CULTURALS", was launched on the day. The celebrations were streaming online.

73rd Republic Day Celebrations

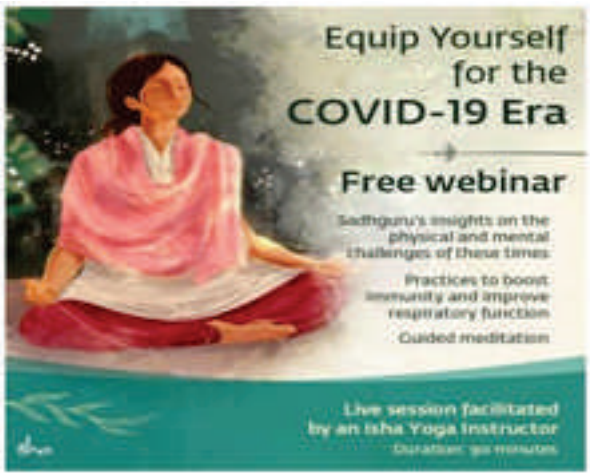
IIT Tirupati celebrated India's 73rd Republic Day on 26th January 2022. The programme started with the unfurling of the tricolour at the temporary campus by the Registrar, followed by unfurling of the tricolour by the Director, K. N. Satyanarayana, at the permanent campus in Yerpedu. The Director gave a speech on the occasion highlighting the significance of the day and asking students to unite in the pledge for the success and development of the country. This was followed by a marching parade done by the students. After that, since the Institute was running in online mode considering the then Covid – 19 situation, cultural performances were carried out in streaming mode where students participated mostly from their home. The event was carried out only with essential staff following all COVID related precautions and live telecasts and recordings were made available for all other staff and students.

Rights Awareness Programme for Construction Workers-Azadi Week

IIT Tirupati, in association with IISER Tirupati and the Central Construction Workers Advisory Council, organized anawareness programme for the construction workers on March 11, 2022 on the permanent campus. It was organized as a part of the iconic week - Azadi ka Amrit Mahotsav (March 7-13, 2022).During the event, Mr. Srinivasa Naidu, Chairperson of the Central Construction Workers Advisory Council, explained about the E-Shram portal and the workers' rights. Following this, the Director of IIT Tirupati briefed about different welfare schemes and facilities provided to the construction workers at IIT Tirupati.

International Yoga Day Celebrations

IIT Tirupati Sports Department and Fitness Club organized 7th International Day of Yoga on 21st June 2021 in an online mode. The celebrations included a global webinar on Yoga and Indian Medicine System co-hosted by Swami Vivekananda Yoga AnusandhanaSamsthana (S-VYASA), Bangalore as a part of India@75 Mahotsava. Director Prof. K. N. Satyanarayana gave the opening remarks followed by the inaugural address delivered by Dr. H. R. Nagendra, Chancellor, Swami Vivekananda Yoga AnusandhanaSamsthana, Bangalore. Dr B.R. Ramkrishna, Vice Chancellor S-VYASA, talked about the Intervention of the Ayurveda System in COVID 19 Pandemic. Prof. M. K.Sridhar, Registrar S-VYASA, talked about the history, evolution of Yoga, and India's contribution to the world. Dr Ranjitha R., Assistant Professor, SVYASA, demonstrated Common Yoga Protocol to the particpants.



SPIC MACAY Programmes

Carnatic Music Recital

SPIC MACAY Heritage Club organised a Carnatic Music recital by Dr. S. Sowmya on April 17, 2021. She was accompanied by Embar Sri S Kannan on the Violin, Neyveli Sri R Narayanan on the Mridangam, Chandrasekara Sharma on the Ghatam and Kumari Subashri on the Tanpura. The artistes not just gave a mesmerizing melodic performance but also explained clearly the intricacies and philosophies behind such a beautiful form of art and culture. It was a wonderful evening of fun and learning.

Veena Recital Performance

Vidushi Punya Srinivas performed a Veena recital on August 21, 2021, during the fifth virtual treat organised by SPICMACAY Heritage club, IIT Tirupati. Shri D. A. Srinivas played the Mridangam, and Shri S. Sunil Kumar played the Kanjira.

Flute Concert

SPIC MACAY Heritage club organized Virtual Flute Concert by Pandit Ronu Majumdar accompanied by Shri Ajeet Pathak on Tabla on February 11, 2022, as the sixth virtual treat.

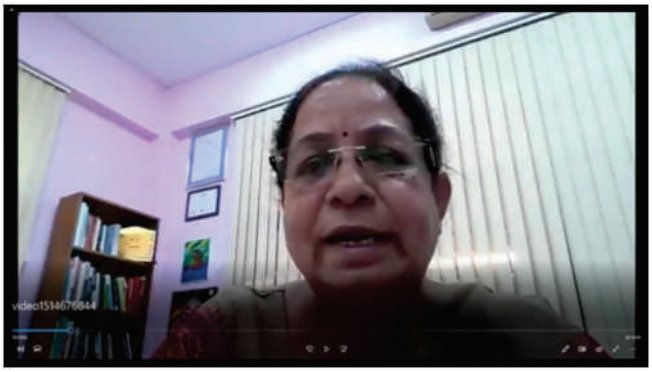
MEDHA Talk on Women Empowerment

MEDHA, Women's Forum & Internal Complaints Committee (ICC) and India@75 Celebration together organised an interesting talk by Missile Women of India, Dr. Tessy Thomas, Distinguished Scientist & Director General - Aeronautical Systems (AS), on June 23, 2021. The Title of the talk was *Women*

Empowerment. The talk motivated IIT Tirupati's female students to stand up for themselves and continuously strive to reach their goals.

MEDHA Women's Day Celebration

To commemorate International Women's Day (March 8), MEDHA had a fun and learning event planned on March 11, 2022. Prof. Archana Shukla, Director of IIM Lucknow, delivered a lecture on "Unlocking your Potential".



9. Campus Infrastructure

IIT Tirupati, since its inception, has been adding new infrastructure facilities to its temporary campus to meet the essential needs of the students and faculty as and when required. In order to meet the additional space requirement, the Institute hired another building adjacent to the existing one on lease to accommodate the increasing number of research scholars and faculty members. In the fourth year of its operations, IIT Tirupati started functioning from its 548 acres Permanent Campus located in Merlapaka Village on Yerpedu-Venkatagiri Highway. The construction of the permanent campus is underway in two Phases to cater to 2,500 students, 250 faculty members and 275 staff members, which has been planned to be built by 2024. Facilities under Phase 1 to cater to a 1250 students' campus are being established in three stages. Stage 1A (Transit Campus) and Stage 1B of the first phase of the campus has already been completed, whereas Stage 1C is under construction. 'Stage 1A (Transit Campus)' of the Institute has won the Exemplary Performance Award from GRIHA Council, New Delhi, and the first prize in the HUDCO Design Awards – 2018 for the design and construction of an eco-friendly campus with sustainable construction materials and technologies. This chapter reports about the progress made in the campuses of the Institute during the period under consideration.

9.1 TEMPORARY CAMPUS

Academic Buildings:

IIT Tirupati began functioning from its temporary campus situated on the Tirupati–Renigunta road in the premises of Krishna Teja Group of Institutions. Within a short span of time, the Institute created all the necessary infrastructure at its temporary campus to ensure smooth functioning. The Institute also created a kitchen-cum-dining facility on its temporary campus within the record time of 45 days using PEB structures. Following are the facilities that are available on the temporary campus:

- Auditorium – 200-Seater
- National Knowledge Network (NKN) Virtual Classroom
- 30-Seater Classroom – 2
- 60-Seater Classroom - 8
- 120-Seater Classroom – 1
- Faculty Cabins and Lounge
- Guest Faculty room
- Staffroom
- Research Scholars room
- Meeting rooms
- Board room
- Centralised Wi-Fi
- Administration Office
- Electronics Lab
- Physics Lab
- Chemistry Lab
- Workshop Computer Lab
- Innovation lab
- Kitchen-cum-Dining Facility
- Cafeteria
- Gymnasium
- Passenger Lift
- 24x7 – 365 days DG Backup for the entire campus
- RO system (2x500 Litres per hour)- For drinking and cooking
- Necessary facilities have been created for the access of the specially-abled

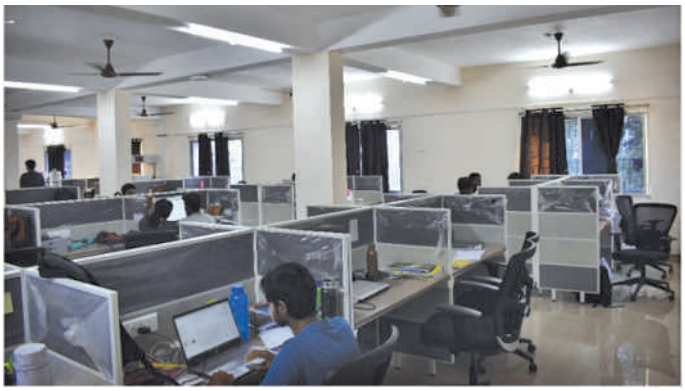
A view of the temporary campus

Annexe Building

In order to meet the additional space requirement for the increased strength of faculty members and research scholars, the Institute hired another G+2-floor building measuring an area of 10,000 sqft (approx.) close to the existing academic building.

A view of the Annexe Building

The Annexe building is also equipped with the facilities required for the faculty chambers and cabins for the research scholars. A total of 60 individual cubicles have been created for MS and PhD students to facilitate dedicated reading and research. Part of this Annexe building also caters to the requirement of some of the laboratories of the Physics Department.



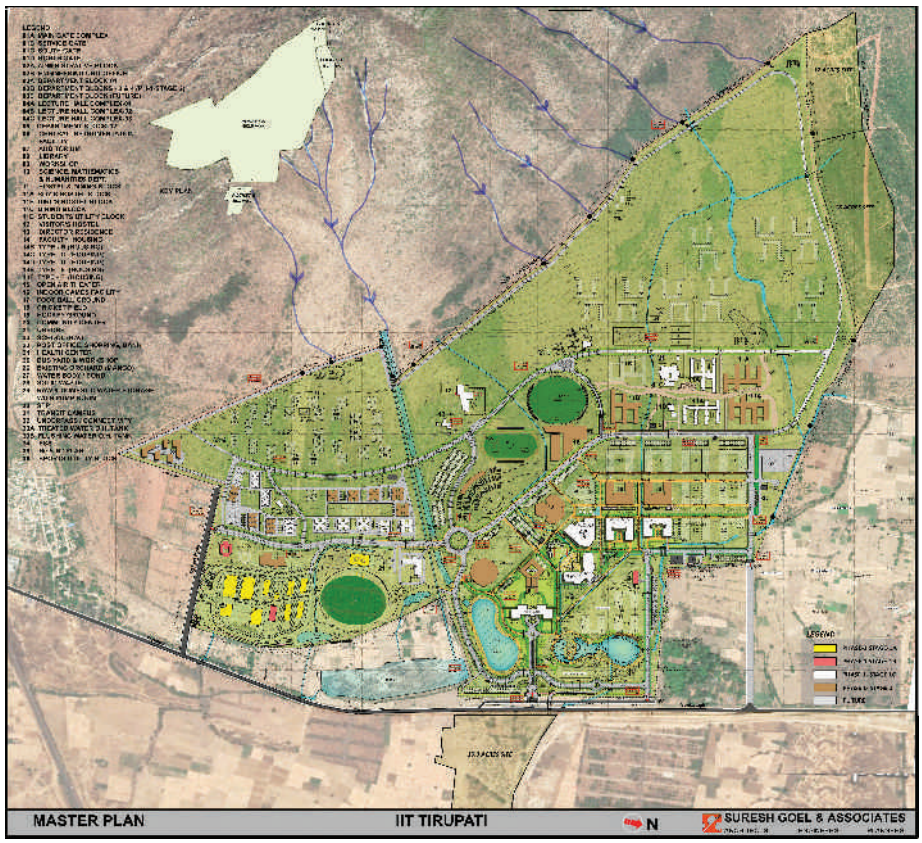
A view of the cubicles for Research Scholars

9.2 PERMANENT CAMPUS

The Government of Andhra Pradesh provided land to the Institute to the extent of 548.11 acres to develop the permanent campus located on the Yerpedu–Venkatagiri Highway in Merlapaka Village. The permanent campus site is 24 km from Tirupati town, 14 km from Renigunta Railway Station and 13 km from the Tirupati Airport. The construction of the compound wall around the site is completed.

With the due approval of the mentor Director, a Campus Master Plan Advisory Committee was constituted in March 2016 for the selection of Master Planner and Architect Agency. Following the due selection process, the committee appointed M/s Suresh Goel & Associates, New Delhi as a consultant for the campus master plan, academic buildings design, and external services in September 2017. For the design of residential buildings and sports facilities, M/s Adarshila Designs Pvt. Ltd, New Delhi has been appointed.

The Master Plan for the 12,000-student campus has been completed. It includes four zones, namely, Academic Zone, Hostel Zone, Housing Zone, and Recreational Zone, along with a transit campus (that has been integrated with the permanent campus) as shown in the figure below:



Master Plan, IIT Tirupati

Salient features of the Master Plan:

- A national highway bifurcates the site. The west campus (528.81 acres) will house the academic campus, and the east campus (19.3 acres) will house a research park. An underpass will connect these two campuses.
- The campus is planned with Green Building features (GRIHA 5/4 Star) as a smart, sustainable, and pedestrian-friendly campus.

- To maintain the ecological features of the campus site, the existing rivulets and water bodies are being retained. In order to preserve the ecology of the permanent campus site, a detailed Ecological Management Plan (EMP) was prepared by Care Earth Trust, a Chennai based NGO.
- Two water bodies/ponds are being created for the accumulation and storage of runoff. This will sustain three months of water supply for the entire campus.
- The locations of the buildings and other facilities are planned to minimise the earthwork (cutting and filling) in the site.
- The buildings are oriented to minimise heat retention

It has been planned that the permanent campus would be constructed in phases. A complete campus to provision 2,500 students, 250 faculty members and 275 staff members will be built by 2024. The construction is to be taken up in two stages. In Phase 1, buildings and facilities to cater to 1250 students, Director's residence, 168 faculty and staff members are to be completed. All operations are to be moved to the permanent campus by July 2022, the rest of the facilities will be ready in Phase 2 by 2024. Subsequently, the campus is to be developed in various phases growing over a period of 25-30 years to cater to a 12,000-student campus.

1. PERMANENT CAMPUS PHASE-1 STAGE 1A CONSTRUCTION (TRANSIT CAMPUS)

TOTAL BUILT-UP AREA = 22,674 sq m

The buildings and facilities on the permanent campus Stage-1A construction include:

- Five hostels with G+3 floors, each to accommodate about 150 students
- A G+1 floor multipurpose building with a 120-seater studio type classroom, a 60-seater recording studio, a 60-seater Computer lab, Library, and a Health Centre with two medical examination rooms and a 4-bed ward
- Two laboratory buildings, Lab 1 and Lab 2 to house laboratories for Civil and Mechanical Engineering (Lab 1), and laboratories for Electrical Engineering and workshop facilities (Lab 2)
- A residential block with four apartments for essential staff
- A maintenance office building
- An indoor-sports complex along with outdoor sports facilities
- A dining-cum-kitchen facility for 300 persons in a batch, equipped with a modern and hygienic kitchen
- BT roads with street lighting

- 500 kVA sub-station with a provision to extend DG Power automatically during the external power outages
- Water treatment and Sewage treatment plants

An aerial view of Phase -1, Stage 1A of the permanent campus

The construction of Transit campus includes following sustainable Eco-Friendly Features

- Glass Fiber Reinforced Gypsum (GFRG) technology in the construction of hostels and residential blocks.
- PEB structures for laboratories, workshop, dining block, indoor sports complex.
- Polished concrete flooring in the laboratories
- 48-volt DC light fittings and ceiling fans in hostels
- 220 kWp roof-top grid interactive type solar power plant
- Solar water heater
- High Volume Low Speed (HVLS) fans
- STP with treated water used for flushing and gardening purpose

2. PERMANENT CAMPUS PHASE-1 STAGE 1B CONSTRUCTION

TOTAL BUILT UP AREA = 7,156 sq m

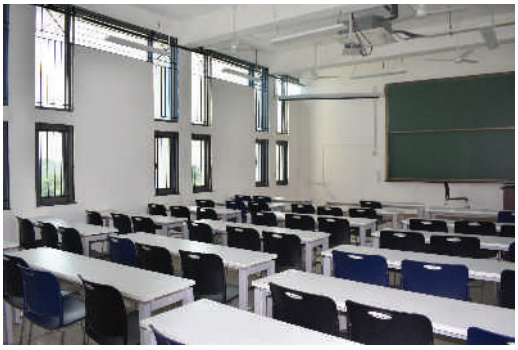
The buildings and facilities constructed on the permanent campus Stage-1B include:

- Class Room Building
- Engineering Unit Building
- Hostel Block-F (Sixth Hostel)

Class Room Building: This building is a (G+2) floor housing 13 classrooms, a computer lab, and the Academic Section office. The classrooms include eight 40-seater classrooms, four 60-seater classrooms, and a 120-seater classroom. The computer lab has a 20-seater capacity. The office room is developed to cater to the requirement of the administrative activities related to the academic section. All the access ramps and utilities are constructed to have easy access for the specially-abled people.

Aerial view of Class Room Building (G+2)

Typical view from inside the Class Room Building



Typical view of a 40-seater class room in Class Room Building

Typical view of the 120-seater class room in Class Room Building

Specially-abled friendly facilities – a typical view of Toilet in the Classroom Building

Hostel Block-F (Sixth Hostel): This hostelwith G+4 floors is constructed to accommodate about 180 students. The building is designed and built keeping in view good ventilation and air circulation, and all the access ramps are designed for the specially-abled.

Outside view of the Hostel Block – F

An inside view of the Hostel Block – F

Engineering Unit Building: This is a G+1 floor building constructed to meet the requirements of the administrative activities of the Engineering Unit. It houses the offices for Dean-Planning and Infrastructure, Head - Engineering Unit, and EU Staff. For the time being, the ground floor is allotted to CPWD to establish its office.

Outside view of the Engineering Unit Building

3. PERMANENT CAMPUS PHASE-1 STAGE 1C CONSTRUCTION:

TOTAL BUILT-UP AREA = 1,31,500 sq m

The Phase 1 Stage 1C construction started on June 03, 2020, and is progressing reasonably well in spite of the challenges posed due to the Covid-19 pandemic. All the facilities will be functional in a phased manner beginning in September 2021 until October 2022. It has four Zones: Academic Zone, Hostel Zone, Sports Zone, and Residential Zones.

Academic Zone: Department Blocks 1 & 2, Lecture Hall complex, Administrative Block, Central Instrumentation Facility and Gas production building. All the Buildings are fully Air-conditioned except the gas production building.

Hostel Zone: Two Hostel buildings to accommodate 1000 persons, Dining-cum-Kitchen facility with a wide variety of South Indian, North Indian and Continental dishes.

Sports Zone: Sports utility building for Indoor sports, Outdoor playgrounds for;

- Two Basketball courts
- Two volleyball courts
- Two Tennis courts and half practice court
- Running track cum football / Cricket Ground

Residential zone: 168 quarters for Faculty and Staff, Director's residence, and Visitors' hostel.

Support Services: Electrical Sub-stations, District cooling plant, Water Treatment Plant, Sewerage Treatment Plant, CCTV surveillance, Roads and Street lighting, Rooftop Solar Power, Solid Waste Management system, Biogas Plant etc.

Department Block-1 (G+3): A 120-Seater Classroom, six 60-Seater Classrooms, four 40-Seater Classrooms, eight Meeting rooms, twenty-eight Research Labs, forty-eight Faculty rooms, eight Under Graduate/Post Graduate Labs, twelve Research Scholar rooms etc. This block will house the Chemistry, Civil Engineering, Chemical Engineering, Mechanical Engineering, and Physics departments.

Rendering View of Department Block-1

Status as of March 2022: Super structure completed. Finishing work is under progress like polished concrete flooring work, tiling work, and Granite works. As of now, 75% of work has been completed.

Department Block-1 construction

Department Block-2 (G+3): A G+3 building having Library, Data Centre and Computer Lab, nine 60-Seater Classrooms, thirty Research Labs, forty-eight Faculty rooms, six Research Scholar rooms, Discussion rooms, 40-Seater Computer Lab etc. This building will house Computer Science and Engineering, Electrical Engineering, Humanities and Social Sciences, and Mathematics departments.

Rendering View of Department Block-2

Status as of March 2022: The **s**uperstructure work has beencompleted. Fixing of doors, and windows are in progress. As of now, 90 % of work has been completed.

Department Block-2 construction

Lecture Hall Complex: A240-seater Class Room, four 120-Seater Class Rooms, twelve 60-Seater Class Room, twelve 40-seater Classrooms, Students' Lounge, Faculty Lounge, Canteen, Tinkering Lab, Reading Lab, Physics and Chemistry Lab, Engineering Drawing Hall and Exhibition Hall.

Rendering view of Lecture Hall complex

Status as of March 2022: Foundation work, and ground floor slab have been completed. The first-floor wall concreting is in progress. As of now, 30% of work has been completed.

Lecture Hall complex construction

Administrative Building (G+4): This building housesoffices oftheDirector, Deans, Registrar, and various Administrative and Academic sections.

Rendering view of administrative block

Status as of March 2022: Foundation work and up to the third-floor slab concreting work have been completed. The fourth-floor wall concreting work is in progress.As of now, 52% of work has been completed.

Administrative block construction

Central Instrumentation Facility Building (G+2): This building housesCleaning room, high precision equipment for the research purposes.

Status as of March 2022: Foundation work and superstructure work have been completed. Brick work is in progress. As of now, 53% of work has beencompleted.

Central Instrumentation Facility Building construction

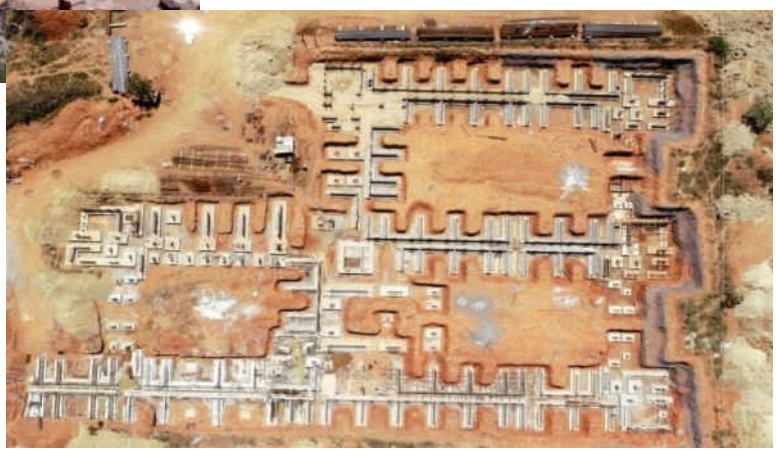
Hostel Buildings construction:

Hostel - 1 and Hostel - 2 Buildings: Each hostel will house495 individual student rooms, study room, indoor stadium, gym, warden room, assistant warden rooms, guest rooms etc.

Rendering view of one of the hostels

Status as of March 2022: Foundation work and superstructure work have been completed. Finishing work like painting, fixation of cupboards, etc. is in progress. As of now, 92 % of work has been completed.

Hostel Block-1 construction



Hostel Block-2 construction at the site

Dining Block (G+2): This building will cater to around 1000 students for dining, along with kitchen and bigger dining spaces.

Status as of March 2022: Foundation work and superstructure work have been completed. Internal electrical works are under progress. As of now, 63% of work has been completed.

Dining Block construction

Sports Utility Block (G+1): This building will be used for sports staff and staff equipment stores.

Status as of March 2022: Foundation work and superstructure work have been completed. As of now, 65% of work has been completed.

Sports Utility Block construction

Residential zone:

- 168 quarters for Faculty and Staff
- Director's residence
- Visitors' hostel

Director Residence: 1 (G+1)

Director Residence 1 (G+1): Completed and occupied in all respects.

Director's residence

Visitors Hostel (G+2):

Foundation work and superstructure have been completed in all respects. As of now, 55 % of work has been completed.

Visitors Hostel Construction

TYPE-B Building (Stilt+4) - 1 Block (16 Flats):

Finishing work is in progress. As of now, 71 % of work has been completed.

Type-B block construction

TYPE-C Buildings (Stilt+4): 4 Blocks (64 Flats)

Each floor of this building has four flats. Two Blocks (C3 and C2) are in the final stage of completion. Final finishing work is in progress. C1 and C4 finishing work is in progress.

Type-C3 block construction

TYPE-D Building (Stilt+4) - 1 Block (24 Flats):

Foundation work and superstructure have been completed in all respects. As of now, 91% of work has been completed.

Type-D Block construction

TYPE-E Building (Stilt+4): 1 Block (32 Flats)

Foundation work and superstructure have been completed in all respects. As of now, 72% of work has been completed.

Type-E block construction

TYPE-F Building (Stilt+4): 1 Block (32 Flats)

Foundation work and superstructure have been completed in all respects. As of now, 72% of work has been completed.

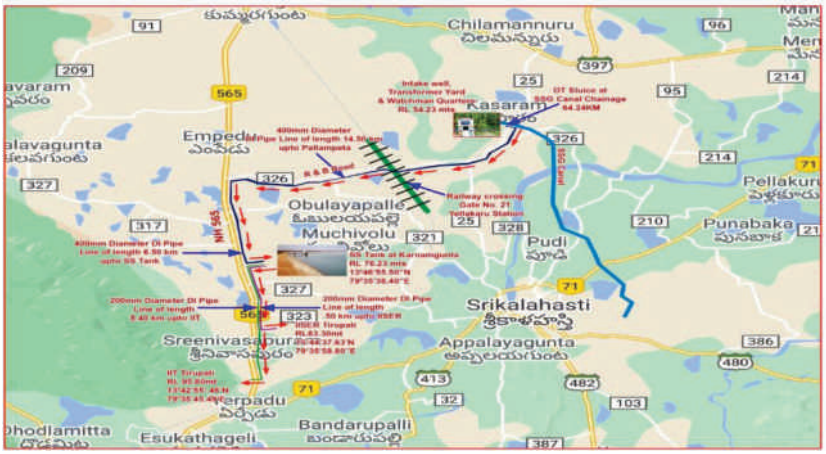
Type-E block construction

External Services

1. Road formation work is in progress.
2. Pond formation and excavation is in progress.
3. Electrical substation plinth beam work has been completed. Finishing work is in progress.

Drinking water facility to IIT Tirupati and IISER Tirupati

1. The Rural Water Supply and Sanitation (RWSS) Department, Government. of Andhra Pradesh is executing the work as a deposit work.
2. The scheme envisages supplying non-treated water of about 2.5 million litres per day to IIT Tirupati and 1.5 million litres per day to IISER Tirupati from SSG (Satya Sai Ganga canal). As of now, 72 % of work has been completed.



Map showing the drinking water facility to IIT Tirupati and IISER Tirupati

Underpass between two parcels of land allotted to IIT Tirupati on either side of NH-565

1. The National Highway Authority of India (NHAI), PIU, Tirupati, is executing the plan as a deposit work.
2. The design and estimates have been completed. Tendering is in progress.
3.

Typical plan showing the underpass connecting the two parcels of the campus on either side of NH-565

9.3 STUDENT HOSTELS AND OTHER FACILITIES

IIT Tirupati constructed 6 Hostels for boys and one Hostel for Girls in the first phase of constructionon the Permanent Campus site in Yerpedu. The total seating capacity of boys' hostels is 720, and the occupancy of Girls' Hostel is 180. All B. Tech and M. Tech students have been accommodated in these hostels. In addition to it, the Institute also leased two buildings in the vicinity of the Temporary Campus at Lakshmi Nagar Colony to offer hostel accommodation to MS and PhD students. 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 its own primary care health centres on both temporary and permanent campuses. It has also signed an MoU with a multispeciality hospital in the town to provide students with cashless treatment.

The Institute has also arranged a transport facility for the students to commute between the hostels and various facilities on the Temporary Campus. The hostels have a 24x7Wi-Fi facility connected through point-to-point radio from the main building of the Institute, washing machines, TV, water coolers, geysers, and common rooms.

An aerial view of the hostels on the permanent campus

Hostel in Lakshminagar Colony near Temporary 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

Health Centre

IIT Tirupati has its primary health care centres in both temporary and permanent campuses 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 and helps the students, faculty and staff through teleconsultations during a crisis like a pandemic. The emergency care equipment present at the Institute Primary Health Care Centre includes Defibrillator, Multipara Cardiac monitor, ECG machine, Autoclave, O_2 concentrator/O_2 cylinder, etc.

The Health Centre managed the COVID - 19 pandemic successfully by following the method of tracing, tracking and treatment. It successfully provided timely health education through guest lectures, emails and displaying charts.

For cashless treatments, the Institute has signed MoUs with Amara Hospital, CKS Dental College, Thyrocare lab, and Sri Venkateswara Institute of Medical Sciences, Tirupati. The Institute is in conversation with Care Hospitals, Hyderabad, and Hari Priya Dental Hospitals for signing MoUs. MoUs have already been signed with Apollo pharmacy at Korlakunta, Renigunta, Padamvathi Puram for cashless medicines. The team of Doctors and Nurses are available round the clock to provide advice, support and guidance to the students, faculty and staff in preventing and treating COVID - 19.

Guest House Facility:

To cater to the need of the guest house, the Institute has hired three flats in the KCR Tower apartment complex. For this purpose, five double-occupancy and three single-occupancy air-conditioned rooms with Wi-Fi and other required facilities are made available for the guests of the Institute. On the permanent Campus of the Institute, two double-occupancy air-conditioned rooms are also available. The guest house has a centralised kitchen-cum-dining hall.

Guest House facility at KCR Towers

Guest House facility on the permanent campus

10. STUDENT ACTIVITIES

In addition to their regular course of academic affairs, the students at IIT Tirupati are actively engaged in organising and participating in various technical, cultural, and sports activities that shape their innovative thinking and enhance their multidimensional talent. The Institute has fostered a number of active clubs in academics, photography, music, drama, dance, technology, astronomy, trekking, volunteering, social services etc. This section of the report summarises the events and activities organised by the students in 2021-22 under the following heads:

(a) Technical and techno-cultural events

(b) NSS activities

(c) Student clubs

(d) Sports-related activities

10.1 TECHNICAL EVENTS

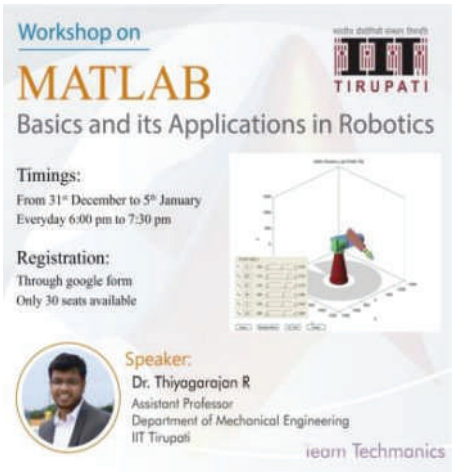
The Technical Affairs Domain consists of the Entrepreneurship Cell, Idea Square Team, and the four technical clubs- Tech Maniacs, Digital Wizards, GaganVedhi, and Winged Voyage. The team successfully organised the institute's first Intra-IIT Tech Summit event, where all the technical clubs came together to organise a series of technical competitions. This year, the technical clubs made strong collaborations with industries and startups to organise various events like- the ROS Workshop by Rig Betele Labs, Model Rocketry Workshop by Sunny Kabrawala (CEO of STAR Orbitals) and special talk on 'Decentralised Startups' by Raghu Mohan from Lumos Labs. Digital Wizards Club organiseda month-long 'DSA Series' with 10+ sessions covering various aspects of DSA, focused mainly on the coding tests that students come across mostly during their placements. The technical events organised by the technical clubs are hereunder:

- An**Intra-IIT Tech Summit** was organised byTechnical Affairs Council. In this event a series of technical competitions were organised in the month of November 2021 covering major technical domains with a participation of more than 100 students.

- A talk on **Decentralised Startups** was organised by the E-Cell (Entrepreneur Cell) in collaboration with Lumos Labs. The talk was delivered by Mr. Raghu Mohanwhich encouraged the attendees to explore a career in entrepreneurship via Crypto Products.
- **Startup Clinic Sessions**were organised twice every month.These sessions were conducted by Dr HiranVedamto help students crystallize their start-up ideas.
- **Block-Chain and Crypto-Currency Workshop** was organised in collaboration with industry professionals powered by Jupiter.
- The students organised a **workshop on introducing Arduino** by the use of the online simulator TinkerCadfollowed by an offline workshop on the same theme where the students were introduced to Arduino and its software and were given hardware to work on to get hands-on experience.


- **6-Day Workshop on MATLAB Basics and its Applications in Robotics**

  A series of 6 sessions spanning over 6 days, was organigedespecially for sophomores to start their journey on MATLAB. The workshop was a joint initiative by Dr R.Thiyagarajan (Faculty Advisor,TechManiacs) and the ROS Interest Group Coordinators. The workshop started with the basics of MATLAB coding and the later sessions covered the usage of MATLAB for the control of robots.



- A month-long online series of **sessions to introduce CAD and 3D Printing** was heldevery week where freshers were introduced to CAD modelling and assembling. The session also explored the various parts and functions of the FDM 3D printer, its kinematics, and the motion of gantry with special emphasis on IDEX-style 3D printers.

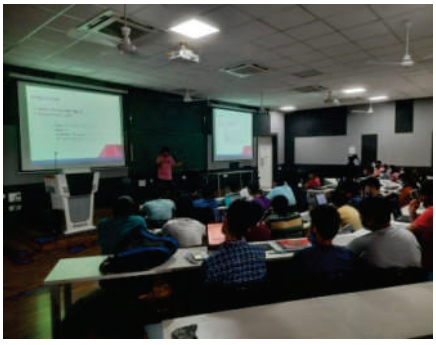
- **Workshop on Using 3D Printer and CNC Machine**

The sessions of the workshop introduced students to how a 3D printer works, its design considerations, and the workflow to be followed to 3D print a CAD design. They were also introduced to a Mini CNC machine and were trained on using both.

- Introductory Workshops were organised on **Web Development, Cyber Security, App Development, Python, and Machine Learning** by the various interest groups of Digital Wizards Club.

- A workshop on **NODE and Problem Solving was** organised to conduct sessions on explaining the NODE and how to solve problems related to DSA topics like Binary Search and Heap with examples of Running Median.

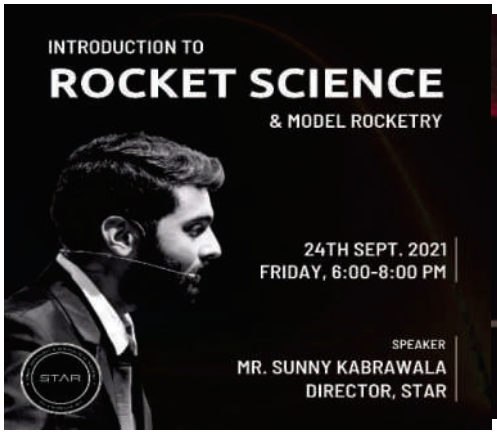
- A workshop on **REACT and Competitive Coding was** organised. The sessions were dedicated to explaining the basics of the development of REACT, coding, count inversion, and search in rotated sorted array.

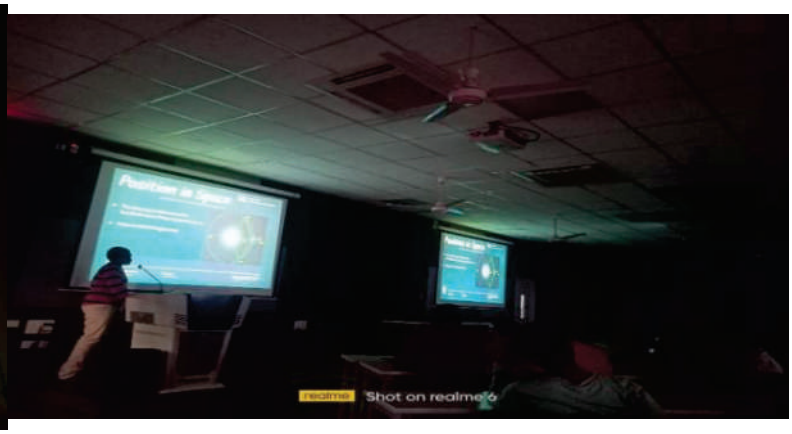


- As part of Tirutsava-2022,**Robospherea,**an Arduino-based robot soccer event where teams made their bot with a unique mechanism to hit the ball, was organised. A double-knockout tournament was held among the participants to choose the winner.


- **Rocket Science Workshop:**Team STAR Orbitals (A space-tech startup) conducted a workshop for both IIT Tirupati and IISER Tirupati. The basic structure of the rocket and its mechanics were the prime focus of the workshop. The attendees were also introduced to open rocket software. The speaker of the session was Mr. Sunny, CEO, STAR Orbitals.

- **WATCH PARTY - JWST LAUNCH:** On the launch of the James Webb SpaceTelescope, a watch party was organised. The event was divided into two parts - the presentation- where the term JWST, its importance, the engineering involved in its functioning, and its position in space, etc. were introduced; and the live stream, where the club live-streamed the launch broadcast by NASA.





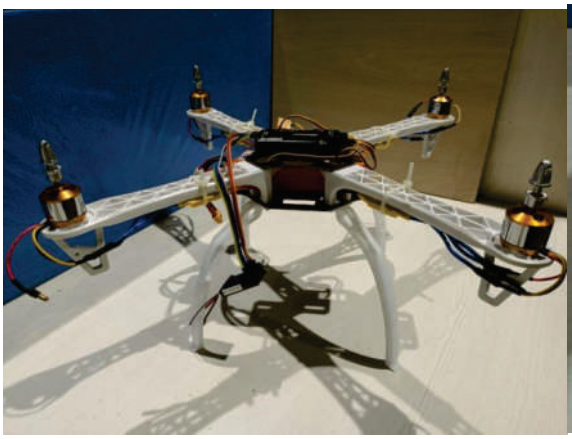
- **Club Projects:** The Technical Clubshave come up with an idea of giving innovative projects to the interested teams that are enthusiastic about taking up new technological challenges. Following are the projects that students are working on:

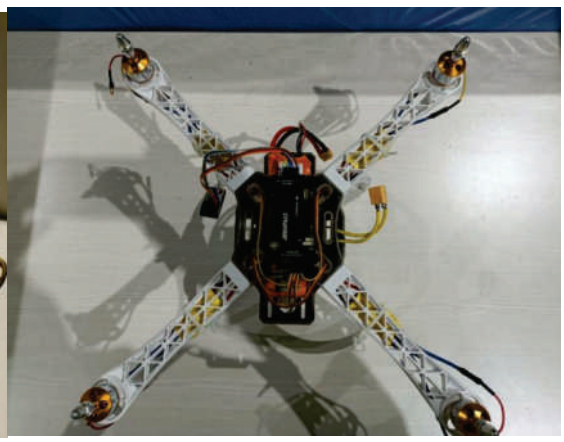
Hybrid 3D Printer Build Project

A team is working on building a 3-axis CNC machine with two interchangeable tool slots capable of routing, 3D printing, and laser engraving operations. Currently, the CAD design is almost finalized with minor changes/ additions. Further, the team will be working on analysing the structural stability of the build.

Drone Build Project

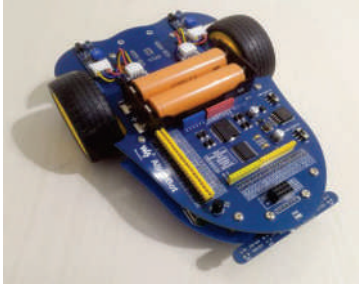
The team working on drone building has completed the mechanical build of the drone and is currently working on the drone's calibration.





Functional Weeder (IITB's EYRC 2021-22) Project

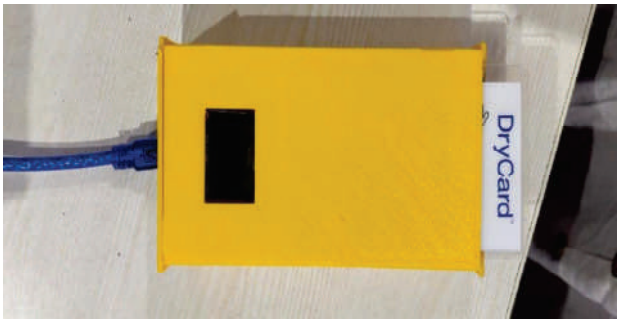
This project is intended to helplabour-intensive work in agriculture. The project's goal is to build multiple autonomous robots to explore the farm, which comprises crop seeds to be planted and weeds to be removed and communicate with one another to perform tasks concurrently. The team is simultaneously working on the robot's prototype and the programming using Elixir.



Project on IoT for Smart Agriculture Applications

Prototype-1: The team first developed an IoT device to monitor the moisture level of the soil for automated irrigation systems with radio transmission features.

Prototype-2: The team further developed another IoT device to exactly predict the moisture content in a seed bag. A conventional dry card is used to measure the moisture content in a seed bag, but itcan only givea rough estimate of the moisture level. The developed prototype successfully overcomes the problem stated above.



- **Collaboration with Algo-academy:** Code club collaborated with Algo-Academy and conducted a workshop where top industry experts gave information about placements and internships. They discussed how one could use competitive coding to get a better offer; after the workshop, the company held a contest and awarded prizes to the winners.

10.2 TIRUTSAVA - 2022: THE FIFTH TECHNO-CULTURAL FEST

Tirutsava is the annual festival of IIT Tirupati which is organised and managed by students of the Institute.Tirutsava-2022 was conducted in threephases— The Inception, The Avenue and The Conclusion. This year, the famous singer Sreerama Chandra performed for the pro-show on the second day. This breathtaking performance was followed by performances by DJ Ashtrix and DJ Esha on the last day of the event. In addition to these pro-shows, event teams conducted various events like Funky Feet (Dance competitions), Espressivo (Solo singing competition), KBC, various ideathons, Cricket-o-ania, Treasure Hunt, Capture the Flag, Enigma and squid games, to mention a few. The fest saw a footfall of around 10,000 people ranging from college students to working professionals.

10.3 NATIONAL SERVICE SCHEME ACTIVITIES

The overall aim of the National Service Scheme (NSS) is to give an extended dimension to the higher education system and orient the student youth to community services. The reason for the formulation of this objective is the general realisation that the students, both college-going and +2 level, have tendencies to alienate themselves from the village/slum masses that form the country's major population. The educated youth, who are expected to take the reins of administration in the

future, are found to be unaware of the problems of the village/slum community and, in some instances, are indifferent towards their needs and problems. Therefore, it is necessary to arouse the students' social conscience and provide them with an opportunity to work with the people in the villages and slums. It is felt that their interaction with the common villagers and slum dwellers will expose them to the realities of life and bring about a change in their social perception.

The academic year 2021 - 2022 was a challenge to all the institute activities, academic, social and otherwise. NSS, IIT Tirupati did its best with its available resources, online and offline, to participate in the collective struggle in this demanding time. With the four clubs— Schools, Old Age Homes and Orphanage, UBA and Rural Development, Health and Blood Camp, that formed to assist NSS activities, the team NSS could organise various activities towards social and environmental welfare.

The various events organised under various clubs and in collaboration with reputed NGOs in the year 2021 - 2022 are as follows:

A. NSS Day Plantation

Every year NSS Day is celebrated on 24 September. To make the 53rd NSS Day celebration even more memorable, the teamplanned a 'tree plantation' activity as a restoration campaign, with the aim of 'LET'S PLANT A TREE'. Those students who were not on campus wererequested to plant a tree at their place and upload a picture of the plantationin the Google form circulated.

B. Gandhi Punyaha

On the 152nd birthday of Mahatma Gandhi, the team NSS decided to celebrate it with an appreciation campaign, 'GANDHI PUNYAHA.'In this campaign, students, professors, and other administrative officials of IIT Tirupati volunteered in cleaning the Institute premises, giving a token

of thanks to the housekeeping staff for their earnest service. People at home were encouraged to cut down the usage of plastics for the entire week and were also requested to help their respective housekeepers on that day.

C. Poster and Video Making Competition

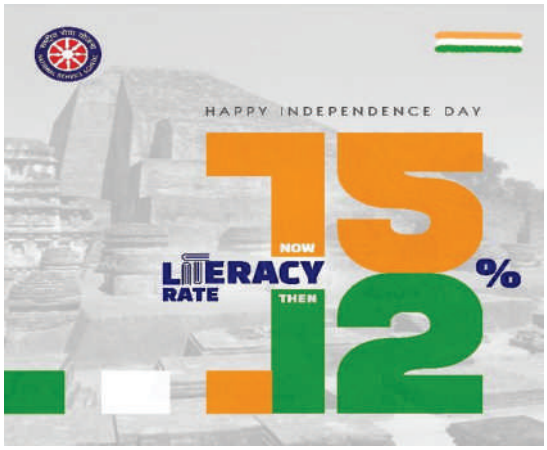
A poster and video-making competition wasorganised from 9th June to 8th July 2021, on the pandemic awareness theme. The team received a good number of posters and a few videos portraying the situation of the pandemic and the measures that must be taken to fight against the coronavirus in several regional languages.

D. Grocery distribution to the nearby village

NSS IIT Tirupati in collaboration with JCI contributed groceries worth Rs.25,000/- to the migrants from Gujarat staying at Marathi Puram, a nearby village.

E. Poster-Making Competition

In connection with the 75th Independence Day,NSS at IIT Tirupati conducted a poster-making competition from August 8 to 14, 2021 on the theme "India: Then vs. Now".



F. SwachhtaPakhwada- 2021

a. Pledge and Tree plantation

As a part of the SwachhtaPakhwada, 2021, NSS IIT Tirupati held a pledge and plantation event on the permanent campus of the institute on September 1, 2021.SwachhtaPakhwada, as instructed by the government, was observed between the 1st and 15th of September 2021.

b. 'Best out of Waste' Activity:

Every significant change comes from a small move and the same holds for this vision of Swachh Bharat. So, the team took a small step forward for this vision by conducting the "Best out of Waste" activity from 2nd to 11th September of 2021.28 products were made by 26 participants.These were the valuable innovative products transformed from the thrown away items.

c. Poster-Making Competition:

Apart from reusing the waste creatively to support a clean environment, reducing the trash by conserving those resources is also a key to Swachh Bharat. The team organised a poster-making competition themed on Swachata Importance, Forest, and Water Conservation from September 4 to 11, 2021.

d. Bag Making Competition:

To reduce plastic usage and encourage its alternatives, the NSS-UBA unit organised a Bag Making Competition from 9th to the 25th September 2021. Students were asked to make a bag using any eco-friendly material. A total of 18 students participated in the competition, contributing one bag

G. Mass Cleaning

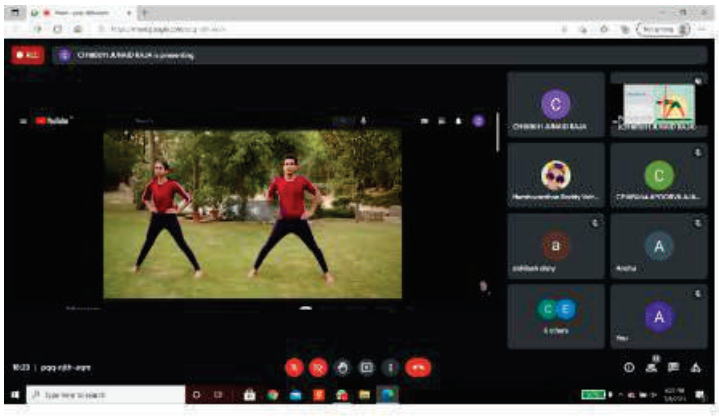
With an aim to motivate the students for a clean and healthy environment and pay respect to all the housekeeping staff for their impeccable work every day, NSS team conducted a mass cleaning activity on 02 January 2022 where all the students were requested to clean their hostel rooms themselves, giving a day off to the housekeeping staff.

H. Essay Writing Competition

Considering the perplexity of rural India and the need to develop it further, UBA - NSS IIT Tirupati organised an Essay Writing Competition from 11th to 27th February 2022 on the theme "Role of Engineers in Rural Development". As a part of this event, students were given an opportunity to express their understanding of the problems of rural India and their viewpoint on being an engineer, and what role they can play in the rural development.

I. Activities involving SOS Children's Village

A team of 92volunteers organised a total of 25 activities involving SOS Children's Village in collaboration with theSOS organisation and the Ullas Trust.The activities were designed such that the students could learn about life lessons, discipline and manners, etc.



J. Donating the Mask Activity

The NSS volunteers donated protective masks and meals to homeless children in their neighbourhood and interacted with them. The activity was organised with an intention to help the homeless people during the challenging time of COVID crisis.

K. Science Hack 2.0

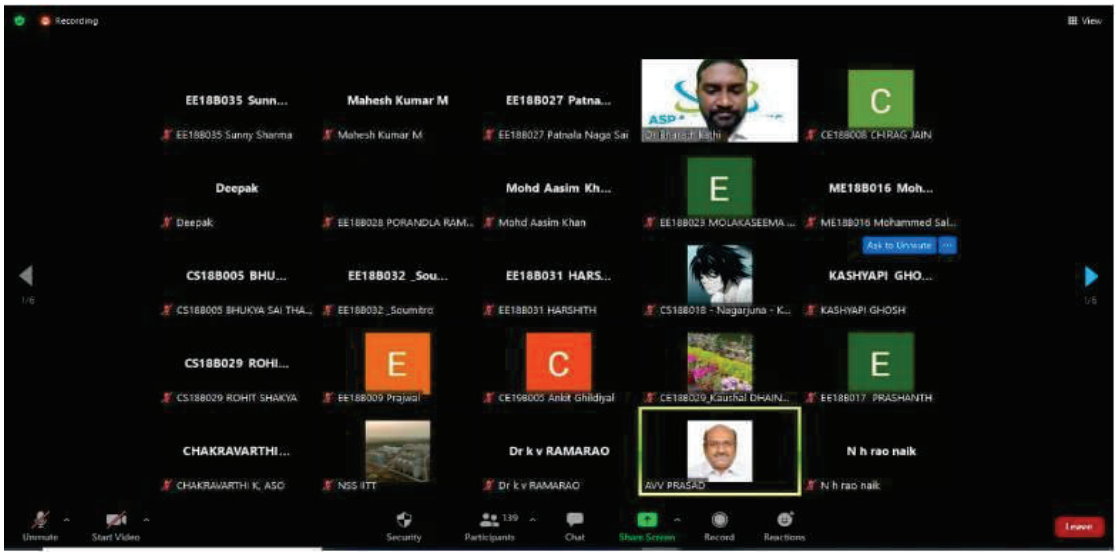
NSS Volunteers organised an online project competition called Science Hack 2.0 from 05 February to 15 March 022 where the students had to identify a science experiment and record a video of the demonstration. The team received a huge response from schools in different parts of the country where students demonstrated various experiments enthusiastically.

L. Poster Making Competition

NSS Unit of IIT Tirupati organised a poster-making competition from 12 to 23 November 2021 to promote and spread awareness about a healthy and tobacco-free environment on the campus. 17 participants presented their innovative ideas.

M. Talk about "Tobacco: A Devil in Disguise "

To create and promote a healthy and tobacco-free environment in the institution, a special talk was organised by the NSS, IIT Tirupati, on 18 November 2021. The topic for the talk was “Tobacco: A Devil in Disguise.” The speaker of the talk was Dr Bharat Kumar K., MBBS MD, who has been serving ASRA Chest Clinic, Tirupati, as a Consultant Pulmonologist. The special evening talk was hosted by MsKashyapi Ghosh.



N. Dental Check-Up

A dental checkup camp was organised on 18 December 2021 in association with Haripriya Dental Hospital for the students, staff, and faculty at the health center of IIT Tirupati. The primary motive was to create dental health awareness.

O. Seminar in collaboration with GCU

A seminar on Stress Management was organised in collaboration with GCU on 23 February 2022. The speaker for the day was Dr Nagesh from NIMHANS. The seminar was hosted by Dr. Pooja Vyavahare. The focus of the seminar was on the root causes of stress, strategies to balance stress, smartphone addiction, relationships, and time management.

P. Pulse Polio Immunization

The NSS volunteers were sent to the nearby polio camps to extend necessary assistance to the medical teams in the smooth conduct of Pulse Polio vaccination drive organised by the Govt. of India on 27 February 2022.

10.4 GCU - GUIDANCE AND COUNSELLING UNIT

The Guidance and Counselling Unit of IIT Tirupati aims to have a campus where every member of the institute is healthy both physically and mentally. In order to achieve the goal, Sarathi GCU IITT, in the year 2021-22, facilitated counselling sessions, and created awareness about mental health through webinars and activities. GCU facilitates counselling sessions for the community ensuring confidentiality of the people availing the sessions. From April 2021-March 2022, we were supported by Prof. Samiullah (Counsellor), MrsBhooma Krishnan (Counsellor), and YourDOST team (an online platform where counsellors are available 24X7). The GCU has set up its own office in the basement of Hostel F block where counsellors are available for face-to-face sessions twice a week. The room is equipped with office furniture along with a bed for relaxation during sessions. The central library also procured various books related to mental wellbeingon the recommendation of GCU. The end of the year 2021, when the classes and exams started offline after about 1.5 years of online classes due to Covid-19, many of the students found it difficult to deal with and to help them GCU conducted many more counselling sessions than the usual.

To reach out to the people in need, GCU launched its website, Instagram page and a Youtube channel earlier this year and also the posters were pasted throughout the campus with GCU contact details. The Unit continued its peer learning and UG buddy programmes throughout the year. In addition, the GCU also conducted various seminars (online and offline) for mental health awareness. The list of seminars is as follows:

1. Empower your Inner Self by Dr. Bhooma Krishnan on 23rd August 2021
2. A guide to suicide prevention by Dr. KersiChavda and Mr. Narendra Kinger on 1st November 2021
3. Barefoot counselling training programme for faculty members by Puroitree Majumdar on 1st December 2021
4. Peace of Mind or pieces of mind by Dr. Himanshu Asnani on 2nd February 2022
5. Stress management by Dr. A M Nagesh on 23rd February 2022
6. General GCU orientation sessions by GCU faculty advisor and a counsellor for new UG, PG students and research scholars

10.5 STUDENT CLUBS AND ACTIVITIES

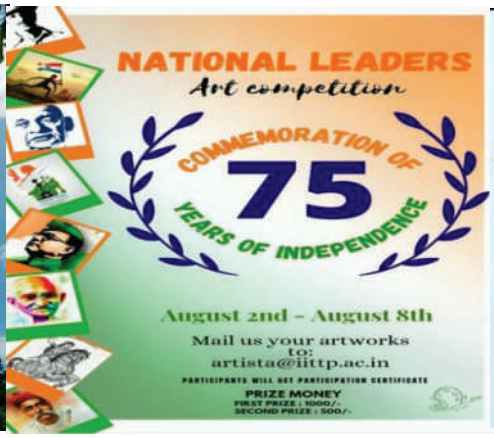
The student clubs play a pivotal role in organising events to extend life beyond the boundaries of textbooks and exams to extra-curricular development. Several events have been organised by the different clubs during the year 2021-2022.

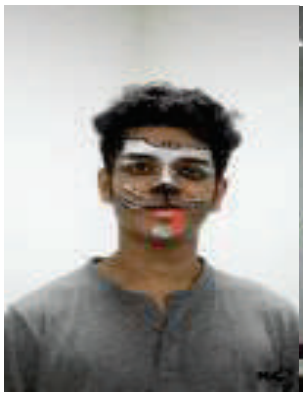
Actomania- The Drama Club

The Actomania club hosted a lot of online events using social media platforms such as Instagram and Facebook to reach out to a larger audience. The club conducted a dialogue delivery competition titled “Lights, Camera, Action!” in connection with the Independence Day. Another entertaining event, “Dumbcharads” was also organised by the club. Actomania also successfully completed an online workshop, where participants enjoyed the session and learned some skills in acting.

Artista- The Art Club

Events like National Leaders Painting, Logo Making Competition, Halloween Face Painting Session, Diya Painting Session, and Still Life Sketching were organised by this club. DuringTirutsava, the club organised competitions like Character Design and Wordoodle.





Photography and Film Club (PFC)

The photography and film club (PFC) hosted a series of photography and video-making competitions like the Shutter Skills 3.0 Photo Contest, Editor's Cut Video Editing Contest, Lorem Ipsum Graphic Design Contest, and Photoverse Photography Contest. The club released the TirutsavaAftermovie 2022, the Fresher's Intro Video AAGMAN 2021 and a video showing a glimpse of the transit campus.

Sargam- The Music Club

Sargam, the music club, conducted a series of events in the academic year 2021-22, like Radio Nights, Antakshari Only, and Unplugged - Acoustic Night. The club also organised Antara 6 - The musical event exclusively for Freshers '21 which was an introductory session for the freshers. There

were events like Sargam Online Show 2.0, Saturday Night Live with Sargam, and 20+ hours of online sessions, which included discussions, fun and informative musical games, virtual meets with the alumni and impromptu composing.

Xcite-The Dance Club

The dance club conducted events like Dance Week and K-Pop challenges. Several offline events were also conducted this year after the campus was reopened, like Christmas Eve Group Dancing, workshops on Hip-hop dancing and dandiya routines. DuringTirutsava 2022, flash mobs were also held.Solo and duo dance competitions were also organised for events like “Spark” and “Fiesta”.

Aranya Club

The club organised events like Scavenger Hunt (a quiz and an online scavenger hunt to introduce the students to some of the flora and fauna of Andhra Pradesh), and Treasure Hunt.

Cultural Activities

The activities of the cultural committee started with the celebration of Independence Day. The students celebrated this national festival on the Zoom platform. An online fest was organised in

collaboration with Tribevibe, a sunburn company under BookMyShow for the freshers. Ganesh Chaturthi was celebrated in the offline mode adhering to all the COVID norms. Open-mic sessions were also organised, where students were given an opportunity to present their views. Diwali was celebrated with the Diya Painting conducted by the Artista club in the morning session and a Rangoli competition in the evening session. The Signature Day was also organised for the graduating students to share their memories and to get their t-shirts signed by their friends. Christmas, New year, Sankranti and Holi were also celebrated on the campus.

Literati Club

The Literati Club consists of the Literary Affairs Committee, the Debate and Oratory Club, the Quizzing Club, and the Writing Club. The club is planning to expand its reach by making an online presence, therefore, the club has set up three Instagram handles namely, Literati IITT, Scribbles IITT and Film Buffs IITT. The club organised events like Standpoint, and Open Debate Sessions.

The club also conducted programs like "Have We Met Before?", essay writing competition, ease your pace, and poetry circle. The January 2022 edition of Udaan, a student-run campus magazine,

was also published. The club has a dedicated discord server, where students can share their literary work and receive feedback from their fellow writers. The teams from the Debate and Oratory club participated in 11 inter-college events, including the Aristotle Cup, an international intervarsity debate tournament hosted by a university in the Philippines. The club has organised more than twelve parliamentary debate sessions, five casual oratory sessions and several impromptu events.

10.6 SPORTS ACTIVITIES

A sports council is central to the coordination and functioning of different sports activities under the supervision of the Sports Officer, Physical Training Instructor, and Faculty Advisor.

FIT India Freedom Run

As per the guidelines from the Ministry of Education, Fitness Club IIT Tirupati organised the 'Fit India Freedom Run' on 13th August 2021 for faculty, staff, and students.

Fit India Cyclothon - 2021

Fitness Club organised FIT India Cyclothon - 2021 on 28th November 2021 on the permanent Campus of the Institute.

Winter Tournament - 2021

In the month of December, the Sports Councilorganised winter sports events that included games like Badminton, Basketball, Football, Table Tennis, and Volleyball.

11. APPENDICES

APPENDIX-1

Research Publications

Journals

Chemical Engineering

1. A. Bhattacharjee, M. K. Purkait, S. Gumma, and C. V. Sastri. "CeO2 nanoparticles incorporated MIL-100(Fe) composites for loading of an anticancer drug: Effects of HF in composite synthesis and drug loading capacity." *Inorg. Chim. Acta*., vol. 533, pp. 120784, 2022.
2. A. K. Patan, and S. K. Thamida. "Modeling and Simulation of a Batch Reactive Distillation Process with Column Heating." *Chemical Engineering & Technology*, vol. 44, no. 12, pp. 2365-2373, 2021.
3. A. K. Patan, M. Mekala, and S. K. Thamida. "Simulation of a Steady State Continuous Catalytic Reactive Distillation Column by Using a Multiscale Capillary Model." *Chemical Engineering & Technology*vol. 45, no. 5, pp. 878-889, 2022.
4. A. Sadeghian, M. Nabil, O. Wu, and B. Huang. "Robust Probabilistic Principal Component Regression with Switching Mixture Gaussian Noise for Soft Sensing." *Chemometrics and Intelligent Laboratory Systems*, vol. 222, pp. 104491, 2022.
5. P. Das, B. P. Mandal, and S. Gumma. "L-tyrosine grafted palladium graphite oxide and sulfonated poly (ether ether ketone) based novel composite membrane for direct methanol fuel cell." *Chemical Engineering Journal,*vol. 423, pp. 130235, 2021.
6. P. Das, D. Mukherjee, B. P. Mandal, and S. Gumma. "Engineering of Interfacial Energy Bands for Synthesis of Photoluminescent 0D/2D Coupled MOF Heterostructure with Enhanced Selectivity toward the Proton-Exchange Membrane," *ACS Applied Materials and Interfaces*, vol. 13, pp. 29619-30, 2021.
7. P. Medikonda, R. Pilli, C. V. Sastri, and S. Gumma. "Adsorption of gases on small–pore aluminum bisphosphonate MOF MIL–91(Al)." *J. Chem. Sci*, vol. 133, 2021.
8. R. Gadhewal, S. K. Thamida, V. V. Ananthula, and V. S. Patnaikuni. "Hot spot identification in PEM fuel cell and its purging strategies." *Chemical Papers*, vol. 76, no. 2, pp. 1199-1211, 2022.
9. R. Mittal, R. Sharma and KSMS Raghavarao. "Novel adsorption approach for the enrichment of R-Phycoerythrin from marine macroalga Gelidiumpusillum." *Algal Research*, vol. 62, pp. 102605, 2022.
10. R. Tellagorla, S. C. Balchandani, S. Gumma, and B. Mandal. "Equilibrium CO2 solubility of novel tris(2-aminoethyl) amine as a promoter to N-methyldiethanolamine and 2-amino-2-methyl-1-propanol." *Sep. Purif. Tech*., vol. 279, pp. 119705, 2021.
11. Y. Cao, M. Nabil, B. Huang, and Y. Wang. "Multimodal Process Monitoring Based on Variational Bayesian PCA and Kullback-Leibler Divergence between Mixture Models." *Chemometrics and Intelligent Laboratory Systems*, vol. 210, pp. 104320, 2021.

Civil and Environmental Engineering

1. A. M. Krishna, and Biswas, A. "Performance of Geosynthetic Reinforced Shallow Foundations." *Indian Geotech Journal*, vol. 51, pp. 583–597, 2021.

2. A. S. S. Kumar Dey, and A. M. Krishna "Evaluation of dynamic shear modulus of sand using on-sample strain measurements in cyclic triaxial testing." *Acta Geotechnica* (Springer), vol. 16, pp. 221-236, 2021.

3. A. Singh, A. Charak, and K. P. Biligiri, and V. Pandurangan. "Glass and carbon fiber reinforced polymer composite wastes in pervious concrete: Material characterization and lifecycle assessment." *Resources, Conservation & Recycling*, vol. 182, 106304, 2022.

4. A. Singh, K. P. Biligiri, and P. V. Sampath. "Engineering properties and lifecycle impacts of Pervious All-Road All-weather Multilayered pavement." *Resources, Conservation and Recycling*, vol. 180, p.106186, 2022.

5. A. Singh, K.P. Biligiri, and P. V. Sampath. "Engineering properties and lifecycle impacts of Pervious All-Road All-weather Multilayered pavement." *Resources, Conservation & Recycling*, vol. 180, pp. 106186, 2022.

6. B. Radhika, V. Pannala, S. Singh, S. Sundar, and K. P. Biligiri. "Time-Frequency Analysis of Acoustic Signals from Tyre-Pavement Interaction." *Journal of the Acoustical Society of America*, vol. 151(1), 2022.

7. B. Radhika, VishalaPannala, Sudhanshu Singh, Sriram Sundar, and Krishna PrapoornaBiligiri. "Time-Frequency Analysis of Acoustic Signals from Tyre-Pavement Interaction." *Journal of the Acoustical Society of America*, vol. 151(1), 2022.

8. Gandhi, T. P., Sampath, P. V. and S. M. Maliyekkal. "A critical review of uranium contamination in groundwater: Treatment and sludge disposal." *Science of The Total Environment*, vol. 825, pp. 15394, 2022.

9. M. Nagaraj, and Srivastav, R. "Non-stationary modelling framework for regionalization of extreme precipitation using non-uniform lagged teleconnections over monsoon Asia." *Stoch Environ Res Risk Assess*, vol. 36, pp. 3577-3595, 2022.

10. MSVN Jyothi, A. Harafan, S. S. Gupta, N. Neethu, G. Singhal, B. J. Ramaiah, and S. M. Maliyekkal. "Chitosan immobilised granular FeOOH-MnxOy bimetal-oxides nanocomposite for the adsorptive removal of lead from water." *Journal of Environmental Chemical Engineering*, vol. 10(2), 107353, 2022.

11. N. Siva Pavani Peraka, K. P. Biligiri, and K. N. Satyanarayana. "Development of a Multi-Distress Detection System for Asphalt Pavements: A Transfer-Learning Based Approach."*Journal of the Transportation Research Record*, vol. 2675, issue 10, pp. 538-553, 2021.

12. P. Chauhan, V. Kanagaraj, and G. Asaithambi, "Understanding the Mechanism of Lane Changing Process and Dynamics using Microscopic Traffic Data." *Physica A: Statistical Mechanics and its Applications*, vol. 593, p. 126981, 2022.

13. P. K. Behera, S. Misra, and K. Mondal, "Corrosion behavior of bent plain reinforcing rebars used in concrete." *Materials and Structures*, vol. 55 (37), 2022.

14. P. Vaddy, V. Pandurangan, and K. P. Biligiri. "Discrete Element Modeling to Investigate Flexural Strength of Pervious Concrete." *Construction and Building Materials*, vol. 323, pp. 126477, 2022.

15. S. J. Gaddam, and P. V. Sampath. "Are multiscale water–energy–land–food nexus studies effective in assessing agricultural sustainability?" *Environmental Research Letters*, vol. 17(1), p.014034, 2022.

16. S. Sahdeo, A. K. Chandrappa, and K. P. Biligiri. "Effect of Compaction Type and Compaction Efforts on Structural and Functional Properties of Pervious Concrete." *Transportation in Developing Economies,* vol. 7, no. 19, 2021.

17. T. P. Gandhi, P. V. Sampath, and S. M. Maliyekkal. "A critical review of uranium contamination in groundwater: Treatment and sludge disposal." *Science of The Total Environment*, vol. 825, p. 15394, 2022.

18. U. Kannan, S.A. Gafoor, S. Srivastava, S. Gupta, M. Nithyaharan, S.M. Maliyekkal. "A waste-derived nanocomposite sealant for repairing micro-cracks in concrete." *Journal of Building Engineering*, vol. 48, pp. 103965, 2022.

Computer Science and Engineering

1. A. S. M. Venigalla, D. Vagavolu, and S. Chimalakonda. "SurviveCovid-19-an educational game to facilitate habituation of social distancing and other health measures for covid-19 pandemic." *International Journal of Human–Computer Interaction*, vol. 38, issue 16, pp. 1563-1575, 2022.
2. A.S.M. Venigalla and S. Chimalakonda. "On the comprehension of application programming interface usability in game engines." *Journal of Software: Practice and Experience*, vol. 51, issue 8, 2021.
3. G. K. Nayak, K. R. Mopuri, S. Jain, and A. Chakraborty, "Mining Data Impressions from Deep Models as Substitute for the Unavailable Training Data." *IEEE Transactions on Pattern Analysis and Machine Intelligence,*vol. 44, no. 11, pp. 8465-8481, 2021.
4. J. Tudu, S. Ahlawat, S. Shukla, and V. Singh. "A framework for configurable for joint-scan design-for-test architecture." *Springer Journal of Electronic Testing: Theory and Application (JETTA)*, vol. 37,pp.593–611, 2021.
5. K. R. Mopuri, H. Bilen, N. Tsuchihashi, R. Wada, T. Inoue, K. Kusanagi, T. Nishiyama, and H. Tamamura. "Early sign detection for the stuck pipe scenarios using unsupervised deep learning." *Journal of Petroleum Science and Engineering*, vol. 208, 2022.
6. R. Sharma and V. R. Badarla. "A Multi Objective Optimization Tool-Chain for 3D Indoor Beacon Placement Problem." *IEEE Internet of Things Journal*, vol. 8, no. 17, 2021.
7. S. E. Bhaskara, A. K. Pradhan, V. Badarla, and S. P. Mohanty. "iBlock: Intelligent Decentralised Blockchain-based Pandemic Detection and Assisting System." *Springer Journal of Signal Processing Systems*, vol. 94**,** pp. 595–608, 2021.
8. S. E. Bhaskara, A. K. Pradhan, V. R. Badarla, and Saraju P. Mohanty. "Fortified-Chain: A Blockchain Based Framework for Security and Privacy Assured Internet of Medical Things with Effective Access Control." *IEEE Internet of Things Journal*, vol. 8, no. 14, pp. 11717-11731, 2021.

Electrical Engineering

1. A. K. Jha, A. Lamecki, R. Gómez-García, and M. Mrozowski, "Extending the frequency limit of microstrip coupled CSRR using Asymmetry." *IEEE Transactions on Microwave Theory and Techniques*, vol. 69, no. 8, pp. 3759-3769, 2021.
2. A. K. Jha, N. K. Tiwari, and M. J. Akhtar. "Accurate microwave cavity sensing technique for dielectric testing of arbitrary length samples." *IEEE Transactions on Instrumentation and Measurement*, vol. 70, pp. 1-10, 2021.
3. A. S. Madhvacharyula, A. V. S. Pavan, S. Gorthi, S. Chitral, N. Venkaiah and V. K. Degala. "In situ detection of welding defects: a review." *Welding in the World Journal,*vol.66 (4), p.611-628, 2022.
4. D. Mondal, S. Yuvaraj, M. Rawat, M. K. A. Thumm and M. V. Kartikeyan. "Realistic Design Studies on a 300-GHz, 1-MW, DEMO-Class Conventional-Cavity Gyrotron." *IEEE Transactions on Electron Devices*, vol. 69, no. 3, pp. 1442-1450, 2022.
5. G. N. K. Reddy, M. S. Manikandan and N. V. L. Narasimha Murty. "Evaluation of Objective Distortion Measures for Automatic Quality Assessment of Processed PPG Signals for Real-Time Health Monitoring Devices." in *IEEE Access*, vol. 10, pp. 15707-15745, 2022.
6. G. S. Baghel, and M. V. Kartikeyan. "Output System of a 42/84 GHz 0.5 MW Dual Regime Gyrotron." *Defence Science Journal*, vol. 71, No. 3, pp. 341-345, 2021.

7. G. Smpokos, Z. Chen, P. Mohapatra, and N. Pappas. “Performance Analysis of a Cache-Aided Wireless Heterogeneous Network with Secrecy Constraints.” *IEEE Access*, vol. 9, pp. 52442-52454, 2021.
8. I. A. Gillani, P. Vyavahare, A. Bagchi, “Lower bounds for in-network computation of arbitrary functions.” *Distributed Computing*, vol. 34, pp. 181-193, 2021.
9. J. K. Mandapalli, V. Ravi, S. S. Gorthi, S. Gorthi and R. K. S. Gorthi. “Single-shot circular fringe projection for profiling of objects having surface discontinuities.” *Journal of the Optical Society of America A (JOSA-A)***,** vol. 38, no. 9, pp. 1-13, 2021.
10. K. P. Naveen and R. Sundaresan. “Double-Auction Mechanisms for Resource Trading Markets.” *IEEE/ACM Transactions on Networking*, vol. 29, no. 3, pp. 1210 – 1223, 2021.
11. N. George, P. Vooka, A. S. K. Bandi, and S. Gopalakrishna. “A novel dual slope conversion technique for measurement of ratio and phase errors of current transformer using comparison method of testing.” *Measurement*, vol. 179, 2021.
12. Pallavi V, D. Mishra, and R. K. S. Gorthi. “Guided MDNet Tracker with Guided Samples.” *The Visual Computer (TVCJ),* Springer, vol. 38, pp.1135–1149, 2022.
13. Ruchi, and M. V. Kartikeyan. “Metamaterial-inspired tri-band antenna for 5G-C and Ka band applications.” *Microwave Optical Technology Letters,*vol. 63, pp. 2423– 2429, 2021.
14. S. Adya, S. Yuvaraj, M. Rawat, M. V. Kartikeyan and M. K. Thumm. “Investigations on RF Behavior of a V-Band Second Harmonic Gyrotron for 100/200 kW Operation.” *IEEE Transactions on Plasma Science*, vol. 50, no. 2, pp. 222-228, 2022.
15. S. Mohapatra, M. Abhangi, S. Vala, P. K. Sahu, S. Rath, and N. V. L. Narasimha Murty. “Comparative study of Single Crystal (SC)-Diamond and 4H-SiC bulk radiation detectors for room temperature alpha spectroscopy.” *Journal of Instrumentation*, vol.16, p.06020, 2021.
16. S. Ramakrishnan, V. Ramaiyan, and K. P. Naveen. “Completely Uncoupled Utility Maximization Algorithms for State Dependent Networks.” *IEEE Transactions on Wireless Communications*, vol. 21, no. 1, pp. 191 – 202, 2022.
17. S. Zhou and A. K. Jha. “Characteristics modeling of GaN class-AB dual-band PA under different temperature and humidity conditions.” *IEEE Access*, vol. 9, pp. 121632-121644, 2021.
18. Sannakashappanavar, B. S. Yadav, A. B. Kumar, and N. V. L. Narasimha Murty. *“*Low Resistance Ohmic Contact on ZnO Thin Film Revealed by Schottky Barrier Height.” *Silicon,* vol.14, 1531–1536, 2022.
19. Sumanth V, Naveen P, and R.K.S. Gorthi. “3D Deformation Measurement in Digital Holographic Interferometry Using A Novel Multitask Deep Learning.” *Journal of the Optical Society of America A (JOSA-A),* vol. 39, no. 1, pp. 167-176, 2022.
20. Sumanth V, Vaishnavi R, and R. K. S. Gorthi. “A Multi-task Learning for 2D Phase Unwrapping in Fringe Projection.” *IEEE Signal Processing Letters***,** Vol. 29, pp. 797 – 801, 2022.
21. U. Somalatha and P. Mohapatra. “Role of Shared Key for Secure Communication Over 2-User Gaussian Z-Interference Channel.” *IEEE Transactions on Information Forensics and Security*, vol. 17, pp. 85-98, 2021.
22. V. Swetha, A. K. Mishra, D. Mishra, and R. K. S. Gorthi. “An eigenvector approach for obtaining scale and orientation invariant classification in convolutional neural networks.” *Advances in Computational Intelligence,* Springer, vol. 2, no. 8, 2022.
23. V. L. Vineela, P. A. Praveen, T. Kanagasekaran, N. Kumar, and N. V. L. Narasimha Murty. “Direct x-ray detection using thin-film pentacene Schottky diodes.” *Journal of Instrumentation*, vol. 17, P02024, 2022.

Mechanical Engineering

1. A. Basak. "Grain boundary-induced premelting and solid<->melt phase transformations: effect of interfacial widths and energies and triple junctions at the nanoscale." *Physical Chemistry Chemical Physics.* vol. 23, pp. 17953-17972, 2021.
2. A. Krishna, L. S. Aravinda, A. Murugan, N. S. Kumar, and M. R. Sankar, K. N. Reddy, N Balashanmugam. "A study on wafer scalable, industrially applicable CNT based nanocomposites of Al-CNT, Cu-CNT, Ti-CNT, and Ni-CNT as thermal interface materials synthesised by thin film technique." *Surface and Coatings Technology*, vol. 429(15), pp. 127926, 2022.
3. A. Kumar et al. "Improving Corrosion Resistance on Surface-Alloyed Butterfly Valves." *CASTING SOURCE,* Vol. 36, 2021.
4. A. Kumar, P. Muthukumar, P. Sharma, and E. A. Kumar. "Absorption based solid state hydrogen storage system A: review." *Sustainable Energy Technologies and Assessments.* vol. 52, pp. 102204, 2022.
5. A. Ramesh, and S. Sundar. "Contributions of various non-linearities to the dynamic response of an automotive drum brake during typical braking: A theoretical study." *International Journal of Non-Linear Mechanics*, vol.137, p. 103808, 2021.
6. A. Singh, A. Charak, K. P. Biligiri, and V. Pandurangan. "Glass and carbon fiber reinforced polymer composite wastes in pervious concrete: Material characterization and lifecycle assessment." *Resources, Conservation and Recycling*, vol. 182, p. 106304, 2022.
7. B. Radhika, S. Sundar, and K. PrapoornaBiligiri. "Analysis of vibro-acoustic path for quantification of tire-pavement interaction noise using a two-wheeler." *Journal of Testing and Evaluation,* vol. 50, no. 1, 2021.
8. G. K. Rajan. "Damping rate measurements and predictions for gravity waves in an air-oil-water system."*Phys. Fluids*, vol. 34(2), p. 022113, 2022.
9. G. K. Rajan. "Solutions of a comprehensive dispersion relation for waves at the elastic interface of two viscous fluids." *European Journal of Mechanics B - Fluids*, vol. 89, pp. 241-258, 2021.
10. G. Pullangott, U. Kannan, S. Gayathri, D.V. Kiran, S. M. Maliyekkal. "A comprehensive review on antimicrobial face masks: an emerging weapon in fighting pandemics." *RSC Advances*. vol. 11, pp. 6544-6576, 2021.
11. K. K. Gajrani, P. S. Suvin, S. V. Kailas, K. P. Rajurkar, and M. R. Sankar. "Machining of Hard materials using textured tol with minimum quantity nano green cutting fluid." *CIRP Journal of Manufacturing Science and Technology*, vol. 35, pp. 410-421, 2021.
12. K. SarathBabu, and E. A. Kumar. "Thermodynamic analysis of compressor operated resorption thermochemical energy storage system for heat storage, combined cooling and heat upgradation", *Journal of Energy Storage*. vol. 50, pp. 104659, 2022.
13. K. SarathBabu, and E. A. Kumar. "Thermodynamic characterization of Mg-50 wt% $LaNi_5$ composite hydride for thermochemical energy storage applications." *Energy Storage*. Vol. 3(6), e272, 2021.
14. M. A. Sampath, A.V. Sai Pavan, S.Gorthi, C. Srihari, N. Venkaiah, and D.V. Kiran. "In situ detection of welding defects: a review." *Welding in the World.* vol. 66, pp. 611–628, 2022.
15. N. K. Etteneni, and M. M. Avulapati. "An Experimental Investigation on Liquid Sheet Breakup due to Perforations in Impinging Jet Atomization." *Atomization and Sprays*, Vol 32 (2), 2022.
16. P. Boggavarapu, S. P. Ramesh, M. M Avulapati, and Ravikrishna RV. "Secondary Breakup of Water and Surrogate fuels: Breakup Modes and Resultant Droplet Sizes." *International Journal of Multiphase Flow*, vol. 145, p. 103816, 2021.

17. P. Vaddy, V. Pandurangan, and K. P. Biligiri. “Discrete element method to investigate flexural strength of pervious concrete.” *Construction and Building Materials,* vol. 323, 126477, 2022.

18. R. Kumar, B. N. Srivatsa, and B. Subramanian. “Calibration design evaluations through computational analysis and investigation of a six-component wind tunnel balance.” *ISSS Journal of Micro and Smart Systems*, vol. 10.1, p. 7-31, 2021.

19. R. Sharma, E. A. Kumar, P. Dutta, S. Srinivasa Murthy, Yu.I. Aristov, M.M. Tokrev, T.X. Li and R.Z. Wang. “Ammoniated salt based solid sorption thermal batteries: A comparative study.” *Applied Thermal Engineering*, Vol., 116875, 2021.

20. T. Kumar, D. V. Kiran, N. Arora, and C. Srihari. “Manipulating heat density to enhance the performance of Aluminium Alloy-Steel joints using arc oscillations in the GTAW process.” *Materials Letters*. vol. 306, pp. 1-5, 2022.

21. T. Kumar, D. V. Kiran, N. Arora, and P. S. Kumar. “Study of steel-aluminium joining under the influence of current waveforms using advanced CMT process variants.” *Materials and Manufacturing Processes,* pp. 1-18, 2022.

22. Y. Mitikiri. “Globally Stable Attitude Control and Quasi-Static Disturbance Estimation in the Presence of Aerodynamic Dissipation.” *IEEE Robotics and Automation Letters*, vol. 7(2):5039-5046, 2022.

Chemistry

1. A. Chalana, R. K. Rai, R. Karri, K. K. Jha, B. Kumar and G. Roy. “Interplay of the intermolecular and intramolecular interactions in stabilizing the thione-based copper(I) complexes and their significance in protecting the biomolecules against metal-mediated oxidative damage,” Polyhedron, vol. 215, pp. 115647, 2022.

2. A. Joy and R. Biswas. “Molecular Insight into the High Thermal Stability of Metalloprotein Azurin.” *The Journal of Physical Chemistry B*, vol. 126, no. 13, pp. 2496-2506, 2022.

3. A. Sivaiah, R. Nag and C. P. Rao. “Glyco-Conjugate Design and Demonstration as Receptors for the Species of Biological, Ecological and Medical Importance: Support from Spectroscopy and Microscopy.” *Chemistry Select,* vol. 6, no. 9, pp. 2051-2079, 2021.

4. B. Sk, V. Thangaraji, N. Yadav, G. P. Nanda, S. Das, P. Gandeepan, E. Zysman-Colman and P. Rajamalli. “High performance non-doped green organic light emitting diodes via delayed fluorescence.”*Journal of Materials Chemistry C*, 2021, vol. 9, no. 43, pp. 15583-15590, 2021.

5. K. Boya, K. Nam, A. K. Manna, J. Kang, C. Lyi, A. Jain, S. M. Yusuf, P. Khuntia, B. Sana, V. Kumar, A. V. Mahajan, D. R. Patil, K. H. Kim, S. K. Panda and B. Koteswararao. “Magnetic properties of the $S=\frac{1}{2}$ anisotropic triangular chain compound $Bi_3FeMo_2O_{12}$.” *Physical ReviewB,* vol. 104, no. 18, pp. 184402-184408, 2021.

6. K. D. Reddy, A. Joy and R. Biswas. “Effects of hydrophobic solute on water normal modes.”*Chemical Physics.* vol. 550, pp. 111303, 2021.

7. L. Mantry, R. Maayuri, V. Kumar and P. Gandeepan. “Photoredox catalysis in nickel-catalyzed C–H functionalization.”*Beilstein Journal of Organic Chemistry*, vol. 17, pp. 2209-2259, 2021.

8. N. Kumarswamyreddy, D. N. Reddy, D. M. Robkis, N. Kamiya, R. Tsukamoto, M. M. Kanaoka, T. Higashiyama, S. Oishi, and J. W. Bode. “Chemical Synthesis of Torenia Plant Pollen Tube Attractant Proteins by KAHA Ligation.” *RSC Chemical Biology,* vol. 3, no. 6, pp. 721-727, 2022.

9. N. Kumarswamyreddy, S. Jayakumar, V. Kesavan. “Palladium-catalyzed Asymmetric Allylic Alkylation of 3-Amino-2-Oxindoles: Synthesis of 3-Allyl-3-Amino-2-Oxindoles.” *Tetrahedron Letter*, vol. 82, pp. 153385, 2021.

10. R. Ahmed and A. K. Manna. "Origins of Large Stokes Shifts in a Pyrene–Styrene-Based Push–Pull Organic Molecular Dyad in Polar Solvents and Large Electron Mobility in the Crystalline State: A Theoretical Perspective." *The Journal of Physical Chemistry C,* vol.126, no. 1, pp. 423-433, 2021.
11. R. Ahmed and A. K. Manna. "Theoretical insights on tunable optoelectronics and charge mobilities in cyano-perylenediimides: interplays between–CN numbers and positions." *Physical Chemistry Chemical Physics*, vol. 23, no.27, pp.14687-14698, 2021.
12. R. Das, M. Carlon, B. Kumar, S. Ambala, J. Pécaut, C. Gateau, G. Roy and P. Delangle. "Tripodal scaffolds with three appended imidazole thiones for Cu(I) chelation and protection from Cu-mediated oxidative stress."*Journal of Inorganic Biochemistry*, vol. 222, pp. 111518, 2021.
13. R. Nag & C. P. Rao. "Supramolecular Conjugates of Calixarenes in Biological Cells by Microscopy." *Journal of Chemical Sciences*, vol. 133, pp. 92, 2021.
14. R. Nag and C. P. Rao. "Development and Demonstration of Functionalized Inorganic-Organic Hybrid Copper Phosphate Nanoflowers for Mimicking the Oxidative Reactions of Metalloenzymes by Working as a Nanozyme." *Journal of Materials Chemistry B,* vol. 9, no. 16, pp. 3523-3532, 2021.
15. R. Rafeek and D. Mondal. "Noise-induced symmetry breaking of self-regulators: Anasymmetric transition towards homochirality." *The Journal of Chemical Physics*, vol. 154, no. 24, pp. 244906, 2021.
16. S. Muthusamy, N. Kumarswamyreddy, and V. Kesavan. "Enantioselective Synthesis of 3-Amino-3'-carbazole Oxindole Derivatives via Friedel-Crafts Aminoalkylation Reaction." *ChemistrySelect*, vol. 7, no. 7, p. e202200131, 2022.
17. S. Polepalli& C. P. Rao. "Development of Hybrid DNA-Copper Phosphate Nanoflowers as Peroxidase Enzyme Mimics and for Colorimetric Sensing of Phenol." *InorganicaChimica Acta,* vol. 536, pp. 120885, 2022.
18. S. Ray and S. Reuveni. "Resetting transition is governed by the interplay between thermal and potential energy." *The Journal of Chemical Physics,* vol. 154, pp. 171103, 2021.
19. S. Y. Ali, R. Rafeek and D. Mondal. "Geometric Brownian information engine: Upper bound of the achievable work under feedback control." *The Journal of Chemical Physics*, vol. 156, no. 1, pp. 014902, 2022.
20. T. Debnath, P. Chaudhury, T. Mukherjee, D. Mondal and P. K. Ghosh. "Escape kinetics of self-propelled particles from a circular cavity." *The Journal of Chemical Physics*, vol. 155, no. 19, pp. 194102, 2021.
21. V. P. R. Gajulapalli, N. Kumarswamyreddy, K. Lokesh, and V. Kesavan, "Enantioselective Synthesis of 3-Acetyl Coumarin Substituted 3-Hydroxy Oxindoles and Pyranocoumarin Fused Spirooxindoles." *ChemistrySelect*, vol. 6, no. 31, pp. 7855-7859, 2021.

Physics

1. A. Mandal, P. C. Deshmukh and K. P. Singh. "Controlling high harmonic generation using inhomogeneous two-color driving laser pulse." *Laser Physics, IOP publishing,* vol. 31, pp. 075302, 2021.
2. B. Shen, F. Breitner, D. Prishchenko, R. S. Manna, A. Jesche, M. L. Seidler, P. Gegenwart, and A. A. Tsirlin. "Pressure-induced dimerization and collapse of antiferromagnetism in the Kitaev material ϯ-Li_2IrO_3." *Physical Review B, American Physical Society,* vol.105, pp. 054412, 2022.
3. E. Kermarrec, R. Kumar, G. Bernard, R. Hénaff, P. Mendels, F. Bert, P. L. Paulose, B. K. Hazra, and B. Koteswararao. "Classical Spin Liquid State in the Heisenberg Kagome Antiferromagnet $Li_9Fe_3(P_2O_7)_3(PO_4)_2$," *Physical review letters American Physical Society,* vol. 127, pp. 157202, 2021.
4. J. Ananthanarasimhan, R. K. Gangwar, P. Leelesh, P. S. N. S. R. Srikar, A. M. Shivapuji, and L. Rao. "Estimation of electron density and temperature in an argon rotating gliding arc using optical and

electrical measurements." *Journal of Applied Physics, American Institute of Physics*, vol. 129, pp. 223301, 2021.

5. K. Boya, K. Nam, A. K. Manna, J. Kang, C. Lyi, A. Jain, S. M. Yusuf, P. Khuntia, B. Sana, V. Kumar, A. V. Mahajan, Deepak R. Patil, Kee Hoon Kim, S. K. Panda, and B. Koteswararao. "Magnetic properties of the S=5/2 anisotropic triangular chain compound $Bi_3FeMo_2O_{12.}$" *Physical Review B, American Physical Society*, vol. 104, pp. 184402, 2021.
6. M. B. Peters, V. P. Majety and A. Emmanouilidou. "Triple ionization and frustrated triple ionization in triatomic molecules driven by intense laser fields." *Physical Review A, American Physical Society,* vol. 103, pp. 043109, 2021.
7. P. C. Deshmukh, A. Ganesan, S. Banerjee, and A. Manda. "Accidental Degeneracy of the Hydrogen Atom and its Non-accidental Solution in Parabolic Coordinates." *Canadian Journal of Physics,* vol. 99, pp. 853-860, 2021.
8. P. C. Deshmukh, J. Jose, H. R. Varma and S. T. Manson. "Electronic structure and dynamics of confined atoms." *The European Physical Journal D,* vol. 75, pp. 1, 2021.
9. P. C. Deshmukh, S. Banerjee, A. Mandal, and S.T. Manson, "Eisenbud–Wigner–Smith time delay in atom–laser interactions." *The European Physical Journal Special Topics,* vol. 230, pp. 4151, 2021.
10. P. C. Deshmukh, S. Ghosh, U. Kumar, C. Hareesh, and G. Aravind. "A Primer on Path Integrals, Aharonov–Bohm Effect and the Geometric Phase." *The Physics Educator, World Scientific Publishing Company,* vol. 4, pp. 2250005, 2022.
11. R. Püttner, J. B. Martins, T. Marchenko, O. Travnikova, R. Guillemin, L. Journel, I. Ismail, G. Goldsztejn, D. Koulentianos, D. Céolin, M. L. M. Rocco, M. N. Piancastelli, M. Simon, D. A. Keating, C. R. Munasinghe, P. C. Deshmukh and S. T. Manson. "Nonstatistical behavior of the photoionization of spin–orbit doublets." *Journal of Physics B: Atomic, Molecular and Optical Physics,* vol. 54, pp. 085001, 2021.
12. S. Banerjee, G. Aarthi, S. Saha, G. Aravind and P. C. Deshmukh. "Time delay in negative ion photodetachment.**"** *PhysicaScripta, IOP publishing,* vol. 96, pp. 114005, 2021.
13. S. S. Baghel, R. K. Gangwar and R Srivastava. "Diagnostics of Ne–Ar mixture plasma using a fine-structure resolved collisional radiative model." *Contributions to Plasma Physics, Wiley-VCH GmbH*, vol.62, pp. e202100226, 2022.
14. S. S. Baghel, S. Gupta, R. K. Gangwar and R Srivastava. "Diagnostics of laser produced Mg plasma through a detailed collisional radiative model with reliable electron impact fine structure excitation cross-sections and self-absorption intensity correction." *Plasma Sources Sci. Technol., Institute of Physics*, vol. 30, pp. 055010, 2021.
15. S. S. Rahaman, S. Sahoo, and M. Kumar. "Quantum phases and thermodynamics of a frustrated spin-1/2 ladder with alternate Ising–Heisenberg rung interactions." *Journal of Physics: Condensed Matter, IOP Publishing,* vol. 33, pp. 265801, 2021.
16. U. K. Voma, S. Bhattacharya, E. Kermarrec, J. Alam, Y. M. Jana, B. Sana, P. Khuntia, S. K. Panda, and B. Koteswararao. "Electronic structure and magnetic properties of the effective spin J eff =1/2 two-dimensional triangular lattice $K_3Yb(VO_4)_{2.}$" *Physical Review B American Physical Society,* vol. 104, pp. 144411, 2021.

Mathematics and Statistics

1. H. Cindric, P. Mariappan, L. Beyer, P. Wiggermann, M. Moche, D. Miklavcic and B. Kos. "Retrospective study for validation and improvement of numerical treatment planning of irreversible electroporation ablation for treatment of liver tumors." *IEEE Transactions on Biomedical Engineering,* vol. 68, no. 12, pp. 3513-3524, 2021.

2. I.Das. “Statistical assessment of Spatio-temporal impact of Covid-19 lockdown on air pollution using different modeling approaches in India, 2019-2020”, *Regional Statistics*, Vol. 12, no. 3, pp. 1-31, 2022.

3. K. Kishore. “Matrix Waring Problem”, *Linear Algebra and its Applications*, vol. 646, pp. 84-94, 2022.

4. M. J. van Amerongen, P. Mariappan, P. Voglreiter, R. Flanagan, S. F. M. Jenniskens, M. Pollari, M. Kolesnik, M. Moche and J. J. Fütterer. “Software-based planning of ultrasound and CT-guided percutaneous radiofrequency ablation in hepatic tumors.” *International Journal of Computer Assisted Radiology and Surgery*, vol. 16, no. 1, pp. 1051-1057, 2021.

5. S. A. Prasad. “Super Coalescence Hidden-Variable Fractal Interpolation Functions.” *Fractals: Complex Geometry, Patterns, and Scaling in Nature and Society*, vol. 29, no. 3, pp. 2150051, 2021.

Humanities and Social Sciences

1. C. S. Bahinipati, R. A. Sirohi, and S. Rao. “Technological innovation and behavioural interventions for household energy conservation: policy insights and lessons.” *Ecology, Economy and Society – the INSEE Journal*, vol. 5, no. 1, pp. 63-87, 2022.

2. C. S. Bahinipati, V. Kumar, and P.K. Viswanathan. “An Evidence based systematic review on farmers’ adaptation strategies in India.” *Food Security*, vol. 13, no. 2, pp. 399-418, 2021.

3. C. S. Bahinipati. “Do Risk Management Strategies Prevent Economic and Non-Economic Loss and Damages? Evidence from Drought Affected Households in Western India.” *Environmental Quality and Management*, vol. 31, no. 3, pp. 59-66, 2022.

4. N. Sekhar, and R. A. Sirohi**.** “The Revolution Will Not Be Colour Blind: The Enduring Relevance of Anti-Apartheid Voices.” *International Critical Thought,* vol. 11, no. 4, pp. 568–584, 2021.

5. P. K. Verma, and P. S. Dwivedi. “Revisiting Sringar with Dhanamjaya's Conceptions: A Manifestation of Ayoga, Viprayoga, and Sambhoga through Kalidasa's*Malvikagnimitra*”, *Quarterly Journal of Mythic Society*, Vol. 112, No. 2-3, pp. 22-39, April - September 2021.

6. P. K. Viswanathan, and C. S. Bahinipati. “Growth and human development in the regional economy of Gujarat, India: an analysis of missed linkages.” *Journal of Social and Economic Development*, vol. 23, no. Suppl 1, pp. S25-S47, 2021.

7. P. S. Dwivedi, Exploring Ethics and Aesthetics of Eco-Caring in *Uttararāmacarita*. *Journal of Dharma*, 46(2), pp. 129-144, June 2021.

8. P. Tripathi, P. S. Dwivedi, Sheo Rama, and Shreya Sharma. “Economic Perspectives on Violence Against Women During Covid – 19 Crisis: A Case Study of Bihar”, *Feminist Research*, Vol. 6, No. 1, pp. 14-25, 2022.

9. V. Kashyap, and R. Arora. “Decent Work and Work-family Enrichment: Role of Meaning at Work and Work Engagement.” *International Journal of Productivity and Performance Management,* vol. 71, no. 1, pp. 316-336, 2022.

10. V. Kashyap, N. Nakra, and R. Arora. “Do Decent Work Dimensions lead to Work Engagement? Empirical Evidence from Higher Education Institutions in India.” *European Journal of Training and Development,* vol. 46, no. 1/2, pp.158-177, 2022.

Books and Book Chapters

1. P. S. Dwivedi (Ed). *Aesthetics and the Philosophy of Art: Comparative Perspectives*, Routledge India, 2021.
2. A. Harafan, S. A. Gafoor, T. D. Kusuma, and S. M Maliyekkal. "Graphene modified photocatalysts for the abatement of emerging contaminants in water." *New Trends in Emerging Environmental Contaminants*, Springer, pp. 371-406, 2022.
3. C. N. Lakshmi and Narendra Singh. "Removal of Pharmaceutical Compounds: Overview of Treatment Methods." *New Trends in Emerging Environmental Contaminants*. Energy, Environment, and Sustainability. Springer, Singapore, 2022.
4. C. S. Bahinipati, V. Kumar, P. K. Viswanathan, and K. Kavya. "Estimation of district-wise livelihood vulnerability index for the four coastal states in India." *Disaster Resilience and Sustainability. Elsevier*, Chapter 21, pp. 459-487, 2021.
5. C. S. Bahinipati., and U. Patnaik. "Climate change and human security in India: evidence, opportunities and challenges", In Behera, A. & S. Mishra, *Varying Dimensions of India's National Security: Emerging Perspectives,* Springer, Chapter 13, pp. 197-213, 2022.
6. C. S. Bahinipati., and U. Patnaik. "What motivates farm-level adaptation in India? A systematic review", In Haque, A.K.E. et al., *'Climate change and community resilience: insights from South Asia'*, Springer, Chapter 4, pp. 49.68, 2021.
7. M. Monachan, N. Dixit, S. M. Maliyekkal, and S. P. Singh. "Reverse Osmosis (RO) and Nanofiltration (NF) Membranes for Emerging Contaminants (ECs) Removal." *New Trends in Emerging Environmental Contaminants*, Springer, pp. 407-425, 2022.
8. Markus Ketomaki, and TrivikramNallamilli. Christine Schreiber and Thomas Vilgis. "Emulsified systems in food." *Handbook of Molecular Gastronomy*, 2021.
9. P. K. Behera. "Frontiers of High-Speed Rail Development, Estimating Direct, Indirect, and Induced Employment from Highway Construction in India." *ADBI*, 2021.
10. R. Karri, R. K. Rai and G. Roy. "Activation of Mercury-C Bond by N-Heterocyclic-Based Thiones and Selones: A Structural Overview." *A Closer Look at Coordination Complexes*, Nova Science Publishers, USA, pp. 369-409, 2021.
11. S. Loganathan, C. S. Bahinipati, K. E. Seetharam and K. N. Satyanarayana, "Policies and priorities for developing capacity to build high quality infrastructure", In Hayashi, Y. et al., 'Frontiers in high-speed rail development', *ADBI Press*, Tokyo, Chapter 20, pp. 510-525, 2021.
12. S. M. Allabakshi, P.S. N. S. R. Srikar, R. K. Gangwar and S. M. Maliyekkal. "Application of Plasma-Assisted Advanced Oxidation Processes for Removal of Emerging Contaminants in Water." *New Trends in Emerging Environmental Contaminants,* Springer, Singapore, pp. 333-370, 2022.
13. S. M. Allabakshi, P.S.N.S.R. Srikar; R. Gangwar, S.M. Maliyekkal. "Application of plasma-assisted advanced oxidation processes for removal of emerging contaminants in water." *New Trends in Emerging Environmental Contaminants*, Springer, pp. 333-370, 2022,
14. ShamikMisra, and Christos T. Maravelias. "Overview of Scheduling Methods for Pharmaceutical Production." *Optimization of Pharmaceutical Processes.* Springer, Singapore, 2022.
15. Shihabhudeen and M. Maliyekkal. "Dissolved Arsenic in Groundwater Bodies: A Short Review of Remediation Technologies." MSVN Jyothi, S Gayathri, TP Gandhi, SM Maliyekkal, *Pollution Control Technologies, Pollution Control Technologies*, Springer Nature, 2021.
16. Shihabhudeen and M. Maliyekkal. S.P. Singh, T. Gupta, A.K. Agarwal, and SM Maliyekkal. *New Trends in Emerging Environmental Contaminants*, Springer, 2022.

Newspaper Articles

1. A. Raghuramaraju. "Different Departures: Descartes and Ambedkar's Roads to Modernity." *The Telegraph*, 5 April 2021.
2. A. Raghuramaraju**.** "A Fine Balance: Agricultural Reform is necessary as is Farmers Agency." *The Telegraph*, 10 May 2021.
3. A. Raghuramaraju. "Memories Lost: Inferences from the past could have helped tackle the Second Wave." *The Telegraph*, 7 June 2021.
4. A. Raghuramaraju**.** "The Key Element." *The Telegraph*, 5 July 2021
5. A. Raghuramaraju. "The Rousing Text: The Bhagavad Gita and the Indian National Movement." *The Telegraph*, 2 August 2021.
6. A. Raghuramaraju**.** "Special Bonds: Remembering some teachers and their students." *The Telegraph*, 14 September 2021.
7. A. Raghuramaraju**.** "Hybrid Model: Modernizing Indian would require Data on Premodern." *The Telegraph*, 11 October 2021.
8. A. Raghuramaraju. "Modern Masterpiece." *The Telegraph*, 15 November 2021.
9. A. Raghuramaraju**.** "A Second Look." *The Telegraph*, 13 December 2021.
10. A. Raghuramaraju**.** "Cerebral Minds: Reversal as Restatement often Adds Something New." *The Telegraph*, 10 January 2022.
11. A. Raghuramaraju**.** "Inner Voice: Internal Criticism as a moral virtue." *The Telegraph,* 14 February 2022.
12. A. Raghuramaraju. "The Relevance of Badarayana: Original Compiler." *The Telegraph*, 14 March 2022.

APPENDIX - II

Conference Proceedings/Presentations

Chemical Engineering

1. N. Choudhary, and A. K. N. Nair, (2021). "Role of sodium dodecyl sulfate surfactant at the Interface of the Decane+ Brine in the Presence of CO2, CH4, and Their Mixture." *1st InterPore Saudi Chapter Annual Meeting,*12 November 2021.

Civil and Environmental Engineering

1. A. Charak, V. Pandurangan, and K. P. Biligiri. "Utilization of CFRP and GFRP Composite Wastes in Pervious Concrete Pavements." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.
2. A. Charak, V. Pandurangan, and K. P. Biligiri. "Utilization of CFRP and GFRP Composite Wastes in Pervious Concrete Pavements." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.
3. A. Dey, S. S. Kumar, and A. M. Krishna,"Nonlinear Ground Response Analysis: A Case Study of Amingaon, North Guwahati, Assam." *Latest Development in Geotechnical Earthquake Engineering and Soil Dynamics*, Ed. T. G. Sitharam, R. S. Jakka and S. Kolathayar, Springer Nature, Singapore, Springer Transactions in Civil and Environmental Engineering, pp. 539-550, 2021.
4. A. K. Haridas, Naga Siva Pavani Peraka, and K. P. Biligiri. "A Deep Neural Network Approach to Predict Overlay Thickness of Asphalt Pavements using Deflection Parameters and Estimated Traffic." *101st Annual Meeting of the Transportation Research Board of the National Academies*, Washington, DC, USA, January 2022.
5. A. Singh, PoornachandraVaddy, P. V. Sampath, and K. P. Biligiri. "Performance monitoring of pervious concrete pavement systems." *International Conference on Resource Sustainability – Sustainable Pavement Technologies* (icRS SPT 2021), Tirupati, India 26-27 May 2021.
6. Akhil Charak, Venkataraman Pandurangan, Avishreshth Singh, and K. P. Biligiri. "Structural and hydrological evaluation of pervious concrete incorporating recycled glass and carbon composites." *International Conference on Resource Sustainability – Sustainable Pavement Technologies* (icRS SPT 2021), Tirupati, India 26-27 May 2021.
7. C. Gubbala, K. P. Biligiri, and A. K. Sandra, "Development of Pavement Temperature Prediction Models for Tropical Regions: Incorporation into Flexible Pavement Design Framework." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.
8. C. Gubbala, K. P. Biligiri, and A. K. Sandra, "Development of Pavement Temperature Prediction Models for Tropical Regions: Incorporation into Flexible Pavement Design Framework." *18th International Road Federation (IRF) World Meeting & Exhibition, Dubai*, UAE, 7-10 November 2021.
9. CSSU Srikanth, B. J. Ramaiah, and A. Murali Krishna. "Stability analysis of unsaturated pond ash slope subjected to rainfall." *In Proc. of International conference on sustainability, development and innovation*, Prince Sultan University, Riyad, Saudi Arabia, 19-22 Feb 2022.
10. G. M. Latha, A. M. Krishna, G. S. Manju, and P. S. Kumar "Geosynthetics in Retaining Walls Subjected to Seismic Shaking. In: Sitharam T., Jakka R., Kolathayar S. (eds) Latest Developments in Geotechnical Earthquake Engineering and Soil Dynamics. Springer Transactions in Civil and Environmental Engineering. Springer, Singapore. 2021.
11. G. R. Mahajan, B. Radhika, and K. P. Biligiri. "Influence of Dynamic Analysis on Estimation of Rutting Performance using the Fixed Vehicle Approach." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.

12. G. R. Mahajan, B. Radhika, and K. P. Biligiri. "Influence of Dynamic Analysis on Estimation of Rutting Performance using the Fixed Vehicle Approach." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.
13. G. R. Mahajan, B. Radhika, and K. P. Biligiri. "Quantification of Material Uncertainty in Rutting Estimation of Asphalt Pavements using the Fixed Vehicle Approach." *101st Annual Meeting of the Transportation Research Board of the National Academies*, Washington, DC, USA, January 2022.
14. J. Ardra, M. Kashyap, N. R. and G. Asaithambi, "Identification of True Leading Vehicle in Disordered Traffic Conditions using Dynamic Time Warping Algorithm." *101st TRB Annual Meeting*, Washington D.C., USA, 2022.
15. M. S. V. Naga Jyothi, B. J. Ramaiah, and S. M. Maliyekkal. "Fe-Mn binary oxides granules for mercury removal from water." *First IITM International Conference on Circular Economy for Sustainable Water Management* (SuWaM-2022), 23 March 2022.
16. P. Kiruthika, S. Banerjee, A. M. Krishna, and A. Boominathan, "Performance of Stone Columns in Multi-Layered Soils System." *Proceedings of Geocongress* 2022, Charlotte, North Carolina, March 20–23, 2022.
17. P. N. S. Pavani, K. N. Satyanarayana, and K. P. Biligiri. "Framework for multi-parametric approach for pavement delineation: a novel technique for prioritization of pavements for maintenance." *International Conference on Resource Sustainability – Sustainable Pavement Technologies* (icRS SPT 2021), Tirupati, India 26-27 May 2021.
18. S. S. Kumar, A. M. Krishna, and A. Dey, "Dynamic Properties and PWP-model Parameters of Sandy Soil for Ground Response Analysis." *Proceedings of the Indian Geotechnical Conference 2019* Vol IV, Ed. S. Patel, C. H. Solanki, K. R. Reddy and S. K. Shukla, Springer Nature, Singapore, Vol. 138, Lecture Notes in Civil Engineering, pp. 737-749, 2021.
19. S. S. Kumar, A. M. Krishna, and Dey, A. "Implications of on-sample LVDTs in cyclic triaxial test to measure small strain shear modulus in Soil Dynamics." Ed. T. G. Sitharam, S. V. Dinesh and R. S. Jakka, Springer Nature, Switzerland, Vol. 119, *Lecture Notes in Civil Engineering*, pp. 53-62, 2021.
20. S. Surehali, A. Singh, and K. P. Biligiri. "Recycling Waste Rubber Tires in Pervious Concrete: Evaluation of Hydrological and Strength Characteristics." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.
21. S. Surehali, A. Singh, and K. P. Biligiri. "Recycling Waste Rubber Tires in Pervious Concrete: Evaluation of Hydrological and Strength Characteristics." *18th International Road Federation (IRF) World Meeting & Exhibition*, Dubai, UAE, 7-10 November 2021.
22. U. Kannan, and S. M. Maliyekkal. "Ag Nanoparticles based point of use disinfection system for personal and household use." Indo-Canadian Joint Symposium on *"Water purification, optimization and Management"*, IIT Tirupati, India, 17-18th March 2022.

Computer Science and Engineering

1. A. S. M. Venigalla and S. Chimalakonda. "Understanding Emotions of Developer Community Towards Software Documentation." *43rd International Conference on Software Engineering:Software Engineering in Society* (ICSE-SEIS), May 2021.
2. A. S. M. Venigalla, and S. Chimalakonda. "StackEmo: towards enhancing user experience by augmenting stack overflow with emojis." *29th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering*, August 2021.
3. A. S. M. Venigalla, D. Vagavolu, and S. Chimalakonda. "SurviveCovid-19++ : A collaborative healthcare game towards educating people about safety measures for Covid-19." *Conference Companion Publication of the on Computer Supported Cooperative Work and Social Computing,* October 2021.
4. A. Vadlamani, R. Kalicheti, and S. Chimalakonda. "APIScanner-Towards Automated Detection of Deprecated APIs in Python Libraries." *43rd International Conference on Software Engineering: Companion Proceedings* (ICSE-Companion), May 2021.

5. B. Zhao, K. R. Mopuri, and H. Bilen. "Dataset Condensation with Gradient Matching." *International Conference on Learning Representations (ICLR),* September 2021.
6. D. Vagavolu, K. C. Swarna, and S. Chimalakonda. "A Mocktail of Source CodeRepresentations." *36th International Conference on Automated Software Engineering (ASE)*, November 2021.
7. D. Vagavolu, V. Agrahari, S. Chimalakonda and A. Venigalla. "GE526: A Dataset of Open-Source Game Engines." *18th International Conference on Mining Software Repositories (MSR),* May 2021.
8. E. Rao, D. Vagavolu, and S. Chimalakonda. "AC²: towards understanding architectural changes in Python projects." *9th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering*, August 2021.
9. H. Rangwani, K. R. Mopuri, and R. Venkatesh Babu. "Class Balancing GAN with a Classifier in the Loop." *the Conference on Uncertainty in Artificial Intelligence (UAI),* December 2021.
10. K. Prashanth, B. Kowndinya, C. Vijay, D. Teja, V. Rodge, R. Velaga, R. Abasaheb Deshmukh and K. Yeturu. "A platform for large scale auto annotation of scanned documents featuring real-time model building and model pooling." *Computer Vision and Image Processing (CVIP),* December 2021.
11. M. Besta, R. Kanakagiri, G. Kwasniewski, R. Ausavarungnirun, J. Beránek, K. Kanellopoulos, K. Janda, ZurVonarburg-Shmaria, L. Gianinazzi, I. Stefan, J. Gómez Luna, M. Copik, L. Kapp-Schwoerer, S. Di Girolamo, M. Konieczny, O. Mutlu, T. Hoefler. "SISA: Set-Centric Instruction Set Architecture for Graph Mining on Processing-in-Memory Systems." *54th IEEE/ACM International Symposium on Microarchitecture*, October 2021.
12. M. K. Srivastava, D. Reddy, B. Kurma and K. Yeturu, "Signature2Vec - An algorithm for reference frame agnostic vectorization of handwritten signatures." *Computer Vision and Image Processing (CVIP),* December 2021.
13. N. S. Mathews, S. Chimalakonda, and S. Jain. "AiR- An Augmented Reality Application for Visualizing Air Pollution." *IEEE Visualization Conference (VIS)* 2021, October 2021.
14. R. Gupta, V. Mahendran, and V. Badarla. "Optimal Searching of Prefetched DASH Segments in Fog Nodes: A Multi-Armed Bandit Approach." *ACM Q2SWinet, Alicante*, Spain, November 2021.
15. S. Raja and G. V. Sumukha Bharadwaj. "On the Hardness of the Determinant: Sum of Regular Set Multilinear Circuits." *23rd International Symposium on Fundamentals of Computation Theory*, June 2021.
16. V. Agrahari, and S. Chimalakonda. **"**A Catalogue of Game-Specific Anti-Patterns." *15th Innovations in Software Engineering Conference*, February 2022.

Electrical Engineering

1. G. Ghosh and Viju Nair R. "Modeling and Design Considerations in the Control of an Isolated Bidirectional Electric Vehicle Charger**."** *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society,* pp. 1-6, 2021.
2. G. Ghosh, S. Vyapari and R. Viju Nair "Stability Oriented Design Considerations in the Control of Cascaded Converters through their Impedance Models." *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society,* pp. 1-6, 2021.
3. Jeevan J & R. K. S. Gorthi. "Feature Fusion Ensemble Architecture with Active Learning for Microscopic Blood Smear Analysis." *IEEE International Conference on Image Processing (ICIP),* 19-21 September 2021.
4. M. Sravani and S. Bhuktare. "Injection Locking of Spin Torque Nano Oscillators (STNO) Using Surface Acoustic Waves (SAW)." *IEEE Around-the-Clock Around-the-Globe Magnetics Conference*, August 2021.
5. R. Prabhakar, Gowtham S, S. Agrawal, Venkatesh Babu R, and R. K. S. Gorthi. "Labeled from Unlabeled: Exploiting Unlabeled Data for Few-shot Deep HDR Deghosting." *IEEE / CVF Conference on Computer Vision & Pattern Recognition*(CVPR),19-25 June 2021.
6. S. K. R. Nareddula, S. Gorthi, and R. K. S. Gorthi. "Fusion-Net: Time-Frequency Information Fusion Y-Network for Speech Enhancement." *Proc. Interspeech***,** 3360-3364, August 2021.

7. S. Pathak, C. Sindhura, R. K. S. Gorthi, V. K. Degala, and S. Gorthi. "Cranial Implant Design Using V-Net Based Region of Interest Reconstruction." *Second MICCAI challenge on cranial implant design (AutoImplant2021), Lecture Notes in Computer Science,* vol 13123, 116-128, October 2021.
8. Vinayak N, R. K. S. Gorthi, and Arshad J, Siam. "RPN++D: Improved SiamRPN++ Using Cascaded Detector Sensing." *12th Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP 20-21),* 19-22 December 2021.
9. Z. Akhter, A. Shamim, A. Khusro and A. K. Jha. "Tackling non-linearity in cavity perturbation using machine learning approach." *2021 IEEE MTT-S International Microwave and RF Conference (IMARC)*, pp. 1-4, 2021.

Mechanical Engineering

1. A. Meena, K. SarathBabu, and E. Anil Kumar. "Suitability of $LaNi_{5-x}Co_x$(x = 0, 0.25, 0.5 and 0.75) for Low Temperature Thermochemical Energy Storage Application." *International Conference on Renewable Energy (ICRE 2022)*, University of Rajasthan, Jaipur, India, February 25-27, 2022.
2. A. Ramesh, and S. Sriram. "Variation in vibro-acoustic noise due to the defects in an automotive drum brake." *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, vol. 263, no. 4, pp. 2646-2653, 2021.
3. A. Yella, and S. Sundar. "Comparison of noise generated from simplex and duplex configurations of drum brake using non-linear vibro-acoustic models." In *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, Institute of Noise Control Engineering, vol. 263, no. 5, pp. 1415-1425. 2021.
4. D. D. Babu, E. Anil Kumar and I. P. Jain. "Effect of aluminium substitution for Ni in $LaNi_5$ on the performance of a metal hydride-based hydrogen compressor." *International Conference on Renewable Energy (ICRE 2022)*, University of Rajasthan, Jaipur, India, February 25-27, 2022.
5. E. Anil Kumar. "Metal hydrides for high temperature thermal energy storage." *BRICS International workshop on Sorption based high performance thermal batteries: materials, thermal engineering and systems,* IISC Bangalore, 15th December 2021.
6. K. M. R. Shripad, and S. Sundar. "Development of experimental vibro-acoustic transfer function for a system with combined rolling-sliding motion." *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, vol. 263, no. 5, pp. 1505-1515, 2021.
7. K. SarathBabu, and E. Anil Kumar. "A Novel Cascade Resorption System for High Temperature Thermochemical Energy Storage and Large Temperature Lift Heat Upgradation." *International Conference on Renewable Energy (ICRE 2022)*, University of Rajasthan, Jaipur, India, February 25-27, 2022.
8. K. SarathBabu, and E. Anil Kumar. "Application of Mg-30wt% $LaNi_5$ and $LaNi_{4.7}Al_{0.3}$ for Thermochemical Energy Storage Using Coupled Metal Hydride Beds." *International Conference on Polygeneration 2021 (ICP 2021)*, Universidad de Zaragoza, Spain, October 4-6, 2021.
9. M. R. R, K. Chandrasekaran, T. Ranganathan and A. Thondiyath. "Computational Fluid Dynamic Study on the Effect of Winglet Addition in Flapping Hydrofoils to Evaluate the Propulsive Performance of Wave Gliders." *OCEANS 2022* - Chennai, pp. 1-4, 2022.
10. Rakesh Sharma, S. Anil kumar, and E. Anil Kumar. "Comparative Study of Adsorption and Resorption Cooling Systems Using Ammonia-Halide Salts Sorption Pairs." *7th National and 1 st International Conference on Refrigeration and Air Conditioning (NCRAC 2022)*, IIT Guwahati, India, February 24-26, 2022.
11. S. Dey, R. Puppala, N. Govindan, T. Ranganathan and A. Thondiyath. "Towards Mission-Specific Characterization of the Diving Performance of an Underwater Glider." *OCEANS 2022* - Chennai, pp. 1-6, 2022.
12. S. Panigrahi, V. Ashok, V. K. Pediredla, T. Ranganathan and A. Thondiyath, "Mathematical modelling and control of a submersible multi-medium UAV." *OCEANS 2022* - Chennai, pp. 1-9, 2022.
13. S. Pathak, C. Sindhura, Rama Krishna Sai S. Gothi, D. V. Kiran, and S. Gorthi. "Cranial implant design using V-net based region of interest reconstruction, Towards the Automatization of Cranial Implant Design in

Cranioplasty II: Second Challenge, AutoImplant 2021." *Held in Conjunction with MICCAI 2021*, Strasbourg, France, 1st October 2021.

Physics

1. A. Maignan, P. Reddy, S. Jeevanandam, P. C. Deshmukh, K. Roberts, N. Jisrawi and S. R. Valluri. "The electronic properties of GrapheneNanoribbons and the Offset Logarithm function." *Materials Today: Proceedings*, Elsevier, Vol. 54 (1), pp. 7-13, 2022.
2. Aravinda S. "On the maximally entangled and entangling unitary operators and its role in constructing a Quantum Ergodic Hierarchy." *International conference on quantum information and foundation,* Kolkata, 18 February 2022.
3. P. Srikar, S. M. Allabakshi, S. M. Maliyekkal and R. K. Gangwar. "Optical diagnostic of air surface dielectric barrier discharge plasma." *IEEE International Conference on Plasma Science (ICOPS) proceedings*, pp. 1-1, 2021.
4. P. Srikar, S. M. Allabakshi, S. M. Maliyekkal and R. K. Gangwar. "Optical diagnostic of air surface dielectric barrier discharge plasma." *IEEE International Conference on Plasma Science (ICOPS)*, 12-16 September 2021.
5. S. M. Allabakshi, P. Srikar, R. K. Gangwar and S. M. Maliyekkal. "Characterization of reactive chemical species in non-thermal air surface dielectric barrier discharge plasma." *IEEE International Conference on Plasma Science (ICOPS) proceedings*, pp. 1-1, 2021.
6. S. M. Allabakshi, P. Srikar, R. K. Gangwar and S. M. Maliyekkal. "Characterization of reactive chemical species in non-thermal air surface dielectric barrier discharge plasma," *IEEE International Conference on Plasma Science (ICOPS)*," 12-16 September 2021.
7. T. Chakrabarty, I. Heinmaa, B. Koteswararao and R. Stern. "Contradiction of one-dimensional magnetism in $InCuPO_5$ from MAS-NMR experiments." *AIP Conference Proceedings*, Vol. 2369, pp. 020050, 2021.

Mathematics and Statistics

1. A. Lahiri, and G. N. Vyshnavi. "Lagged long memory covariance matrix analysis from Indian stock market." *Virtually Hosted at Indian Society of Probability and Statistics (ISPS)*, 7-10 September 2021.
2. A. Lahiri, P. Gulati, R. Sen, and Puneet Gulati. "Some recent research interests in statistical finance." *The International Virtual Conference on Statistics and Data Science: Theory and Practice for Progress and Prosperity*, Hyderabad, India (Online Mode), 11-13 March 2022.
3. H. Cindric, P. Mariappan, L. Beyer, P. Wiggermann, M. Moche, D. Miklavcic, and B. Kos. "Numerically predicted irreversible electroporation ablation of hepatic tumors compared to MRI imaging - a retrospective study", *4th World Congress on Electroporation BioEM Conference*, Flander Expo, Ghent, Belgium, 26 September - 1 October 2021.
4. I. Das. "Introduction to Statistical Programming Methods using R Software." *International Webinar on Awareness of Statistical Softwares (R, PYTHON, SAS, SPSS) in Conjunction with the Annual Academic Competitions of ISPS*, virtually hosted at Indian Society of Probability and Statistics (ISPS), 13-14 March 2021.
5. I. Das. "Robust credit risk modeling using generalized linear models." *International conference on emerging trends in statistics and data science in conjunction with 40th annual convention of Indian society for probability and statistics (ISPS)*, virtually hosted at Indian Society of Probability and Statistics (ISPS), 7-10 September 2021.
6. I. Das. J. Mathews, S. Sen, and Sumangal Bhattacharya. "Multiple inflated multivariate negative binomial regression using copula." *The International Virtual Conference on Statistics and Data Science: Theory and Practice for Progress and Prosperity*, virtually hosted by Hyderabad, India (Online Mode), 11-13 March 2022.
7. K. Kishore. "Matrix Waring Problem." *Workshop on Group Theory 2022*, Virtually hosted by IISER - Pune, India, 4-5 February 2022.

8. S. A. Prasad. "Super Coalescence Hidden-variable Fractal Interpolation Function", *International Conference AMS Sectional Meeting Program: Special Session on Fractal Geometry and Dynamical Systems*, virtually hosted by University of New Mexico, 23-24 October 2021.

Humanities and Social Sciences

1. A. K. Singh, and P. S. Dwivedi. "Censoring of Women's Cultural Space during the Indian National Movement- A Linguistic Perspective", *International conference on "Women Encountering Emancipation and Adversity in the 20th Century*, at University of Chichester, Humanities Department, March 14, 2022.
2. A. Raghuramaraju. "How the presence of modernity-colonialism forced enslaved Indians to scout for resources for freedom in the past: Bal GangadharTilak and Bhagavad Gita." workshop on *Freedom 'from' Others or Freedom 'with' Others: Alienation, Independence and Liberation in Contemporary Indian Philosophy*, organized by Eberhard KarlsUniversitat, Tubingen on 11-13 December 2021.
3. A. Raghuramaraju. "Indian Philosophy Today: Reclaiming, Critiquing, Describing and Evaluating." Webinar on *Indian Philosophy Today: A Reappraisal*, organised by the Department of Philosophy, Delhi University 30 July 2021.
4. A. Raghuramaraju. "Responsibility, Emotion and Cognitive Competence in Krishnachandra Bhattacharyya." webinar on *Philosophy, Science and Values*, organised by Centre for Philosophy, Jawaharlal Nehru University, New Delhi on 7 April 2021.
5. C. S. Bahinipati, A. Singh, and U. Patnaik. "Soil Based Interventions for Economic Returns in India: A Systematic Review." *International Multi-Disciplinary On-line Conference on Sustainable Soil Resources 2021* [SSR 2021), KIIT, Bhubaneswar, India, April 22-25, 2021.
6. C. S. Bahinipati, and A. K. Gupta. "Methodological Challenges in Assessing Losses and Damages from Climate Extremes in India." International Conference on *"Tackling Climate Change through Urban Resilience: Role of Institutions and Public Policies in Canada and India."* Indian Institute of Technology Tirupati, India, March 24, 2022.
7. C. S. Bahinipati, and R. A. Sirohi. "Choosing Energy-efficient Home Appliances in Urban India: Effects of Income and Environmental Externalities." *International Conference on Contemporary Issues in Economics (ICCIE 2022)*, XIM University, Bhubaneswar, February 4-7, 2022.
8. C. S. Bahinipati, and U. Patnaik. "Building resilience against floods in India: human development, income, inequality and forest cover." *the 2nd International Symposium on Disaster Resilience and Sustainable Development*, Asian Institute of Technology, Bangkok, June 24-25, 2021.
9. C. S. Bahinipati, R. A. Sirohi and S. S. Rao. "Technological innovation, behavioural interventions and conserving household level energy: a review." *The 17th Globelics International Conference*, Heredia, Costa Rica, November 3-5, 2021.
10. C. S. Bahinipati, R. A. Sirohi, and S.S. Rao. "Technological Innovations, Behavioural Interventions and Household Energy Conservation: Policy Insights and Lessons." *the Environmental Research Conference 2021*, November 15-19, 2021.
11. C. S. Bahinipati, U. Patnaik, and A. Senapati. "Enhancing resilience to extreme events in India: do socio-economic factors matter?" International conference on *"Ecosystem Restoration for Resilience and Sustainability: living with nature,"* Indian Institute of Technology Indore, June 5-7, 2021.
12. C. S. Bahinipati. "COVID-19, Migration and Social Distancing: Reflections from Behavioural Economics." International Workshop on '*Public Policies for the Post-Pandemic Era',* IIT Tirupati, February 24-25, 2022.
13. C. S. Bahinipati. "Do formal coping mechanisms mitigate non-economic losses and damages from climate change? Empirical evidence from drought affected households in western India." National Seminar on '*Global Biodiversity and Sustainable Development',*Periyar University, Salem, February 23-24, 2022.

14. C. S. Bahinipati. "Do Indian farmers undertake farm-level adaptation measures? Determinants, barriers, and the way forward." *6th International Climate Change Adaptation Conference (Adaptation Futures 2020),* New Delhi, India, October 5-8, 2021.
15. C. S. Bahinipati. "Do Socioeconomic Factors Enhance Household's Resilience to Climate Extremes? Empirical Evidence from Cyclonic Storms and Floods in India." *Sustainability & Beyond Colloquium series*, Amrita Vishwa Vidyapeetham's UNESCO Chair on Experiential Learning for Sustainable Innovation and Development and Amrita School for Sustainable Development in light of UN International Day for Disaster Risk Reduction, Kochi, India, October 21, 2021.
16. C. S. Bahinipati. "Estimating economic and non-economic losses and damages from climate change in India: methodological issues." International Workshop on *'Methodological Challenges in assessing socio-economic losses and damages from climate change in India*, Indian Institute of Technology Tirupati (IITT), National Institute of Disaster Management (NIDM), and Organisation for Economic Co-operation and Development (OECD), May 25, 2021.
17. C. S. Bahinipati. "Impact of COVID 19 on Migration and Street Vendors in India: Reflections from Behavioural Economics Literature." *the 5th Annual national Conference of SOEA on 'COVID 19: Impact of Health, Rural Economy and Migration'*, Khallikote University Berhampur, Odisha, India, September 5, 2021.
18. C. S. Bahinipati. "Impact of COVID 19 on Urban Street Vendors in India: Evidence from Bhubaneswar." National conference on *"Many Facets of Covid-19 Pandemic*." Council for Social Development, Hyderabad, March 1-2, 2022.
19. C. S. Bahinipati**.** "Response to cyclone and COVID-19: Reflections on learning effects and behavioural biases." *'Double Disaster: COVID & Cyclone – Impact and the way forward',* National Institute of Disaster Management and IMPRI Impact and Policy Research Institute, June 2, 2021.
20. C.S. Bahinipati. "Climate Change, and Farmers' Adaptive behaviour and wellbeing: Evidence from the studies in India." *'NIICE International Studies Convention 2021: Reimaging the World: Reflections on the Future of World Order'*, Nepal, August 27, 2021.
21. D. Biswal, and C. S. Bahinipati. "Adoption and impact of crop insurance in India: evidence from India Human Development Survey", presented at the 11th Biennial Conference of the Indian Society for Ecological Economics (INSEE), Indraprastha Institute of Information Technology, Delhi, India, December 15-17, 2021.
22. D. Biswal, and C. S. Bahinipati. "Adoption and impact of crop insurance in India: evidence from India Human Development Survey." *the 17th Globelics International Conference*, Heredia, Costa Rica, November 3-5, 2021.
23. D. Biswal, and C. S. Bahinipati. "Crop-insurance, Adoption and Heterogeneous Impact: Evidence from India." *International Conference on Contemporary Issues in Economics (ICCIE 2022)*, XIM University, Bhubaneswar, February 4-7, 2022.
24. D. Biswal, and C. S. Bahinipati. "Why Farmers in India are not Adopting Crop-Insurance? Insights from Behavioural Economics Literature." *the 2nd International Symposium on Disaster Resilience and Sustainable Development*, Asian Institute of Technology, Bangkok, June 24-25, 2021.
25. M. Singh, and C. S. Bahinipati. "The Socio-economic, Women's Education and Autonomy and Neighbourhood Affecting Appliance Ownership in India: Evidence from Indian Human Development Survey." *International Conference on Contemporary Issues in Economics (ICCIE 2022),* XIM University, Bhubaneswar, February 4-7, 2022.
26. N. Nakra, and V. Kashyap. "Sustainable Human Resource Management: A Multilevel Integrative Review." *7th Biennial Conference of Indian Academy of Management* on "Triple Bottom Line: Developing Business Resilience, Ecological Sustainability and Social Well-being in Post- Pandemic World", Indian Institute of Management, Rohtak, 7-9 January 2022.
27. N. Sekhar, and R. A. Sirohi. "The Revolution Will Not Be Colour Blind: The Enduring Relevance of Anti-Apartheid Voices." *72nd PSA Annual International Conference*, Virtual, University of York, York, United Kingdom, 11-13 April 2022.

28. P. K. Verma, and P. S. Dwivedi. "Revisiting the Ecosophy of the Rāmāyaṇa: An Aesthetical Exploration," *International Conference of Ecocriticism and Environmental Studies, London Centre of Interdisciplinary Research (LCIR)*, London, UK, 16-17 October 2021.
29. P. S. Dwivedi. "Brahma Bābā– A Ghost or A Deity? An Inquiry into the North Indian Folk Beliefs with Special Reference to Harshu Brahma", *18th Annual Conference of the European Association for the Study of Religions (EASR)*, on "Resilient Religion" at the University of Pisa, Italy (Online, August 30 – September 3, 2021), August 31, 2021.
30. R. A. Sirohi, and S.S. Gupta. "Race and Caste in the Writings of Mariátegui and Ambedkar: A Comparative and Relational Perspective". *Society for the Advancement of Socio-Economics (SASE) conference*, Virtual, 2-5th July 2021.

APPENDIX– III

Invited Lectures delivered by the IITT Faculty Members

Chemical Engineering

1. K. Krishnaiah: "Chemical Engineering in 21st Century." Chaitanya Bharathi Institute of Technology (CBTI), Hyderabad, 24 Apr 2021.
2. K. Krishnaiah: "Mind of Teacher." Rajiv Gandhi University of Knowledge Technologies (RGUKT), Nuzvid, AP, 28 June 2021.
3. KSMS Raghavarao: "Energy efficiency improvement and cost saving opportunities for the dairy and food processing industry." Keynote address, College of Dairy Technology, Sri Venkateswara Veterinary University, Tirupati, 24 March 2022.
4. KSMS Raghavarao: "Extraction of Bioactive Compounds from Food Waste." National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Sonipat, 14 September 2021.
5. KSMS Raghavarao: "Food Processing: Research & Industry, Current status & Future Directions." R V College of Engineering, Bangalore 26 October 2021.
6. KSMS Raghavarao: "Food Processing: Research & Industry, Current status & Future directions." *International Joint Webinar*, IIT Guwahati in collaboration with Gifu University Japan, 23 October 2021.
7. KSMS Raghavarao: "Industry Institute Interaction with Dr Y S R Horticulture University." Rajalakshmi Engineering College, Chennai, National Science Day, 28 February 2022.
8. KSMS Raghavarao: "Industry Institute Interaction with Dr Y S R Horticulture University." CII Andhra Pradesh, Industry Institute Interaction with Dr Y S R Horticulture University, 18 February 2022.
9. KSMS Raghavarao: "Engineering Science in Food Processing Technology." Rajalakshmi Engineering College, Chennai, National Science Day, 28 February 2022.
10. KSMS Raghavarao: "Food Processing: Research & Industry - Current Status and Future Directions." Institute of Chemical Technology, Marathwada campus, Jalna, 19 June 2021.
11. KSMS Raghavarao: "Food Processing: Research & Industry, Current status & Future directions." Alabhyam (NIFTEM Technical Society) Sonipat, Haryana. 16 October 2021.
12. KSMS Raghavarao: "Novel Engineering Approaches in Food Processing." Department of Food Engineering & Technology, Tezpur University, Assam, India and Department of Food Science & Technology, University of Georgia, Georgia (US) (virtual International Conference), 24 June 2021.
13. M Nabil: "Machine Learning Applications in Chemical Engineering." MVJ College of Engineering, Bangalore,01 September 2021.
14. M Nabil:"Constrained State Estimation using Kullback-Leibler Divergence." Indian Institute of Technology–Guwahati, 17 March 2022.
15. Narendra Singh: "Metal Oxide Nanostructures for Environmental Applications."AKTU, Lucknow, 8 April 2022.
16. Narendra Singh: "Solar Cells Concepts and Current Trends." Jawaharlal Nehru Technological University-Anantapur College of Engineering Pulivendula, A.P,10 September 2021.
17. Narendra Singh: "Surface Engineering of Polymer/ Metal Oxide/ Metal for Different Applications." IIT BHU, 29 April 2022.
18. SasidharGumma: "Thin Film Nanostructured Membranes for Gas Separation Storage and Water Desalination." virtual workshop organized by IISc under SPARC scheme 18-19 January, 2022.

19. ShamikMisra: "Efficient Computational Approaches for Hierarchical Decision Support System." *Young Investigator Talks (YIT) seminar series*, IIT-BHU, January 2022.
20. Thamida Sunil Kumar: "Inculcating Suitable Traits in Engineers, Domains of Academia: Research and Teaching Learning." Marwadi University, Rajkot, Gujarat, GUJCOST Sponsored STTP, 05 March 2022.
21. Thamida Sunil Kumar: "MATLAB for Chemical Engineers." *CHEM-E-TECH, A National Level Online Technical Workshop for Engineering Students,* Organized by Department of Chemical Engineering, B V Raju Institute of Technology, 8 Jun 2021.

Civil and Environmental Engineering

1. Adapa Murali Krishna: "Geotechnical Aspects of Landslide Hazard Analysis." NEHU, Shillong and NDMA, 30 Mar 2022.
2. Adapa Murali Krishna: "Invited State of the Art Lecture." *7th International Conference on "Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics,* 12-15 July 2021.
3. B. Janaki Ramaiah: "Assessment of Skempton's Pore Water Pressure Parameters A and B using High Capacity Tensiometers," *Workshop on Relevance of Unsaturated Soil Mechanics in Practice*, Online Mode, IGC2021, Trichy, 15 December 2021.
4. B. Janaki Ramaiah: "Cone Penetration Testing: Basics and applications in Geotechnical &Geoenvironmental Engineering." *Short Term Course on Soil Exploration, Indian Geotechnical Society SC7 - Online Course*, 24 July 2021.
5. B. Janaki Ramaiah: "Geotechnical aspects of MSW landfills - Case studies from India." *ATAL Faculty Development Program on Environmental Geotechnology*,Dept. of Civil Engg., NIT Goa, 24 June 2021.
6. B. Janaki Ramaiah: Delivered lecture and served as panel member for the workshop on "Cone Penetration Testing." SC10 Sub-Committee of IGS and IGS Delhi Chapter, 4 March 2022.
7. Dr. K. Prapoorna B: "Quality Control and Maintenance Management in Sustainable Infrastructure: Advanced Tools to Manage Pavements." Visvesvaraya National Institute of Technology Nagpur, 22 July 2021.
8. K. Prapoorna B: "A Mechanistic & Holistic Perspective of Tire / Pavement Interaction Noise," Sardar Vallabhbhai National Institute of Technology Surat, Gujarat, India, 22 October 2021.
9. K. Prapoorna B: "Advanced Tools to Assess Tire / Pavement Interaction Noise: State-of-the-art & Futuristic Designs." S. V. National Institute of Technology Surat, 21 July 2021.
10. K. Prapoorna B: "Advanced Tools to Manage Asphalt (and Concrete) Pavement Systems." *Short-Term Course on Advances in Pavement Engineering*, IIT Bhubaneswar, 25 May 2021.
11. K. Prapoorna B: "Advancements in Roadway Technologies: Innovative Materials, Best Construction Practices, & Asset Management." Shri Vishnu College for Women, Andhra Pradesh, India,14 October 2021.
12. K. Prapoorna B: "Design of connections as per IS 800: 2007." *FDP* jointly organised by SVNIT & NIT Warangal, 27 October 2021.
13. K. Prapoorna B: "Development of Pervious Roadway Materials for Groundwater Recharge." *International Conclave (Virtual Mode) on Adoption of Green Construction Practices with Focus on Water Resource*. Organized by Indian Water Works Association jointly with VNIT Nagpur and NEERI Nagpur, Maharashtra, India, 11 February 2022.
14. K. Prapoorna B: "Green Roadway Infrastructure: Futuristic Designs, Best Construction Practices, & Asset Management." SreeVidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh, India, 14 September 2021.
15. K. Prapoorna B: "Integrated LCA Toolkits for Sustainable Transportation Infrastructure." *Online Workshop under the DTEE and NDC-TIA projects*, Life cycle assessment methods to support India's efforts to decarbonise transport, International Transport Forum & NITI Aayog, 14 April 2021.

16. K. Prapoorna B: "Keynote Lecture: Futuristic Roadway Technologies: Sustainable or Resilient or Perpetual?" Dr. YSR ANU College of Engineering and Technology, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India, 31 March 2022.
17. K. Prapoorna B: "New Generation Pervious Concrete Pavement Systems: Sustainable & Resilient Transportation Infrastructure, Smart Construction & Multifunctional Concrete." *Taiwan Concrete Institute*, Organized by NKUST, Taiwan, 18 November 2021.
18. K. Prapoorna B: "Sustainable and Resilient Pavement Systems." *GMRIT-BVRIT Joint Online FDP on Design and Construction Practices of Sustainable Pavements (DCPSP-2022)*. Rajam, Andhra Pradesh, India, 14 February 2022.
19. K. Prapoorna B: "Sustainable Transportation Infrastructure: Futuristic Designs." *Best Construction Practices, & Asset Management*, NMAM Institute of Technology, Nitte, Udupi, Karnataka, India, 2 September 2021.
20. K. Prapoorna B: "The Art and Science of Publishing." Indian Institute of Technology Tirupati, Andhra Pradesh, India, 14 September 2021.
21. K. Prapoorna B: "Use of Sustainable Technologies in Roadway Infrastructure: Novel Materials, Green Construction, & Asset Management." Nirma University, Ahmedabad, Gujarat, India, 22 December 2021.
22. K. Prapoorna B: "Visions: Sustainable Roadway Technologies." Kerala State Planning Board, Kerala, India, 27 September 2021.
23. K. Prapoorna B: "Visions: Sustainable Roadway Technologies." *Transformation Mission Program for Public Works Department: Consultation Workshop*. Kerala Public Works Department, Kerala, India, 24 November 2021.
24. Nithyadharan M: "Analysis and Design of Simply Supported and Continous Steel Concrete Composite Beams." Thiyagaraja College of Engineering, Madurai,1 December 2021.
25. Nithyadharan M: "Introduction to Design of Composte Beam as per IS:11384." Thiyagaraja College of Engineering, Madurai, 30 November 2021.
26. Prasanna Kumar Behera: "Corrosion of Strained Plain Rebars in Concrete Under Chloride Attack, ADCET." AICTE-ISTE Sponsored One Week ONLINE Induction/Refresher Program on *Repair, Rehabilitation and Retrofitting of RCC Structures",* Ashta, Maharashtra, 21 January 2022.
27. Rahul A V: "Construction by concrete 3D printing, Brigade group, construction company." 5 February 2022.
28. Rahul A V: "Construction by concrete 3D printing: possibilities and challenges." Guru GhasidasVishwavidyalay (a central University), Bilaspur, Chhattisgarh, 22 February 2022.
29. Rahul A V: "Understanding the Early-Age Requirements for Concrete 3D Printing." *L&T Heavy Civil Infrastructure Quality Conference 2021*, 20 December 2021.
30. RomanbabuOinam: "One Week Online Short-Term Training Programme: Post disaster damage assessment and Repair/Demolition." Department of Civil Engineering Srinivasa Ramanujan Institute of Technology, Anantapuramu, Andhra Pradesh, 26 Apr 2021.
31. Roshan Karan Srivastav: "National Webinar: Restore our Earth: Role of GIS and Remote Sensing." Department of Commerce, Union Christian College, Aluva, Kerala, 22 Apr 2021.
32. Roshan Karan Srivastav: "Remote Sensing and GIS in Forest Hydrology." *National Agriculture Higher Education Project - Insitution Development Plan*. Conducted by College of Horticulture Mandsaur, Madhya Pradesh, 7 Jul 2021.
33. Shihabhudeen M Maliyekkal: "Advances in Drinking Water Treatment." NIT Calicut, *Emerging Technologies for Sustainable Environmental Management*,sponsored by AICTE Training and Learning (ATAL) Academy,31st May 2021 to 4th June 2021.
34. Shihabhudeen M Maliyekkal: "Bio-inspired Sealant for Healing Microcracks in Concrete." Climate Change Impacts on Civil Engineering Applications,VIT Chennai, 08 January 2022.

35. Shihabhudeen M Maliyekkal: "Industrial Water Management and Treatment Technologies." CII, 25 November 2021.
36. Shihabhudeen M Maliyekkal: "Keynote address: Nanotechnology Enabled Water Disinfection." *International Conference on Environmental Science and Engineering (ICESE-2022)*, IIT Bombay, 21 January 2022.
37. Shihabhudeen M Maliyekkal: "Sustainable Nanoscale Materials for Purification of Water." *National Workshop on Chemistry in Everyday Life*, Department of Chemistry School of Advanced Sciences, VIT, AP,17th & 18th April 2021.
38. Shihabhudeen M Maliyekkal: "Sustainable Nanoscale Materials in Construction, Repair, and Water purification." Brigade Enterprises Limited, Bandalore, 03 March 2022.
39. Shihabhudeen M Maliyekkal: "The Way Forward for Sustainable Water Treatment Technologies." Indo-Canadian Symposium on "Water: Purification, Optimization, and Management", 18 March 2022.
40. Shihabhudeen M Maliyekkal: "Water: The Inconvenient Truth." Geethanjali Institute of Science &Technology, Nellore, 05 June 2021.

Computer Science and Engineering

1. G. Ramakrishna: "Joy of Programming." Sree Rama Engineering College, Tirupati, 10 February 2022.
2. G. Ramakrishna: "Operating System Services Session - FDP on Computer System Design." Online Event from IIT Tirupati, 7 January 2022.
3. Konda Reddy Mopuri: "An Overview of Unsupervised Learning." Srinivasa Ramanujan Institute of Technology (SRIT), Ananthapuramu, 8 June 2021.
4. Konda Reddy Mopuri: "Interpretable AI: Visualizing CNNs." Srinivasa Ramanujan Institute of Technology (SRIT), Ananthapuramu, 10 June 2021
5. Konda Reddy Mopuri: "Introduction to Generative Adversarial Networks (GAN)." Srinivasa Ramanujan Institute of Technology (SRIT), Ananthapuramu, 22 June 2021.
6. Konda Reddy Mopuri: "Introduction to Statistical Learning: Linear and Logistic Regression." Srinivasa Ramanujan Institute of Technology (SRIT), Ananthapuramu, 27 May 2021.
7. Konda Reddy Mopuri: "Tree Based Methods for Machine Learning." Srinivasa Ramanujan Institute of Technology (SRIT), Ananthapuramu, 22 June 2021.
8. Sridhar Chimalakonda: "A Mocktail of Source Code Representations Robert Bosch R&D." 18 August 2021
9. Sridhar Chimalakonda: "Games for Online Teaching and Learning of Computing Skills." Commonwealth of Learning (COL)/Commonwealth Educational Media Centre for Asia (CEMCA), 11 June 2021.
10. Sridhar Chimalakonda: "Role of AI in Software Industry ATAL FDP on AI", MBMEC Jodhpur, 5 July 2021
11. Sridhar Chimalakonda: "What Is Software Engineering Anyway? Reflections on 50 Years of Software Engineering and the Road Ahead!" ACM India Eminent Speaker Talk, Manav Rachna International Institute of Research & Studies, Haryana,19 April 2021.
12. Sridhar Chimalakonda: "What Is Software Engineering Anyway? Reflections on 50 Years of Software Engineering and the Road Ahead!" IIT Jodhpur 7 May 2021.
13. Sridhar Chimalakonda: "What Is Software Engineering Anyway? Reflections on 50 Years of Software Engineering and the Road Ahead!" - ACM India Eminent Speaker Talk OIST ACM Student Chapter, Bhopal, 28 August 2021.
14. Sridhar Chimalakonda: "What Is Software Engineering Anyway?" Sri PadamavathiMahila Vishwa Vidyalayam, 8 October 2021.
15. V. Mahendran: "Introduction to Blockchain Technology Gyalpozhing." College of Information Technology, Royal University of Bhutan, 26 October 2021.

16. Venkata Ramana Badarla: "Basic Building Blocks of Networking in IoT: FDP on Embedded Systems, IoT, Pervasive Computing." Talla Padmavathi College of Engineering, Warangal, 08 December 2021.
17. Venkata Ramana Badarla: "Congestion Control in Computer Networks." Guest lecture under ISTE student chapter, Sree Rama Engineering College, Tirupati, 24 November 2021.
18. Venkata Ramana Badarla: "Emerging Technologies for Internet of Things: FDP on IoT and ML." JNTU Ananthapuram, 08 December 2021.
19. Y. Kalidas: "Orientation Lecture for Artificial Intelligence and Machine Learning." Sri Venkateswara College of Engineering (SVCE), Tirupati, 22 December 2021.
20. Y. Kalidas: Chief Guest and Resource Person. AICTE- ISTE Sponsored Induction/Refresher Program phase-III on "Machine Learning for all." KSRM College of Engineering, Kadapa, April 2021.

Electrical Engineering

1. Abhishek Kumar Jha: "Microwave Sensors: Epsilon & Mu-Near Zero Sensors." SSN College of Engineering, Kalavakkam,Tamil Nadu India, 08 December 2021.
2. Abhishek Kumar Jha: "Special Class of Microwave Sensors: ENZ & MNZ sensors." Indian Institute of Technology (IIT) Indore, 02 March 2022.
3. Pooja Vyavahare: "Opinion Dynamics in Networks with Trust-mistrust Interactions." as Plenary speaker in ICWiCON 2021, the Department of Electronics and Telecommunications, D J Sanghavi College of Engineering, Mumbai, 8 October 2021.
4. Swapnil Bhuktare: "Spintronics", in FDP on "Emerging trends in electronics, communication and networking technologies." The Department of Electronics and Communication Engineering, SreeVidyanikethan Engineering College,25 October 2021.

Mechanical Engineering

1. A. Madan Mohan: "Alternative fuels for IC engines." G H Raisoni College of Engineering, Nagpur, 2 February 2022.
2. A. Madan Mohan: "Optical Diagnostic Techniques for Spray and Combustion." FDP at Gudlavalleru Engineering College, 10 October 2021.
3. Ajay Kumar: "Friction Stir Processing of Metal Matrix Nanocomposites and Opportunities for Next Generation Composites in India." Faculty Development Program (ATAL-FDP) on *Novel Materials* during 4-8 October 2021, Department of Mechanical Engineering, Ajay Kumar Garg Engineering College, Ghaziabad, Uttar Pradesh,7 October 2021.
4. Ajay Kumar: "Materials related reliability issues in microelectronics packages." 10 Days Online FDP on *Applications of Artificial Intelligence in Digital Manufacturing* from 21.02.2022 to 03.03.2022, Department of Mechanical Engineering, Sri Sairam Engineering College in association with NIT Warangal, 2nd March 2022.
5. Ajay Kumar: "Metal additive manufacturing processes." One Week Atal FDP Program Under AICTE Training and Learning (Atal) Academy Organized by Department of Mechanical Engineering, LNCT Bhopal, 6 July 2021.
6. Ajay Kumar: "Recent Advancement and Challenges in Wire Arc Additive Manufacturing of Ti Alloys for Aerospace Applications." *Novel Perspective of Smart Materials, Hybrid Machining, and Additive Manufacturing (NPSHAM-2021)*, Indraprastha Engineering College, Ghaziabad- U.P, 2 August 2021.
7. Ajay Kumar: "Recent Advancement and Challenges in Wire Arc Additive Manufacturing of Ti Alloys for Aerospace Applications." Faculty Development Programme (FDP) on *3D Printing and Design* From 20th -24th September 2021 sponsored by ATAL AICTE, Department of Mechanical Engineering of GianiZail Singh Campus College of Engineering & Technology MRSPTU, Bathinda Punjab, 23 September 2021.

8. Balaji Subramanian: "Wing Energy Opportunities and Challenges." *2nd International Conference on Renewable Energy (ICRE-2022)*, 26 February 2022.
9. Y. Mitikiri: "Attitude estimation and Control in UAVs." Indian Naval Academy, Ezhimala, March 21-22, 2022.

Chemistry

1. A.K. Manna: "First-principles Modeling of Optoelectronics and Charge-Transport in Functional Molecules and Materials." *Silver Jubilee Celebration at Theoretical Sciences Unit*, JNCASR, Bangalore, India, 29 October 2021.
2. A.K. Manna: "Modeling Optoelectronics and Charge-Transport in Functional Organic Materials: Insights from First-principles." *Loquitur-2021*, Department of Chemical Sciences, IISER-Berhampur, India, 03 November 2021.
3. C.P. Rao: "Carbohydrate –Lectin/Glycosidase Interactions: Demonstration of Experimental and Computational Docking Studies by Aromatic-Imino-Glycoconjugates." *Physical Chemistry Physical Biology,* conducted jointly by IITT, SNBNCBS Kolkata and IITB, 24-28 September 2021.
4. C.P. Rao: "Delivered totally 5 lectures on EPR, Mossbauer and Mass Spectrometry applications." *Science Academies Refresher Course on Spectroscopic Techniques: New facets in contemporary fields of Chemical, Material and Pharmaceutical Sciences.* Vignan University, Guntur, 11-13 May 2022.
5. C.P. Rao: "Protein-Inorganic Hybrid Nano-Materials: Unravelling Multitude Application Domains." *Organic-Inorganic Hybrid Materials (OIHM-2021)*, SVNIT, Surat, 4-8 October 2021.
6. D. Mondal: "National and International Research Fellowships and Employment Opportunitiesat Students." Week Celebrations event at Ramakrishna Mission Sikhshanamandira, Kolkata, India, 05 January 2022.
7. N. Kumarswamyreddy: **"**L-Proline Derived Thiourea Organocatalyst Catalyzed to Access Enantioenriched 3-Acetyl Coumarin Substituted 3- Hydroxy Oxindoles and Pyranocoumarin Fused Spirooxindoles." *Second Virtual International Conference on Chemical Sciences in Sustainable Technology and Development (2nd IC^{2}S^{2}TD-2021)*, Department of Chemistry, Sardar Vallabhbhai National Institute of Technology, Surat, India in Association with the Department of Chemistry, Chung-Ang University, South Korea, 24-26 November 2021.
8. N. Kumarswamyreddy: **"**Chemical Synthesis of Cysteine-rich Proteins and Applications in Plants Biology." Anju Chadha's research group, IIT Madras, 26 March 2022.
9. P. Gandeepan**:** "Carbonyl Group Assisted Molecular Synthesis." *National Conference on Emerging Trends in Chemical Sciences (NCETC-22)*, Department of Chemistry, Karpagam Academy of Higher Education, Coimbatore, Tamil Nadu, 25-26 March, 2022.
10. S. Ray: "Stochastic Resetting induced Enhancement of Diffusive Transport." *Frontier Research in Chemical Sciences*, Jyoti Nivas College Autonomous, Bangalore, India, 11-13November 2021.
11. S. Ray: "Stochastic resetting: When does it accelerate diffusive transport?" *34th Marian Smoluchowsky Symposium on Statistical Physics*, Jagiellonian University, Kraków, Poland, 27-29 September 2021.
12. S. Ray: "To reset, or not to reset, that is the question." *Statistical Physics and Complexity Webinar Series,* School of Physics & Astronomy, University of Edinburgh, Scotland, UK, 14 December 2021.
13. V.Chintalapudi: "Strategies and Efforts Towards the Total Synthesis of Complex Natural Products." *Chem Talks @ CUTN*, Department of Chemistry, Central University of Tamil Nādu, Thiruvarur, 10 February 2022.

Physics

1. Aravinda S: "Introducing Quantum Computation Using IBM Qiskit." IIT Kanpur, 7-12 April 2022.
2. Aravinda S: "Lectures on Quantum Algorithms." ACM winter school IIT Madras, 6-14 January 2022.
3. Aravinda S: "Many-body Entangled State in Quantum Information Theory." Faculty Development Programme sponsored by ATAL, Tripura Central University, 8 February 2022.

4. Aravinda S: "On Quantum Information Theory and Computation." Public talk at Cre'active' forum, Karnataka, 19 March 2022.
5. R. K. Gangwar: "Refresher Course in Physics." TLC, Harish Chandra Post Graduate College, Varanasi, 27 October – 10 November 2021.
6. R. K. Gangwar: "Spectroscopic Methods and its applications." National webinar organized by NallaNarashimaa Reddy education society, 31 July 2021.
7. R. Modak: **"**Entanglement entropy in PT-invariant non-Hermitian system."*Young Investigators Meet on Quantum Condensed Matter Theory*, NISER Bhubaneswar, 16 November 2021.

Mathematics and Statistics

1. A. Lahiri: "Fractional Brownian Markets with Time-varying Volatility and High-Frequency Data." ISI Kolkata, 8 February 2022.
2. A. Lahiri: "Session-II, Mathematics for Data Science- I (Probability theory, statistics, Bayesian statistics, optimization techniques." *AICTE sponsored ATAL online FDP on "Data science for IoT", KIIT*, 21-25 June 2021.
3. A. Lahiri: "Session-III, Mathematics for Data Science- II (Linear algebra and matrix algebra)." *AICTE sponsored ATAL online FDP on "Data science for IoT",* KIIT, 21-25 June 2021.
4. D. P. Challa: "Graph Theory." *Anna university-approved faculty development training program,* Ramco Institute of Technology, Rajapalayam, Tamilnadu, 28 June 2021 - 03 July 2021.
5. D. P. Challa: "Lattices and Boolean Algebra." *Anna university-approved faculty development training program by Ramco Institute of Technology*, Rajapalayam, Tamilnadu, 28 June 2021 - 03 July 2021.
6. K. Kishore: "Matrix Waring problem." *IISER Pune*, 5 February 2022.
7. P. Mariappan: "Mathematical Modeling." *T*hiyagarajar college, Madurai, 3 January 2022.
8. P. Mariappan: "Predictive Modeling for Cancer Treatment." Hindustan college, Coimbatore*,* 12 January 2022.
9. V. Raghavendra: "First order differential equations, a training program of TSTM and TNP, Bihar mathematical society." Education department Patna*,* 29 August 2021.
10. V. Raghavendra: "Introduction to finite elements- theoretical part science academics, virtual lecture workshop on scientific computations." Madanapalle institute of technology and science, Madanapalle*,* 8-9 October 2021.
11. V. Raghavendra: "Special lectures on Sobolev spaces." Free online availability throughout India, Every Monday and Saturday beginning from August 2021 till December 2021.

Humanities and Social Sciences

1. Raghuramaraju: "Calibrating Western Philosophy for India." Online Lecture, *Research Methodology Course for Doctoral Students*, NALSAR University of Law, Hyderabad, 4 March 2022.
2. Raghuramaraju: "Enlightenment and Woman: S. M. Okin's Critique of Kant." Webinar, Department of Philosophy, Hindu College Delhi, 6 August 2021.
3. Raghuramaraju: "Gurdev Rabindranath Tagore and Mahatma Gandhi." Webinar Probhodha Trust, Kochi, Sevagram Ashram Pratishthan, Wardha and Centre for Gandhian Studies, Central University of Kerala, 14 May 2021.
4. Raghuramaraju: "Hermeneutics outside the Academic Institutions in Modern India: Lokamanya Bal Gangadhar Tilak and Mahatma Gandhi on Gita." Webinar, Department of English and Cultural Studies, Punjab University Chandigarh, 31 August 2021.
5. Raghuramaraju: "Indian Ideas of Freedom." Distinguished Gandhi Lecture, Dennis Dalton, Zakir Husain Delhi College of Delhi University, via Webinar, 28 July 2021.

6. Raghuramaraju: "Making of the Mahatma: Revisiting the relationship between Gurudev Rabindranath Tagore and Mahatma Gandhi." Indian Institute of Management, Calcutta, MCHV Special Lecture Webinar, 5 November 2021.
7. Raghuramaraju: "Making of the Nation: Lessons from the Recent Past." Webinar Sri Vidyaniketan Institute of Management, Tirupati, 18 June 2021.
8. Raghuramaraju: "Non-Being and Permanence in Indian and Western Philosophies." Online lecture, *3rd Refresher Course in Philosophy*, HRDC JNU, New Delhi, 11 January 2022.
9. Raghuramaraju: "Problematising Two Aspects in Critical Thinking: The Thought that is Criticised and the Thinker Criticizing." Pandu College, Guwahati, 15 December 2021.
10. Raghuramaraju: "Revisiting classical Indian philosophy." Online lecture, *Refresher Course in Indian Folklore, Culture and Traditions (IMD)*, DU Centre for Professional Development in Higher Education (CPDHE), UGC-HRDC, the University of Delhi, 28 December 2021.
11. Raghuramaraju: "Rousseau and the institution of old age home." an online talk School of Philosophy, Gangadhar Meher University, Sambalpur, Odisha,27-May 2021.
12. Raghuramaraju: "The Relationship between a Teacher and a Student: Understanding Guru Dev Rabindranath Tagore and Mahatma Gandhi." Visva-Bharati University, Santiniketan, 30 November 2021.
13. Raghuramaraju: "The Setting Question paper and evaluating Answers for Relative Grading." Offline lecture, Faculty Development Programme, Department of Management, Sri Vidyaniketan, Tirupati, 24 December 2021.
14. Raghuramaraju: "Use of past by the present." Online lecture, *Refresher Course in Indian Folklore, Culture and Traditions (IMD)*, DU Centre for Professional Development in Higher Education (CPDHE), UGC-HRDC, the University of Delhi, 28 December 2021.
15. Raghuramaraju: "Uses of tradition by Modern Indian Thinkers." Online Lecture, *Refresher Course,* UGC-Human Resource Development Centre, S. V. University, Tirupati, 20 December 2021.
16. Raghuramaraju: "Way Forward." Concluding session of the 5th International Annual Conference on *"Deleuze and Guattari studies Indian Conference"* 11 November 2021.
17. Raghuramaraju: "Why Indian Modernities Turn Towards the Past." Online Lecture, Refresher Course on *Locating the Contours of Indian Modernities: Challenges and Possibilities,* organised by UGC-Human Resource Development Centre, Panjab University, Chandigarh, 19 March 2022.
18. Raghuramaraju: Chaired the first plenary of the 5th International Annual Conference on "*Deleuze and Guattari studies Indian Conference"* 11 November 2021.
19. A.Raghuramaraju: "Indian Philosophy Today: Reclaiming, Critiquing, Describing and Evaluating." Keynote Address Delivered in a webinar on Indian Philosophy Today: An Appraisal, organised by Department of Philosophy, Delhi University, 30 July 2021.
20. C.S. Bahinipati: "How to do Systematic Review and Meta-Analysis?" *Refresher Training Programme*, A N Sinha Institute of Social Studies, Patna, Bihar, 9 March 2022.
21. C.S. Bahinipati: "Regression Analysis with Cross-Sectional Data, RCT and Quasi-Experimental Design." *Research Methodology in Social Science and Humanities*, UGC- Human Resource Development Centre, Kannur University, Kerala, 22 March 2022.
22. C.S. Bahinipati: "Research Writing: Systematic Review and Meta-Analysis." ATAL Sponsored a Five-Day Online Workshop on '*Capacity Building through Academic and Research Writing',* Indian Institute of Technology Tirupati, 12 September 2021.

APPENDIX– IV

Awards and Achievements

1. A. Raka (PhD scholar in Chemistry): Received Best Poster Award, *17th Theoretical Chemistry Symposium-2021 (TCS-2021)*, IISER Kolkata, IACS Kolkata, University of Kalyani and S. N. Bose National Centre for Basic Sciences, Kolkata, India, 11-14December, 2021.
2. C.P. Rao: Member of the Senate, NIT Surat, September 2020 – August 2022.
3. C.P. Rao: Member, Board, IIT Tirupati, August 2020 – December 2021.
4. Krishna Prapoorna B.: Chairman, International conference on Resource Sustainability (icRS), Chairman of icRS SPT 2021, May 26-27, 2021.
5. Krishna Prapoorna B.: ESF College of Expert Reviewers, Nominated by European Science Foundation, France, Expert panelist, April 2021.
6. Krishna Prapoorna B.: Lead Guest Editor, American Society for Testing & Materials International Journal of Testing & Evaluation, Special Issue from icRS SPT 2021, June 2021.
7. Krishna Prapoorna B.: Managing Guest Editor, Resources, Conservation & Recycling Journal; Resources, Conservation & Recycling Advances Journal, Special Issues from icRS SPT 2021, June 2021.
8. Krishna Prapoorna B.: Member (R&D Institutions), Working Group on Transport,Kerala State Planning Board (2022-27), 2022.
9. Krishna Prapoorna B.: Member, International Scientific Committee, International Conference on Transportation Infrastructure, Lima, Peru, October 2021.
10. Krishna Prapoorna B.: Member, International Scientific Committee, 1st International Online Conference on Infrastructures (IOCI 2022), hosted by the MDPI journal infrastructures, December 2021 for June 2022 Conference.
11. M. T. Annette (CY21D501): Received DST Inspire Doctoral Fellowship, September 2021-August 2025.
12. N. Kumarswamyreddy: Research Excellence Award-2021for quality of research publication from InSc, Bangalore.
13. Prasanna Kumar Behera: Outstanding PhD thesis award in Civil Engineering, IIT Kanpur, Best PhD thesis, 28/12/2021.
14. R. Rafeek: Received Best Poster Award, *CTTC-2020*, Bhabha Atomic Research Centre, Mumbai, 23-25September 2021.
15. R. Rafeek (PhD scholar in Chemistry): Received PCCP Poster Presentation Prize, Theoretical *Chemistry Symposium (TCS 2021),* IISER Kolkata, 11-14 December 2021.
16. S. Ray: Awarded Scholarship for Short-Term Research Visit to Max Planck Institute for the Physics of Complex Systems, Dresden, Germany (June-August, 2022), March 2022.
17. Shihabhudeen M.Maliyekkal: Awarded Indian design patent titled "Integrated design for automated Capacitive Deionization (CDI) System," Design No.: 349450-001, Granting Date: 24-11-2021.
18. Shihabhudeen M.Maliyekkal: Awarded Indian patent titled "A method for the preparation of Immobilized graphene-based composite from asphalt," Patent Grant No.: 393415; Granting Date: 29-03-2022.
19. Shihabhudeen M.Maliyekkal: Awarded Indian Patent titled "Metal oxyhydroxide mediated anoxic ammonia removal from aqueous solutions" Patent No.: Patent No.: 360373; Granting Date: 05-03-2021.
20. Shihabhudeen M.Maliyekkal: Incubated a company at IIT Tirupati, NGEN Water Solutions Pvt. Ltd. Registered on: October 2021.

21. Shihabhudeen M.Maliyekkal: The article titled “A comprehensive review on antimicrobial face masks: an emerging weapon in fighting pandemics” has been included in the RSC Advances 10th Anniversary collection focusing on Chemistry in the battle against infections.
22. Shihabhudeen M.Maliyekkal: The project titled “Bio-derived sealant (Eco-Nanoseal) for the repair of micro-cracks inconcrete” has been selected for the IIT R& D fair. This is one of the six projects selected from 23 IITs under the theme Infrastructure (including smart mobility).
23. Shihabhudeen M.Maliyekkal: The project titled “Capacitive Deionization (CDI) for clean drinking water” has been selected for the IIT R&D fair. This is one of the five projects selected from 23 IITs under the theme—Environment and Sustainability (including air, water, rivers)

APPENDIX– V

1. Membership of Professional Bodies

1. A. Raghuramaraju: Appointed as a member of the Senate Indian Institute of Science Education Research, Tirupati 1-10-2021 to 30-9-2024.
2. Ajay Kumar: Tribology Society of India (TSI), American Society for Composites (ASC), Institute of Engineers, India (IEI).
3. C.P. Rao: Fellow of Andhra Pradesh Academy of Sciences (FAPAS, 2015)
4. C.P. Rao: Fellow of Indian Academy of Sciences, Bengaluru (FASc., 2012)
5. C.P. Rao: Fellow of Indian National Science Academy, New Delhi (FNA, 2015)
6. C.P. Rao: Fellow of National Academy of Sciences, Allahabad (FNASc., 2011)
7. C.P. Rao: Life Member, Biological Chemistry Society of India.
8. C.P. Rao: Life Member, Chemical Research Society of India.
9. C.P. Rao: Life Member, Crystallographic Society of India.
10. C.P. Rao: Life Member, Society for Carbohydrate Chemists & Technologists of India.
11. C.S. Bahinipati: Member, European Association of Environmental and Resource Economists
12. C.S. Bahinipati: Member, Human Development and Capability Association
13. C.S. Bahinipati: Member, Indian Society for Ecological Economics
14. C.S. Bahinipati: Member, Orissa Economic Association
15. G. K. Rajan: American Physical Society (Division of Fluid Dynamics)
16. G. Roy: Life Member, Chemical Research Society of India.
17. Madan Mohan A: Institute of Liquid Atomization and Spraying Systems (ILASS), Combustion Institute (India).
18. N. Kumarswamyreddy: Editorial Board Member for American Journal of Heterocyclic Chemistry (AJHC) (2022-2014).
19. P. Gandeepan: Life Member, Chemical Research Society of India.
20. P. Gandeepan: Professional Member, Institute of Scholars (InSc), Bengaluru, India, March 2020-Present.
21. S. Chakraborty: *RSC Advances* Reviewer Panel membership 2021.
22. Y. Mitikiri: *IEEE* Robotics and Automation Society, *IEEE* Control Systems Society.

2. Extension/Extracurricular Activities

1. A. K Manna: Served as an external review committee member for CSIR-JRF to SRF upgrade of Mr. Gyan Prakash Nanda, a doctoral student in Materials Research Centre at IISc, Bangalore, working under the supervision of Dr. Rajamalli P., 23 February, 2022.
2. A. K. Manna: Served as doctoral advisory committee (DAC) member for conducting the 1st DAC for Ph.D. scholar.Ms. Silpa S. (Reg. No. 20PHD0552) in Chemistry from VIT Vellore, 28 October2021.
3. A. K. Manna: Served as research advisory committee (RAC) member for conducting 1st RAC presentation for JRF to SRF upgradation of Ph.D. scholar Ms. SreejaniKarmakar (Roll No. 20182407) in Physics from IISER Tirupati, 31 August 2021.

4. A. Madan Mohan: Reviewer for Journals: Sadhana, Fuel, Applied Energy, Journal of flow visualisation and image processing, Energies.
5. Anil Vir: PhD Viva Examiner-VTU Belagavi
6. Anki Reddy Katha: Visited and interacted with faculty and students of OU, JNTU-H, BVRIT and CBIT Hyderabad, March 11, 2022. Delivered Seminar on "Dynamics of immersed bodies in a granular medium"
7. Anki Reddy Katha: Visited IIIT Idupulapaya to interact with faculty and students of Chemical Engineering Department
8. Anki Reddy Katha: Visited Pierre and Marie Curie University, France
9. C. S. Bahinipati: Associate Editor, International Journal of Climate Change Strategies and Management, Emerald Publishing.
10. C. S. Bahinipati: Associate Editor, SN Business and Economics Journal, Springer.
11. C. S. Bahinipati: Member of Doctoral Advisory Committee, Ashoka Trust for Research in Ecology and Environment, Bengaluru.
12. C. S. Bahinipati: Member of Thesis Advisory Committee, Indian Institute of Science Education and Research, Pune, India.
13. C. S. Bahinipati: Member, Earth System Governance Taskforce on Knowledge Cumulation, Earth System Governance Network, Utrecht University, Netherlands.
14. C. S. Bahinipati: Research Fellow, Earth System Governance Network, Utrecht University, Netherlands.
15. C. S. Bahinipati: Review Editor – Climate and Economics, Frontiers in Climate Journal.
16. C. S. Bahinipati: Reviewer for Research Proposal submitted to South Asian Network for Development and Environmental Economics (SANDEE), Kathmandu, Nepal.
17. C.P. Rao: On the BOS for Chemistry at JNTU Ananthapur.
18. C.P. Rao: Reviewed about 46 manuscripts submitted to ACS, RSC, Wiley, Elsevier and Springer journals.
19. C.P. Rao: Reviewed six Ph.D. theses, one each from Savitribai Phule Pune University, Central University of Rajasthan, NIT Warangal, VNIT Nagpur, NIT Trichy, JNTU Ananthapur.
20. C.P. Rao: Served on the Chemistry Faculty Selection Committees for three different institutes.
21. C.P. Rao: Served on the Senates of IISER Berhampur and SVNIT, Surat as external member.
22. C.S. Bahinipati: Lead Author, Chapter 2, "Types of uncertainties and understanding of risks of losses and damages", In: OECD (2021), 'Managing Climate Risks, Facing up to Losses and Damages', Organisation for Economic Co-operation and Development (OECD), Paris, pp. 39-107.
23. C.S. Bahinipati: Reviewer for papers submitted to 17th Globelics International Conference, Heredia, Costa Rica, November 3-5, 2021, and 6 th International Climate Change Adaptation Conference (Adaptation Futures 2020), New Delhi, India, October 5-8, 2021.
24. C.S. Bahinipati: Reviewer for Third World Quarterly, SN Business and Economics Journal, Journal of the Air & Waste Management Association, International Migration Review, Journal of Public Health and Development, Environment, Development and Sustainability, Asia Pacific Viewpoint, Cogent Economics and Finance, Development in Practice, International Journal of Rural Management, The Indian Economic Journal, PLOS ONE, Climatic Change, Food Reviews International, International Review of Applied Economics, Journal of Human Development and Capabilities, Regional Studies in Marine Science, Asia-Pacific Social Science Review, Sage Open, Environmental Science and Pollution Research, Water policy, Journal of International Development, Frontiers in Climate, Sustainability, International Journal of Climate Change Strategies and Management, Natural Hazards, Climate and Development, Rural Society, Journal of Public Affairs.
25. D. Mondal: Served as External expert, Doctoral Committee, Department of Chemistry, IITJodhpur.
26. D. Mondal: Served as External expert, MSc Thesis Committee, Department of Chemistry, IIT Jodhpur.

27. G. K. Rajan: Reviewer for Physics of Fluids, Physical Review Fluids, Meccanica.
28. G. Roy: Served as an external thesis reviewer. Evaluated PhD Thesis of Mr. Kaustav Banerjee(Roll No: 166122042), Department of Chemistry, IIT Guwahati,19 November, 2021.
29. G. Roy: Served as a SERB project reviewer. Evaluated four research proposals from SERB (Inorganic and Physical Section, SERB).
30. G. Roy: Served as an external thesis reviewer. Evaluated Ph.D. Thesis of DulalMusib (Enroll No. 16402002), Department of Chemistry, NIT Manipur, 01 December 2021.
31. G. Roy: Served as Doctoral Committee member of Ms. Pampa Jhariat (19PHD0252), School of Advanced Sciences, VIT Vellore, 22 June 2021.
32. KSMS Raghavarao: Chairman, Board of Studies for Chemical Engineering, SV University, Tirupati.
33. KSMS Raghavarao: BoS Chairman, SVUCE, Tirupati
34. KSMS Raghavarao: Chairman, BoS, SV University, Tirupati.
35. KSMS Raghavarao: Expert Member, Review and revision of MOU charges with firms for transfer of technology on jaggery powder, liquid jaggery and other jaggery products, ANGRAU, Guntur.
36. KSMS Raghavarao: Member in Drinking Water & Carbonated Beverages Sectional Committee, FAD 14, BIS
37. KSMS Raghavarao: Member, Drinking Water and Carbonated Beverages Sectional Committee, FAD 14, BIS.
38. KSMS Raghavarao: Member, RC, Food Technology Department, ICT Mumbai
39. KSMS Raghavarao: Member, Research & Recognition Committees (RRC), institute of chemical Technology, Mumbai
40. Nilesh Choudhary: External Examiner, Ujjain Engineering College.
41. Nithyadharan M: Doctoral committee member, VIT Chennai.
42. Nithyadharan M: PhD Thesis reviewer and oral viva-voce Examiner, Department of Civil Engineering, IITMadras.
43. P. Gandeepan: Doctoral Committee member of Mr. Manikandan R (19PHD0367), School of Advanced Sciences, VIT Vellore, Date of meeting: 19.05.2021.
44. P. Gandeepan: Doctoral Committee member of Ms. Jyothylakshmi J (20PHD0452), School of Advanced Sciences, VIT Vellore, Date of meeting: 06.07.2021.
45. P. Venkataraman: Reviewer - International Journal of Mechanics and Materials in Design, PhD thesis review IITM.
46. SasidharGumma:BoS Member, JNTU Hyderabad
47. SasidharGumma:Member, Board of Studies, JNTU (Hyderabad), 2021-22 onwards
48. Shihabhudeen M Maliyekkal: Doctoral committee member, VIT Chennai.
49. Shihabhudeen M Maliyekkal: PhD Thesis Examiner, UTS Graduate Research School, University of Technology Sydney, Australia.
50. Shihabhudeen M Maliyekkal: PhD Thesis reviewer and oral viva-voce Examiner, Department of Chemistry, IITMadras.
51. T. Ranganathan: Reviewer for ASME, Journal of Mechanisms and Robotics; Science Direct, Ocean Engineering.
52. Thamida Sunil Kumar: Collaboration with Dr. Azeden Mohamed from THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY, Australia (Corrosion Topic).
53. Thamida Sunil Kumar: BoS Member, SVUCE, Tirupati.
54. Y. Mitikiri: Reviewer for *Elsevier Automatica*, *IEEE Transactions on Automatic Control*.

भारतीय प्रौद्योगिकी संस्थान तिरूपति
Indian Institute of Technology Tirupati
Renigunta Road, Tirupati–517506, A.P.

www.iittp.ac.in