



भारतीय प्रौद्योगिकी संस्थान तिरुपति  
Indian Institute of Technology Tirupati



T i r u p a t i

वार्षिक प्रतिवेदन Annual Report

2020-21



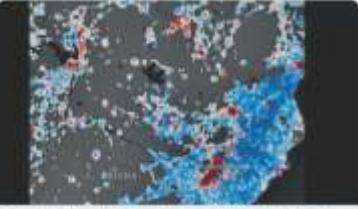
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वार्षिक प्रतिवेदन / Annual Report  
**2020-21**





CMO Odisha  @CMO\_Odisha · 26 Mar  
#Odisha continues to leverage #Tech for fighting #COVID19, this time by partnering with @Facebook & @IIT\_Tirupati to analyse physical distancing in red zones & where more stringent enforcement needs to be deployed.  
[#TechForGood](#)



Gagan uses Tirupati IIT mobility analysis to track COVID-19 infection in Odisha. The State Government imposed security checks and enforce restrictions to contain spread of infection by analysing the movement ... [#TechForGood](#)

**Relevant people**

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Our mission is to give people the power to build community and bring the world closer together. [Follow](#)

IIT Tirupati  @IIT\_Tirupati  
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**What's happening**

COVID-19 - LIVE  
COVID-19: Here are the latest fact checks 



**International Webinar**  
1<sup>st</sup> - 2<sup>nd</sup> Feb 2021

**Speakers**

**Advances in Materials Processing and Mechanical Testing**

Department of Mechanical Engineering, IIT Tirupati

Patron: Chairman

Organizing Committee

Sponsors:  



Indian Institute of Technology Tirupati

- Commemoration of 75 years of India's Independence (Bharat Ka Amrit Mahotsav)
- 12<sup>th</sup> March 2021

AZADI KA JAMBOREE  
75th Independence Day  
TIRUPATI

75th Independence Day  
TIRUPATI

Tiruphysiga



**Blitz**  
**BATTLE OF BRANCHES**  
3 minutes + 2sec each

09 min 14 sec PM

ELECTRICAL CIVIL CS MECHANICAL CHEMICAL

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# Director's Report

**Presented at 2<sup>nd</sup> and 3<sup>rd</sup> Joint Convocation of IIT Tirupati on 25 September 2021**

Chief Guest, Shri B. Santhanam, CEO, Saint-Gobain, Asia Pacific and India, Shri Amit Khare, Chairman, Board of Governors, IIT Tirupati; members of the Board of Governors; members of the Senate; graduands and their well-wishers; distinguished invitees; colleagues and students.

In 2019, we conducted our first Convocation in the gracious presence of the then Hon'ble Minister of Education Shri Ramesh Pokhriyal 'Nishank' Ji as the chief guest and Hon'ble Dr. Audimulapu Suresh, Education Minister of Andhra Pradesh as the guest of honour. Due to the pervasive Covid crisis in 2020, we were considering whether to hold a virtual Convocation as many institutions had done. We decided to leave the decision to the students who were graduating, as it is their day - an occasion to celebrate the completion of their degree program. Overwhelmingly about 90% of the students opted for a physical Convocation whenever it is possible to hold it. Today we are holding the joint 2<sup>nd</sup> and 3<sup>rd</sup> Convocation of the graduating students during 2020 and 2021.

It gives me immense pleasure to welcome you all to the joint second and the third Convocation of the Indian Institute of Technology Tirupati. It is our privilege to have Shri B. Santhanam, an outstanding industry leader and IIT alumnus, address our graduating students today and award them the medals. On this occasion, we are proud to announce that a total of 209 B. Tech degrees, 98

M. Tech degrees, 9 M. Sc. degrees, 10 M. S. (by research) degrees, and the first PhD degree of the Institute will be awarded today.

Since the inception of the Institute, we are engaged in recruiting world-class faculty members to teach and carry out cutting-edge research, often in collaboration with industry and academic institutions of international repute. The Institute has appointed 109 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 at our Institute to attract top Indian and global companies to recruit our students and conduct collaborative research. The Institute is 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.

I now share with you some snapshots of our journey.

## **Academic Programmes**

The Institute commenced its operations with a total of 106 students in four B.Tech. programmes (Civil, Computer Science & Engineering, Electrical & Mechanical) in 2015. M.Tech programs in Computer Science, Electrical and Mechanical Engineering, and B.Tech in Chemical Engineering were launched in 2018. Gradually, the Institute expanded its strength and introduced a master's programme in Mathematics and Statistics and M. Tech in three streams of Civil Engineering in 2019. The Master's programmes in Chemistry and Physics were launched in 2020.

The current student strength of about 1250 includes 823 B. Tech students, 134 M. Tech students, 84 M. Sc students, 41 MS and 168 PhD research students. It has been often pointed out that IITs have a skewed gender ratio. However, IIT Tirupati boasts of 21.87% of girl students admitted to the B. Tech programmes and overall of 20.5% 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 the objective of working closely with the Indian armed forces, the Indian army has sponsored nine officers for the M.Tech programs in Electrical and Mechanical Engineering in 2020.

## **IIT Tirupati's Response to Covid Crises**

Since March 2020, all academic and extra-mural activities have turned to be online. This crisis caused by Covid 19 did not give time even for the preparations to change the long-standing mode to a platform that was never expected to be the only mode for academic and other activities. But, within a week after the Institute advised all students to return home on 16 March 2020, due to the developing Covid pandemic situation, the Institute equipped itself to hold classes online for all its students. This unforeseen situation indeed caused a lot of trouble for those of the students who come from remotely located rural areas without much computing and network facilities. However, all faculty and students quickly adapted to the new normal. We managed to complete the 2019-20 academic requirements on time to enable graduating students to complete all their academic needs by June 2020.

We attempted to bring back students on campus in small batches starting from December 2020. However, with the start of the second wave of Covid-19, the students were advised to return home again in March 2021. The second wave impacted the Institute community quite hard, with many employees and their family members and students being affected by Covid.

Starting from June 2021, we have started bringing back students to campus in batches. Currently, all final year UG and PG students and research scholars are on campus.

I am pleased to report here that the Institute joined hands with the nation in fighting the pandemic and remained at the forefront in finding solutions to combat and minimise the risks of the Covid 19 virus. A number of faculty, staff and students in the Institute dedicated their time and resources to find solutions to various problems that were faced by people due to this pandemic. Some of the major developments that IIT Tirupati made in dealing with the pandemic include:

- Dr. Sunil Kumar developed a prototype of a thermal air steriliser working with Opustayz Hospitality Solutions Pvt. Ltd, Bangalore/Trivandrum.
- A team comprising Dr. D.V. Kiran, Dr. Shihabudheen M. Maliyekkal, Prof. T.S. Natarajan, Dr. Ambrish Saxena, Prof. K.N. Satyanarayana, Dr. Ajay Kumar, and Dr. D. Subbareddy designed and developed N95 equivalent respirator, tying-up with M/s. Amara Raja Group for mass production of the respirators.
- Dr. Rama Krishna Gorthi, Dr. Subrahmanyam Gorthi, Mr. Gowtham, Mr. Vamshi, Mr. Arun, and Ms. Vaishnavi developed a deep learning-based approach for COVID Chest X-Ray image classification that classifies COVID samples with 100% recall and classifies normal, pneumonia and COVID samples with an overall accuracy of 96.3%.
- Dr. Sridhar Chimalakonda, Dheeraj Vagavolu and Akhila Sri Manasa Venigalla designed and developed an educational game called SurviveCovid-19 (<https://survivecovid-19.itch.io/game2020>) that improves awareness of masks, sanitisers and social distancing in the theme of a city.
- A team consisting of Dr. Sridhar Chimalakonda and Noble Saji Mathews, developed a spam detection platform (<https://stop-corona-iittp.herokuapp.com/>) to flag textual/URL information as fake/misinformation message based on Machine Learning and Natural Language Processing.
- Dr. Sridhar Chimalakonda, Dheeraj Vagavolu and Akhila Sri Manasa Venigalla designed and developed an interactive web portal named Mood of India (<https://moodofindia.herokuapp.com/>) to gauge mood of India during Covid-19 based on analysis of over half a million tweets with hashtags of Corona by using machine learning and natural language processing. The portal has been used across India in states such as Rajasthan, Delhi, Punjab to understand the emotional state of people.
- A project coordinated by Dr. Kalidas Y and Dr. Krishna Prapoorna and supported by a team of about 20 students of the Institute, developed GeoCov19 algorithm to provide population mobility insights in and around containment zones or hot spots. The GeoCov19 algorithm programmatically superimposes and synthesises hot-spot information with mobility patterns to generate informative reports.
- A team comprising Dr. Reetesh Kumar Gangwar, Dr. Shihabudheen M M, Dr. Arijit Sharma from IIT Tirupati and Dr. Vasudharani Devanathan from IISER Tirupati developed a Portable Optical Cavity Sterilization Unit (POSCU) to provide efficient and rapid decontamination of personal protective equipment (PPE) and other household items. A working point-of-use sterilisation unit has been developed with the support of the Science and Engineering Research Board (SERB), a statutory body under the Department of Science and Technology (DST).

- A COVID-EMR app to help doctors to note the list of admitted patients and their conditions including O2 level, BP, PR and comorbidities, and to keep track of the record was developed by Institute's B. Tech students Mr. Sourabh Kumar and Mr. Surya Siriki, under the guidance of Dr. Panchatcharam Mariappan in consultation with SVIMS Hospital Tirupati.
- The team led by Dr. Ravi Shankar with the support of Institute staff designed and made over 2,000 face shields. These were distributed among various front-line workers including health workers in hospitals, police, CISF airport personnel etc.

## Academic and Sponsored Research

The infrastructural constraints of a new Institute and the ongoing pandemic did not dampen the spirit of our faculty members, and they have been rigorously involved in academic and sponsored research. The faculty members of the Institute have approximately 500 publications to their credit which include journal articles, book chapters and authored and edited books published by international publishers of repute. They have also presented approximately 700 research papers at national and international conferences.

The Institute has identified the following thrust areas to undertake inter-disciplinary research:

Smart Infrastructure; Food Technologies & Precision Agriculture; Materials & Manufacturing; Energy; Education Technologies; and Design. These have been identified taking into consideration the national needs, local relevance and global trends.

Drawing on the strength of faculty expertise at IIT Tirupati and IISER Tirupati, a joint 'Center for Atomic, Molecular, Optical Sciences Technologies (CAMOST)' was established. This was inaugurated on 14 August, 2020 by Dr. Arbinda Mitra, Scientific Secretary in the o/o Principal Scientific Adviser to the Govt. of India. The Centre is envisioned to serve as a nodal hub for several ongoing and upcoming scientific National Missions related to Interdisciplinary Cyber Physical Systems (ICPS), Artificial Intelligence (AI), Quantum Technology Applications (QTA), and the Supercomputing Mission (SCM).

For a new Institute, it is a major achievement that we have been awarded the Technology Innovation Hub (TIH) in Positioning and Precision Technologies under the National Mission on Interdisciplinary Cyber Physical Systems. The Institute established a Section-8 company IIT Tirupati Navavishkar I-Hub Foundation for implementing the objectives of this mission including Technology Development; HRD & Skill Development; Innovation, Entrepreneurship and Start-up Ecosystem; and International Collaborations. The TIH will be receiving a funding of Rs. 100 crores over a period of five years.

The Institute takes pride in mentioning here that in the last two years our faculty members have successfully attracted funding for research and consultancy activities from the ministries of the Government as well as Industry. Our faculty members have been granted 82 sponsored research projects amounting to approximately 31.19 crores, and 84 industrial consultancy assignments amounting to around Rs. 7.5 crores. Some of the projects and consultancies are mentioned hereunder:

- Dr. B. Krishna Prapoorna has been successful in attracting projects worth ₹ 12.97 crores and ₹ 68.34 lakh by the Ministry of Road Transport & Highways, and National Highways Authority of India on 'National Facility for Accelerated Testing of Pavements and Vehicle Dynamics (NATPaVeD)', and 'Development of a Methodological Approach to Incorporate the Effect of Vehicle Type in IRC: 37-2018 Performance Prediction Models' respectively.

- Prof. KSMS Raghavarao has been sanctioned with a project worth ₹ 2.60 crores under the PM Formalization of Micro Food Processing Enterprises Scheme from the Andhra Pradesh Food Processing Society. This project is sanctioned in the area of food technologies that the Institute has identified as one of its thrust areas.
- Prof. E. Anil Kumar has been granted two projects worth ₹ 1.44 crores and ₹ 1.24 crores on 'Reversible Alkali-Metal based Hybrids for High Temperature Thermal Energy Storage" and "DST-IIT Bombay Energy Storage Platform on Hydrogen' respectively by the Department of Science and Technology.
- A project worth ₹ 59.53 lakh has been granted to Dr. Gouriprasanna Roy by the Science and Engineering Research Board- SERB on 'Detoxification of Arsenic Compounds: Enzyme Mimetic Studies to Understand the Methylation of Arsenic by Ar(III) S-adenosylmethionine (SAM) Methyltransferase (AS3MT)'.
- Dr. Shihabudheen M Maliyekkal received a sponsored research grant worth ₹ 52.37 lakh by the Department of Science and Technology to work on 'Centre for Sustainable Treatment, Reuse and Management for Efficient, Affordable and Synergistic Solutions for Water (Water-IC for SUTRAM of EASY WATER)'.
- A project worth ₹ 52.29 lakh was sanctioned to Dr. Mamilla Ravi Sankar by the Department of Science and Technology on 'Abrasive Flow Finishing of Micro to Macro Complex Features'.
- Prof. Sasidhar Gumma has been entrusted with a research-based consultancy assignment worth ₹ 1.66 crores by Tata Advanced Systems Limited for Process design to manufacture medical oxygen plants.
- Andhra Pradesh Pollution Control Board has sanctioned a research-based consultancy worth ₹ 1.06 crores to Prof. Suresh Jain to work on 'Source Apportionment, Emission Inventory and carrying capacity studies for Vijayawada City'. Prof. Jain has also worked on another research-based consultancy sanctioned by the Board on 'Development of Environment Plan 2021-2026 (A strategic development plan) for the State of Andhra Pradesh'. This consultancy was worth ₹ 45.6 lakh.
- Prof. K. N. Satyanarayana has been granted a CSR funded project by Godrej Projects Limited worth ₹ 41.25 lakh on 'Lifecycle study of Construction waste at real estate Project sites.

### **Academic Distinctions Secured by our Faculty Members**

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. Some of the awards are mentioned here:

- Dr. Shihabudheen M. Maliyekkal received a Certificate of Appreciation from the Royal Society of Chemistry (RSC) as one of the top 5% of highly cited authors in RSC Journals, 2019.
- Dr. Gouri Prasanna Roy won the CRSI Bronze Medal 2020, Chemical Research Society of India (CRSI), February 2020.
- Dr. P. Gandeepan won the Research Excellence Award 2020, Institute of Scholars (InSc), Bengaluru, India, March 2020.

- Dr. Arijit Sharma won the prestigious Shastri Mobility Program (SMP) Award by the Shastri-Indo Canadian Institute (SICI) in April 2020 for a research visit to Dr. Amar Vutha's research group at the University of Toronto, Canada, pertaining to the project titled "Towards spectroscopy of molecular ions relevant to the interstellar medium".
- Dr. Subrahmanyam Gorthi was chosen as the person of the week of the National Digital Library of India (NDLI) in June 2020.
- Dr. Krishna P. Biligiri was appointed as Associate Editor of the Resources, Conservation and Recycling Journal.

## **Conferences, Continuing Education and Outreach Programmes**

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. Some notable academic events that were organised by the Institute in the past two years include:

- IIT Tirupati and Confederation of Indian Industry (CII) in association with Andhra Pradesh Food Processing Society, Department of Industries and Commerce, Government of Andhra Pradesh organised the fifth edition of FOODBIZ INDIA 2019 during October 16-17, 2019.
- The Department of Mathematics and Statistics organised an "Advanced Training School on Numerical PDEs and Inverse Problems (ATSNPDEIP-19)" in collaboration with the 'National Board for Higher Mathematics (NBHM)', Science and Engineering Research Board (SERB) and NUMA Engineering Services Ltd., Dundalk, Ireland, during December 9-20, 2019.
- Department of Humanities and Social Sciences in collaboration with the Office of The US Consulate General, Hyderabad, organised a three-day workshop on "Academic Writing" during December 10-12, 2019. The Department of Mechanical Engineering conducted an international workshop on Materials for Energy Conversion and Storage during December 24-25, 2019. Around 120 participants attended the workshop from all over India.
- Department of Humanities and Social Sciences organised an international workshop on "Indian Conceptions of Multiculturalism" during January 8-9, 2020. A series of lectures were delivered covering the challenges of multiculturalism in a country like India. The experts arrived from all parts of the world to throw light on the multitude of languages, cultures and aspirations that constitute India and the aspects of unity in diversity that defines the Indian landscape.
- A one-day seminar on 'Spectroscopy and Imaging Technologies', jointly organised by the Department of Chemistry, IITT and PerkinElmer India Pvt. Ltd, was hosted at IIT Tirupati on 01 February, 2020. The main aim of this seminar was to discuss the advances in spectroscopy and imaging technologies and their applications to a diverse field of chemical sciences, physics, biological sciences, pharmaceuticals, and engineering.
- The Department of Humanities and Social Sciences in collaboration with ICSSR-SRC, Hyderabad organised a three-day workshop on 'Academic Writing' during February 07-09, 2020, at IIT Tirupati Campus.

- The Department of Mechanical Engineering organised a seminar on "multi-role multi-scale the mechanical test platforms" in collaboration with the 'Nanatom Technologies Pvt. Ltd' on 18 February, 2020.
- The Department of Chemistry organised an Online conference on "National Symposium on Recent Trends in Chemical Sciences" (NSRTCS2020) during October 3-4, 2020.
- Dr. Krishna P. Biligiri, organised a session on "Sustainability & Resilience Aspects of Roadway Infrastructure", in Vaishvik Bharatiya Vaigyanik (Vaibhav) summit (virtual), sponsored by the Government of India, in October 2020.
- The Geotechnical Engineering group of the Department of Civil and Environmental Engineering initiated a "Webinar Series in Geotechnical Investigations" to disseminate the state-of-the-art and state-of-the-practice in Geotechnical Investigations through a series of online lectures delivered by experts renowned globally. As a part of this series, a registration form of approx. 800 participants from over 40 countries across worldwide have been received.
- Advances in Atomic, Molecular, and Optical Sciences (AAMOS), an online international conference was held on a sliding timetable enabling global participation during December 14-18, 2020. It was organised jointly by the Centre for Atomic, Molecular, Optical Sciences Technologies (Joint Initiative of IIT Tirupati and IISER Tirupati) and Dayananda Sagar University, Bengaluru. The conference was convened by an international committee of distinguished scientists from Australia, Japan, India, Ireland, and the USA. 37 talks over five days were delivered at AAMOS '20 by leading experts from across the world.
- Dr. K. P. Naveen (IIT Tirupati) and Dr. Ashwin Ashok (Georgia State University) organised a workshop on "Last-mile Challenges and Standardisation Opportunities in Smart Infrastructure (LastMileS '21)," held in conjunction with the 13<sup>th</sup> International Conference on Communication Systems & Networks(COMSNETS '21), 05 January, 2021.
- Statistical Mechanics in Chemistry and Biology (SMCB-2021) Conference was jointly organised by IIT Tirupati, IISER Tirupati, and IIT Goa over an online platform on January 23-25, 2021. The conference received overwhelming responses from the community. The community actively participated in talks and flash presentations, making it an atmosphere of conviviality. More than 300 participants registered for the conference across the country and a few from overseas as well.
- Department of Mechanical Engineering organised an international webinar during February 1-2, 2021 on the topic "Advances in Materials Processing and Mechanical Testing."
- An international conference on "Methodological Challenges in Assessing the Socio-economic Losses and Damages from Climate Change in India" was jointly organised by IIT Tirupati, Organisation for Economic Cooperation and Development (OECD), and National Institute of Disaster Management (NIDM), on 25 May, 2021.
- 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.

## **Memorandums of Understanding Signed**

IIT Tirupati inked a number of memorandums of understanding with educational institutions, government bodies as well as industry associates in the last two years.

MoUs were signed with academic institutions like IIT Mandi, IISER Tirupati, Rajiv Gandhi University of Knowledge Technologies (RGUKT), Centre for Quantum Engineering Research and Education (CQuERE), a division of TCG Centres for Research and Education in Science and Technology, Central Food Technological Research Institute (CSIR-CFTRI) to establish a long-standing academic and scientific collaboration. These MoUs facilitate research and teaching visits, startup and incubation facilities, mutual support in postgraduate programmes as well as sharing of research facilities.

The Institute signed MoUs with government bodies like the National Highways Authority of India (NHAI), Andhra Pradesh Police, Petroleum Conservation Research Association (PCRA) to bridge the gap between industries and institutions, to enable internships for students, to acquaint faculty and students with the recent trends in the industry and to train police personnel on latest technologies.

MoUs were also signed with the various industry associates. One such MoU was signed with ASN Fuels to develop technologies for the production of 2<sup>nd</sup> Generation Bioethanol with funding from Hindustan Petroleum.

## **Infrastructure Development**

The Institute started its operations in 2015 from a temporary campus on the Tirupati-Renigunta Road. The Government of Andhra Pradesh has provided a picturesque 548 acres of land for the development of the permanent campus for the Institute.

The campus is being developed in multiple stages. A master plan has been prepared to build a campus to cater to 12,000 students while conserving its ecological features. It has been seen that in many institutions that have been started in the last couple of decades, a few batches had graduated from temporary campuses. At IIT Tirupati, we set ourselves a goal that the first batch should live at least one year in the permanent campus and achieved the target. The Stage 1A campus consisting of laboratories, hostels, classrooms and sports facilities was completed by 2018 by using prefab and sustainable technologies. Subsequently, the Stage 1B project consisting of a hostel building, a classroom complex building and an engineering unit building were completed by the end of 2019.

Currently, the Stage 1C project is under construction. In the academic zone, the buildings under construction include two Department Buildings that will have offices for about 100 faculty members and the associated laboratories, a Central Instrumentation Facility, a Lecture Hall Complex and Administrative Building. In the hostel zone, two hostels with 1,000 rooms, a Central Dining facility and sports facilities are under construction. In the residential zone, 168 apartments for faculty and staff, a 20 room guest house and Director's Bungalow are under construction. The external services for power, water, wastewater handling and roads are also under construction as part of this package. Two lakes over 10 acres are being created to store water.

The architects for the project include M/s Suresh Goel and Associates, Delhi and M/s ADPL, Delhi. The construction projects are being implemented through CPWD. The contractor for the Stage 1C project is M/s JMC Projects Ltd. The Third-Party Quality Assurance is being

provided by CUBE, IIT Madras. In spite of the challenges posed by the Covid-19 pandemic, the project team has been able to make significant progress. The contract for the Stage 1C project was awarded on 20 March, 2020. However, due to the nationwide lockdown, the contractor M/s JMC Projects was able to start mobilisation only after Unlock 1.0 was announced during the first week of June 2020. Viswakarma Awas, the workers' colony set up by the JMC Projects on a six acres plot in the campus is a model construction workers colony consisting of housing, RO water supply, STP for sewerage treatment, medical centre, children's school and gardens. The project has so far achieved over 5 million safe manhours. In recognition of the sustainable construction, health and safety practices adopted at the site, the projects have received many awards including the GRIHA Council Award for exemplary demonstration of Sustainable Building Materials/Technologies, HUDCO Award for sustainable construction, International Safety Award Merit 2021 from British Safety Council, RoSPA Gold Award 2020 from the Royal Society for the Prevention of Accidents, England, and the Trophy and Scroll for the category Construction Health, Safety & Environment presented at the 12<sup>th</sup> CIDC Viswakarma Awards 2021.

In the first year of operation in 2019, the campus was ranked sixth amongst the cleanest Higher Educational Institutions in the category of Residential Universities for the Swachh Campus Award.

The complete project team of the Institute Engineering team, Architects, CPWD and Contractor have been working tirelessly to create a world class campus to be benchmarked by other Institutions. I will be failing if I don't recognise the efforts of the nearly 2,000 migrant workers who are working under difficult conditions during the Covid-19 pandemic.

## **Student Co-curricular and Extra-Curricular Activities**

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, cultural programmes, an annual festival, etc. Some of them include:

### **Tirutsava: Techno-cultural Fest**

Tirutsava, the annual techno-cultural festival of IIT Tirupati organised by the students in February each year, is witness to a motley of cultural and technical events. Coding challenges, think tanks, debates, quizzes, and cultural activities give the students a chance to identify their creative and analytic sides. Since 2021 was a challenge due to the ongoing Covid pandemic, the student organisers conducted the festival entirely online. All the events including the concert and a stand-up comedy show were streamed online for the students to keep up their spirits in uncertain testing times.

### **SPIC MACAY**

SPIC MACAY chapter at IIT Tirupati has been very active, with the aim to promote Indian classical music and dance among the youth. In August 2019 IIT Tirupati hosted the Virasat series consisting of a number of art workshops and music performances by renowned artists. During the pandemic times, five classical concerts were organised online. These included flute recital by Sri Shashank Subramanyam, Qawalli programme by Warsi Brothers, violin recital concert by Padmashri A. Kanyakumari, Carnatic music recital by Dr. S. Sowmya, Vidushi Punya Srinivas gave a Veena recital, all of them accompanied by accomplished artists.

## **National Service Scheme (NSS) Activities**

Students of IIT Tirupati have been actively engaged in the activities of the National Service Scheme. Apart from their regular activities of NSS, the student volunteers launched an appreciation campaign 'Gandhi Punyaha' on 02 October, 2020, for cleaning the campus giving a day of paid leave to the house-keeping staff. Kamalini was another campaign for self-production of sanitisers in the Institute to distribute it to the house-keeping staff, the residents of the adopted villages and to an orphanage. A scheme named 'Mahatma' was launched to support pilot projects by students to solve technological and real time problems. Activities like 'No Plastic Week', 'Let's Plant a Tree', 'Best out of Waste', 'Mind Maps, and Science Hack' were the other initiatives of NSS at IITT.

Under the Unnat Bharat Abhiyan scheme, the Institute has adopted five villages close to the campus including Chindelpalli, Jangalapalli, Rajulapalem, Pagali and Panguru. The activities undertaken by the students include household and village surveys; awareness programs on plastics and waste management; Swatch Bharath activities; awareness rallies; career development, motivational sessions and science experiments demonstration for school children.

## **Clubs and Sports Activities**

IIT Tirupati has about 14 active clubs and societies under which they organise various extra-mural activities. With the increasing number of students, club activities became more diversified. Various clubs play a crucial role in getting the participants ready for Inter-IIT cultural, technical and sports events. Under the Fit India Movement, the Institute launched its Fitness Club to organise yoga classes and informative webinars on the theme of the club. Sarathi, the Guidance and Counseling Unit is catered to the mental well-being of students by conducting counselling sessions, orientation programmes, yoga classes and life-skill sessions.

## **Placement**

The pandemic was a real challenge in terms of internship opportunities and placement drives. Despite the constraints, the Career Development Centre, IIT Tirupati, was instrumental in placing students in leading companies including pre-placement offers from top-notch organisations in different sectors like Information Technology, Core Engineering, Analytics, Consulting, etc. Some of the recruiters include Microsoft, Amazon, CommVault, iManage, Reliance Jio, Mentor Graphics, Mathworks, Versa Networks, iManage, Toshiba, TCS, L&T group, ITI limited, Alstom, AECOM etc. Many students went on for higher studies in leading institutions in India and abroad.

Realigning to the current situation, Career Development Cell has successfully facilitated the virtual internship programme for the 2022 graduating batch. Many students chose to work in association with the Institute faculty in the design and development of technological innovations that help battle the recent Covid-19 crisis such as Air-Pollution Visualiser, SurviveCovid-19, COVID Chest X-Ray image classification, GeoCov19 algorithm, etc.

## **Acknowledgements**

Keeping up with the demands of the growing Institute and the current dynamic situation would not have been possible without the hard work, active support and cooperation of all our students, faculty, staff, agencies and industries sponsoring R&D projects.

The Institute is grateful 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 assisted and guided us. The liberal funding from the Govt. of India will enable us to set up the initial infrastructure to lay the foundation on which the Institute will continue to grow.

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 our former Chairman, Board of Governors Shri R. Subrahmanyam, and current Chairman Shri Amit Khare, and all Board members for their wise counsel, support and guidance, for enabling us to scale new heights.

I would like to express my gratitude to our Chief Guest, Shri B. Santhanam, for gracing this Convocation. We are eager to hear his words of advice to our graduating students.

Before I end, I would like to congratulate the prize-winners and wish all our students of the second and the third batch happiness, professional success, and fulfilment from a life of service to their profession, family, country and society at large. You have been an extraordinary batch and set a benchmark for future batches with the way you have conducted yourselves with maturity, understanding the difficulties of a new institute in providing the necessary infrastructure and the current unprecedented pandemic situation. I see a great future for this Institute and assure you that you will be proud of your alma mater when you come back for your reunions.

Jai Hind!

**Prof. K. N. Satyanarayana**  
Director

# 1. Organisation

Indian Institutes of Technology (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 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

<b>Chairman</b>	<b>Shri Amit Khare, IAS, Govt of India</b> Secretary, Department of Higher Education, Ministry of Education, Government of India
<b>Members</b>	<b>Prof. K. N. Satyanarayana</b> Director, IIT Tirupati
	<b>Shri Satish Chandra</b> Special Chief Secretary to Govt. of Andhra Pradesh Higher Education Department/ Principal Secretary (HE), Govt of Andhra Pradesh
	<b>Shri Rakesh Ranjan</b> Additional Secretary (TE), Ministry of Education, Government of India
	<b>Shri G. Yoganand</b> Chairman & Managing Director, Manjeera Constructions Ltd, Hyderabad
	<b>Prof. K. Srinivasa Reddy</b> Professor of Mechanical Engineering, IIT Madras
	<b>Shri M. Raja Mahender Reddy</b> Managing Director, M/s. Venkateswara Pesticides & Allied Chemicals Pvt Ltd, Hyderabad
	<b>Prof. C.P. Rao</b> Professor of Chemistry, IIT Tirupati
	<b>Prof. A. Raghuramaraju</b> Professor of Philosophy, IIT Tirupati
<b>Member Secretary</b>	<b>Shri A. V. V. Prasad</b> Registrar, IIT Tirupati

## Finance Committee

<b>Chairman</b>	Chairman, Board of Governors, IIT Tirupati
<b>Members</b>	Director, IIT Tirupati
	Add. Secretary (TE) Ministry of Education, Government of India or his/her representative
	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

<b>Chairman</b>	Prof. K. N. Satyanarayana, Director, IIT Tirupati
<b>Secretary</b>	Mr. A. V. V. Prasad, Registrar, IIT Tirupati
<b>Members (Deans)</b>	Prof. Suresh Jain, Dean – Academic Affairs Dr. N. Venkaiah, Dean – Student Affairs Prof. A. Murali Krishna, Dean – Planning & Infrastructure Prof. M. V. Kartikeyan, Dean – Faculty Affairs Prof. E. Anil Kumar, Dean – Sponsored Research & Consultancy Prof. Sasidhar Gumma, Dean – International & Alumni Affairs
<b>All Heads of the Department</b>	Prof. S. Gumma, Chemical Engineering Prof. Chebrolu Pulla Rao, Chemistry Dr. Abhijit Ganguli, Civil and Environmental Engineering Dr. Venkata Ramana Badarla, Computer Science and Engineering Dr. Rama Krishna Sai Gorthi, Electrical Engineering Dr. Rahul A. Sirohi, Humanities and Social Sciences Dr. Durga Prasad Challa, Mathematics & Statistics Dr. Madam Mohan Avulapati, Mechanical Engineering Dr. Koteswara Rao Bommisetty, Physics
<b>All Professors of the Institute</b>	Prof. K. Krishnaiah, Chemical Engineering Prof. KSMS Raghavarao, Chemical Engineering Prof. A. Raghuramaraju, Humanities and Social Sciences Prof. V. Raghevendra, Mathematics & Statistics Prof. N. N. Kishore, Mechanical Engineering Prof. P. C. Deshmukh, Physics Prof. T. S. Natarajan, Physics

<b>Educationists of Repute and not Employees of the Institute</b>	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
<b>Persons from Industry, R&amp;D</b>	Mr. Galla Vijay Naidu, President, Amara Raja Group, Tirupati Dr. K. Raghunath, Scientist, National Atmospheric Research Laboratory, ISRO, Gadanki, A. P.
<b>Faculty Members from the Institute</b>	Dr. Thamida Sunil Kumar, Dept. of Chemical Engineering Dr. Rajib Biswas, Dept. of Chemistry Dr. Biligiri Krishna Prapoorna, Dept. of Civil and Environmental Engineering Dr. Kalidas Yeturu, Dept. of Computer Science Engineering Dr. Neti VL Narasimha Murty, Dept. of Electrical 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/ Dr. Rudra Sekhar Manna, Dept. of Physics
<b>Invitees</b>	Dr. Rajesh Viswanathan, Associate Dean - Academics, IISER Tirupati Dr. Bijily Balakrishnan, CCW Mr. K. K. Shameer, Assistant Librarian (Ex-Officio)
<b>Special Invitees (Student Members from the Institute)</b>	Student General Secretary Academic Affairs Secretary Research Affairs Secretary

### Building and Works Committee

<b>Chairman</b>	Director, IIT Tirupati
<b>Members</b>	Sri K. Nanda Kumar, CGM P&M, APSPDCL Sri Kanaka Raju, CE, CPWD, SDG Office, Chennai Chairman, Engineering Unit, IIT Madras Shri S. Ramanujam, Rtd. Director, DCSEN, DAE, Mumbai Dr. V. Srilatha, Sri Venkateswara Agriculture College, Tirupati Prof. Kailash Rao, SPA, Vijayawada Prof. A. Muralikrishna, Dean - Planning and Infrastructure, IIT Tirupati
<b>Non-Member Secretary</b>	Shri P. P. Chowdhary, Sr. Project Advisor (Const.), IIT Tirupati

## 1.2 NEW FACULTY AND STAFF ENTRANTS

New Faculty Members who joined in 2020-2021:

Name	Designation and Department	PhD	Previous Employment
Dr. M. V. Kartikeyan	Professor, Electrical Engineering	Institute of Technology, BHU, Varanasi	Professor, Indian Institute of Technology Roorkee
Dr. KSMS Raghavarao	Professor, Chemical Engineering	Institute of Chemical Technology, Mumbai	Director, CSIR-CFTRI, Mysore
Dr. Narendra Singh	Assistant Professor, Chemical Engineering	Indian Institute of Technology, Kanpur	Assistant Professor, Centre for Advanced Studies, Dr. A. P. J. Abdul Kalam Technical University Lucknow
Dr. Anil B. Vir	Assistant Professor, Chemical Engineering	Indian Institute of Technology, Madras	Postdoctoral Researcher at Monash University, Australia
Dr. Nallamilli Trivikram Reddy	Assistant Professor, Chemical Engineering	Indian Institute of Technology, Madras	Postdoctoral Researcher at Max Planck Institute for Polymer Research, Germany
Dr. Abhishek Kumar Jha	Assistant Professor, Electrical Engineering	Indian Institute of Technology, Kanpur	Postdoctoral Researcher at Monash University, Australia
Dr. Srujana Kagita	Assistant Professor, Electrical Engineering	Indian Institute of Technology, Delhi	Postdoctoral Researcher at King Abdullah University of Science and Technology (KAUST), Saudi Arabia
Dr. Mopuri Konda Reddy	Visiting Faculty, Computer Science and Engineering	Indian Institute of Science, Bengaluru	Postdoctoral Researcher at School of Informatics, The University of Edinburgh, UK

New Staff Members who joined in 2020-2021:

Name	Designation	Section
Chappidi Chaman Mehta	Deputy Registrar	Academics Affairs
Kuppannagari Arun Kalyan	Assistant Registrar	Academics Affairs
Madhu N.	Assistant Registrar	Finance and Accounts
K. Prasad Rao	Junior Superintendent	Store and Purchase
Sahad Parammal	Junior Superintendent	Registrar Office
Amit Kumar Goswami	Junior Superintendent	Academics Affairs
Gandhapudi Munivinay	Junior Assistant	Registrar Office
K. Kishore Kumar	Staff Nurse	Health Centre

## 1.3 FACULTY PROFILE

IIT Tirupati completed its fourth round of recruitment for the various departments in 2020-2021, and with the joining of the new recruits, the total faculty strength reached 92. Another round of faculty recruitment has already been initiated to 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 to 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 and Corrosion Engineering and Machine Learning for Process Systems.

#### Faculty Members

Name and Qualifications	Major Areas of Specialisation
<b>Professor</b>	
Dr. Sasidhar Gumma (HoD), Ph.D. (Cleveland State University)	Metal-organic frameworks, Adsorption
Dr. K. Krishnaiah, Ph.D. (Indian Institute of Technology, Madras)	Chemical Reactor Analysis and Design, Fluidization
Dr. KSMS Raghavarao, Ph.D. (Institute of Chemical Technology, Mumbai)	Food Process Engineering; Separation Processes.
<b>Associate Professor</b>	
Dr. T. Sunil Kumar, Ph.D. (University of Notre Dame, USA)	Microfluidics and Corrosion Simulation
<b>Assistant Professor</b>	
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

## 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 characterisation 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

Name and Qualifications	Major Areas of Specialisation
<b>Professor</b>	
<b>Dr. Chebrolu Pulla Rao</b> (HoD), Ph.D. (Indian Institute of Science, Bangalore)	Bioinorganic chemistry including Chemosensors Materials for water purification and in drug delivery, including anticancer agents
<b>Associate Professor</b>	
<b>Dr. Gouriprasanna Roy</b> , Ph.D. (Indian Institute of Science, Bangalore)	Chemical Biology, Bioinorganic Chemistry
<b>Assistant Professor</b>	
<b>Dr. Arun Kumar Manna</b> , Ph.D. (JNCASR, Bangalore)	Theoretical and Computational Chemistry
<b>Dr. Debashis Mandal</b> , Ph.D. (IACS, Kolkata)	Theoretical Chemistry
<b>Dr. P. Gandeepan</b> , Ph.D. (National Tsing Hua University, Hsinchu, Taiwan)	Transition Metal Catalysis, Sustainable Organic Synthesis
<b>Dr. Rajib Kumar Biswas</b> , Ph.D. (Indian Institute of Science, Bangalore)	Theoretical and Computational Chemistry
<b>DST-INSPIRE Faculty</b>	
<b>Dr. Kumar Swamy Reddy N</b> , Ph.D. (Indian Institute of Technology Madras)	Synthetic Organic Chemistry and Chemical Biology
<b>Dr. Somrita Ray</b> , Ph.D. (Visva-Bharati University)	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 programme in specialisations such as environmental & water resources engineering, structural engineering, and transportation and infrastructure engineering. M.Tech. in geotechnical engineering commenced from August 2020 along with Dual Degree programmes in the aforementioned streams.

## Faculty Members

Name and Qualifications	Major Areas of Specialisation
<b>Professor</b>	
Dr. K. N. Satyanarayana (Director), Ph.D. (Clemson University, USA)	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
<b>Associate Professor</b>	
Dr. Abhijit Ganguli (HoD), Ph.D. (Universite Libre de Bruxelles, Belgium)	Nondestructive Testing and Evaluation
Dr. B. Krishna Prapoorna, Ph.D. (Arizona State University, USA)	Transportation Engineering
<b>Assistant Professor</b>	
Dr. Bijilji 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. Romanbabu Oinam, Ph.D. (Indian Institute of Technology, Delhi)	Seismic evaluation & retrofitting of structures
Dr. Prasanna V. Sampath, Ph.D. (Michigan State University, East Lansing, USA)	Environmental Engineering
Dr. Roshan Srivastav, Ph.D. (Indian Institute of Technology, Madras)	Water Resources Management, Climate Change, Remote Sensing
Dr. Shihabudheen M. M., Ph.D. (Indian Institute of Technology, Madras)	Environmental Engineering

## 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 emphasising 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

Name and Qualifications	Major Areas of Specialisation
<b>Associate Professor</b>	
<b>Dr. Venkata Ramana Badarla</b> (HoD), Ph.D. (Indian Institute of Technology, Madras)	Wireless Networks, Cloud Computing, IOT
<b>Assistant Professor</b>	
<b>Dr. Ajin George Joseph</b> , Ph.D. (Indian Institute of Science, Bangalore)	Reinforcement learning, Stochastic approximation algorithms
<b>Dr. Jaynarayan T. Tudu</b> , Ph.D. (Indian Institute of Science, Bangalore)	Power-aware Computer Architecture, Digital VLSI Test and Verification
<b>Dr. Kalidas Yeturu</b> , Ph.D. (Indian Institute of Science, Bangalore)	Machine Learning, Big Data Technologies
<b>Dr. V. Mahendran</b> , Ph.D. (Indian Institute of Technology, Madras)	Delay-Tolerant Networks, Software Defined Networks and IOT
<b>Dr. Raghavendra Kanakagiri</b> , Ph.D. (Indian Institute of Technology, Madras)	Parallel Computing
<b>Dr. S. Raja</b> , Ph.D. (Institute of Mathematical Sciences, Chennai)	Theoretical Computer Science, Algorithms and Complexity
<b>Dr. G. Ramakrishna</b> , Ph.D. (Indian Institute of Technology, Madras)	Algorithmic Engineering
<b>Dr. Sridhar Chimalakonda</b> , Ph.D. (IIIT Hyderabad)	Software Engineering, Computing for Education
<b>Visiting Faculty</b>	
<b>Dr. G. Ravi Prakash Iyer</b> , Ph.D. (University of California, Berkeley)	Multidisciplinary Systems Design & Optimization
<b>Dr. Konda Reddy Mopuri</b> , Ph.D. (Indian Institute of Science, Bangalore)	Deep Learning, Computer Vision
<b>Adjunct Faculty</b>	
<b>Dr. B. Yagnanarayana</b> , 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

Name and Qualifications	Major Areas of Specialisation
<b>Professor</b>	
<b>Dr. M. V. Kartikeyan</b> , Ph.D. (Institute of Technology BHU, Varanasi)	High-power Millimeter/THz Wave Engineering, Sources and Allied Components; RF Circuits, Antennas and Systems (RF-CAAS)
<b>Associate Professor</b>	
<b>Dr. Rama Krishna Sai Gorthi</b> (HoD), Ph.D. (Indian Institute of Technology Madras)	Signal/Image Processing, Computer Vision and Pattern Recognition & Machine Learning
<b>Dr. N. N. Murty</b> , Ph.D. (Institute of Technology BHU, Varanasi)	Defect identification and characterisation in semiconductors (Diamond, SiC)
<b>Assistant Professor</b>	
<b>Dr. Abhishek Kumar Jha</b> , Ph.D. (Indian Institute of Technology Kanpur)	RF and Microwaves, Applied Electromagnetics
<b>Dr. K. P. Naveen</b> , Ph.D. (Indian Institute of Science, Bangalore)	Performance Analysis of Wireless Networks
<b>Dr. Parthajit Mohapatra</b> , Ph.D. (Indian Institute of Science, Bangalore)	Advanced communication techniques for future wireless networks, Physical Layer Secrecy
<b>Dr. Pooja Vyawahare</b> , Ph.D. (Indian Institute of Technology Bombay)	Distributed function computation and optimisation, Analysis of communication networks
<b>Dr. Prasanth Vooka</b> , Ph.D. (Indian Institute of Technology Madras)	Measurements and Instrumentation, Capacitive Sensors and Signal-Conditioning Circuits
<b>Dr. P. S. Saikrishna</b> , Ph.D. (Indian Institute of Technology Madras)	Industrial Automation, Robust & Optimal Control and Cloud Computing QoS Management
<b>Dr. Srujana Kagita</b> , Ph.D. (Indian Institute of Technology Delhi)	Rf And Microwave Components and Antennas
<b>Dr. Subrahmanyam Gorthi</b> , Ph.D. (Swiss Federal Institute of Technology, Switzerland)	Medical Image Analysis
<b>Dr. Swapnil Bhuktare</b> , 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 active in research 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, conflict literature, 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

Name and Qualifications	Major Areas of Specialisation
<b>Professor</b>	
Dr. A. Raghuramaraju, Ph.D. (Indian Institute of Technology, Kanpur)	Social and Political Philosophy
<b>Associate Professor</b>	
Dr. Bharat Kumar, Ph.D. (University of Hyderabad)	Social and Political Philosophy, Contemporary Indian Thought
<b>Assistant Professor</b>	
Dr. Rahul A. Sirohi (HoD), Ph.D. (University of Illinois at Urbana Champaign)	Development Economics
Dr. Chandra Sekhar Bahinipati, Ph.D. (Madras Institute of Development Studies, Chennai, India)	Economics of Climate Change
Dr. Prabha Shankar Dwivedi, Ph.D. (Dr. H. S. Gour Central University, Sagar)	Indian Theories of Language and Literature, Comparative Literary Studies, and Indic Religions
Dr. Saranya Kshatriya, Ph.D. (Indian Institute of Technology, Madras)	Empirical Asset Pricing, Financial Engineering and Risk Management

Dr. V. Yamshi Krishna Reddy, Ph.D. (University of Hyderabad)	Culture Studies, Film Studies, Film Theory
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
<b>Professor</b>	
Dr. V. Raghavendra, Ph.D. (Indian Institute of Technology Kanpur)	Inverse Scattering Theory
<b>Assistant Professor</b>	
Dr. Durga Prasad Challa (HoD), Ph.D. Johannes Kepler University & RICAM, Linz, Austria.	Forward and Inverse Scattering Problems, Scientific Computing, Cloaking and Effective Medium Theories
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. M. Panchatcharam, Ph.D. (Indian Institute of Technology Madras, India & TU Kaiserslautern, Germany)	Numerics for PDEs, Computational Fluid Dynamics
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
Dr. Sumit Giri, Ph.D. (The Institute of Mathematical Sciences, Chennai)	Analytic and Additive Number Theory, Elliptic curves over finite fields.

## 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
<b>Professor</b>	
<b>Dr. Anil Kumar Emadabathuni</b> , Ph.D. (Indian Institute of Technology, Madras)	Hydrogen Storage, Thermal Energy Storage, Adsorption Heating and Cooling Systems
<b>Dr. N. N. Kishore.</b> , Ph.D. (Indian Institute of Technology, Kanpur)	Composite Materials, FEM and Non-Destructive Testing
<b>Associate Professor</b>	
<b>Dr. Mamilla Ravi Sankar</b> , Ph.D. (Indian Institute of Technology, Kanpur)	Advanced Materials and Manufacturing, Ultra-Precision Machining
<b>Dr. N. Venkaiah</b> , Ph.D. (Indian Institute of Technology, Madras)	Computational Metrology, Machining, Optimisation Techniques.
<b>Assistant Professor</b>	
<b>Dr. Madan Mohan Avulapati</b> (HoD), Ph.D. (Indian Institute of Science, Bangalore)	Liquid atomisation, Combustion, Alternative fuels for IC engines and gas turbines
<b>Dr. Ajay Kumar</b> , Ph.D. (Indian Institute of Science, Bangalore)	Metal Casting, Metal Forming, Materials Processing and Mechanical Behavior of Materials, Tribology
<b>Dr. Anup Basak</b> , Ph.D. (Indian Institute of Technology, Kanpur)	Solid Mechanics, Computational Mechanics
<b>Dr. Balaji Subramanian</b> , Ph.D. (Swiss Federal Institute of Technology Zurich, Switzerland)	Wind energy, Experimental fluid mechanics /aerodynamics
<b>Dr. Degala Venkata Kiran</b> , Ph.D. (Indian Institute of Technology, Bombay)	Welding science and technology
<b>Dr. Girish Kumar Rajan</b> , Ph.D. (Pennsylvania State University, USA)	Fluid Mechanics and Applied Mathematics

<b>Dr. Sriram Sundar</b> , Ph.D. (The Ohio State University, Columbus, Ohio, U.S.A)	Vibrations, Contact mechanics, Gear and brake dynamics
<b>Dr. Subbareddy Daggumati</b> , Ph.D. (Ghent University, Belgium)	Advanced Fibre Reinforced Composite Materials, Computational Solid Mechanics
<b>Dr. P. Venkataraman</b> , Ph.D. (Nanyang Technological University, Singapore)	Hydraulic fracturing, Multiscale modelling

## Department of Physics

The Department of Physics offers courses at the undergraduate and research levels. The curriculum for a PG programme in Physics has been formulated. 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 13 invited talks during the academic year 2019-20. 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 instrumental in conceptualising a joint IIT Tirupati - IISER Tirupati center for Atomic, Molecular and Optical Science and Technologies (CAMOST).

### Faculty Members

Name and Qualifications	Major Areas of Specialisation
<b>Professor</b>	
<b>Dr. T. S. Natarajan</b> , Ph.D. (Indian Institute of Technology Madras)	Conducting Polymer, Polymer nanofibers
<b>Associate Professor</b>	
<b>Dr. B. Koteswara Rao</b> (HoD), Ph.D. (Indian Institute of Technology Bombay)	Strongly Correlated Electron Systems, Geometrically Frustrated Magnets
<b>Dr. Arijit Sharma</b> , Ph.D. (Raman Research Institute, Bengaluru)	Experimental Atomic Physics and Quantum Optics, Precision Laser Spectroscopy
<b>Dr. Reetesh Kumar Gangwar</b> , Ph.D. (Indian Institute of Technology Roorkee)	Atomic and Molecular Physics, Plasma Physics
<b>Dr. Rudra Sekhar Manna</b> , Ph.D. (Goethe University Frankfurt, Germany)	Experimental Condensed Matter Physics
<b>Dr. Shaon Sahoo</b> , Ph.D. (Indian Institute of Science, Bangalore)	Theoretical Condensed Matter Physics
<b>Dr. Vinay Pramod Majety</b> , Ph.D. (Ludwig Maximilians University, Germany)	Theoretical Ultrafast Physics
<b>Adjunct Faculty</b>	
<b>Dr. P. C. Deshmukh</b> , Ph.D. (Nagpur University)	Photoabsorption Processes in Free/Confined atoms

## 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
Dr. Jagadeesh M.	Junior Technical Superintendent	Chemistry
Dr. Sanyasinaidu G.	Junior Technical Superintendent	Chemistry
Mr. Ajmeera Nagu	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 Seshasayyan	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
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
Mr. Ramesh Krishnan A.	Junior Technical Superintendent	Workshop
Mr. Bijoy U.	Junior Technician	Workshop
Mr. Parthiban K.	Junior Technician	Workshop
Mr. Rohith K.	Junior Technician	Workshop
Mr. Sabarinathan T.	Junior Technician	Workshop
Mr. Vijayaraj V.	Junior Technician	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 2020-2021:

Name	Designation	Name	Designation
<b>Administration</b>			
Mr. A. V. V. Prasad	Registrar	Mr. GandhapudiMunivinay	Junior Assistant
Mr. V. Adinarayana	Project Advisor	Mr. Md. Abdul Rafi SK	Junior Assistant
Mr. Sahad Parammal	Junior Superintendent	Mr. Mohammad IshaqAlikhan	Junior Assistant
Mrs. Sandhya Y.	Junior Superintendent	Mr. P. Midhun Kumar	Junior Assistant
Mr. Ameer Zerwani	Junior Assistant	Mr. Udayakumar R.	Junior Assistant
Mr. Badireddi Prasad	Junior Assistant	Mr. Vamsi Kiran V.	Junior Assistant
Mrs. G. Haritha	Junior Assistant	Mr. Venkateswara Rao D.	Junior Assistant
Mr. Hemanth Kumar S. G.	Junior Assistant		
<b>Academic Affairs</b>			
Mr. Chaman Mehta	Deputy Registrar	Mr. Amit Kumar Goswami	Junior Superintendent
Mr. Arun Kalyan Kuppannagari	Assistant Registrar	Mr. S. L. Pradeep Valan	Junior Superintendent
		Mr. R. Lokesh	Junior Assistant
<b>Accounts</b>			
Mr. T. Siva Kumar	Project Advisor	<b>Centre for Sponsored Research and Consultancy</b>	
Mr. Madhu N.	Assistant Registrar	Dr. Ambrish Saxena	Chief Manager
Mr. Vijay Y.	Junior Superintendent	Mr. Arun Narayanan PJ	Project Manager
Mr. G. Ramoji Rao	Junior Assistant	Mr. Vamsi Paladugu	Project Engineer
<b>Engineering Unit</b>			
Mr. P. P. Chowdary	Senior Project Advisor	Mr. Senthamil Selvan A.	Junior Engineer
Mr. V.S.D. Raja	Project Advisor	Mr. R. Nirajan	Senior Technician
Mr. Chaitanya Subba Reddy	Junior Engineer - Electrical	Mr. G. Ravi	Junior Technician
Mr. Nannavare Prashant Vyankat	Horticulture Officer	Mr. Muthu Karuppasamy.S	Project Officer
		Ms. Aruna Sowdambigai	Project Associate

Name	Designation	Name	Designation
<b>Computer Centre</b>		<b>Establishment</b>	
Mrs. Aswini R.	Junior Technical Superintendent	Mr. S. K. Sahoo	Deputy Registrar
Mr. G. Ramesh	Junior Technical Superintendent	Ms. Sheela Reddy	Assistant Registrar
Mr. M. Venkat Reddy	Junior Technical Superintendent	Mr. L. Sankar Naidu	Junior Assistant
Mr. Senthil T.	Junior Technical Superintendent	Mr. Y. Vamsi Krishna	Junior Assistant
<b>Health Centre</b>		<b>Hostels</b>	
Dr. K. Venkata Ramarao	Medical Officer	Mr. A. S. Kalyana Ramakrishnan	Manager
Dr. Sruthi Kodidini	Medical Officer	Mr. Aari Kranti Kumar	Junior Executive
Mr. J. Sesha Naidu	Staff Nurse	Mr. K. S. Janakiraman	Senior Project Assistant
Ms. Pakala Nagamani	Staff Nurse		
Mr. K. Kishore Kumar	Staff Nurse		
<b>International and Alumni Affairs</b>		<b>Placement</b>	
N. B. Harshavardhan Reddy	International Officer	Mr. Pushpak Kumar	Placement Officer
<b>Library</b>		<b>NSS (National Service Scheme)</b>	
Mr. Shameer K. K.	Assistant Librarian	Mr. Mahesh Kumar Mulakala	NSS Program Officer
Mrs. Fathima Azra Fazal	Junior Technical Superintendent		
Mr. Sreekumar S.	Junior Library Technician		
<b>Purchase and Stores</b>		<b>Sports</b>	
Mr. S. K. Sahoo	Deputy Registrar	Dr. Iyappan I.	Physical Education Officer
Mr. Harikrishna Reddy	Assistant Registrar	Mr. Vasudeva Rao V.	Physical Training Instructor
Mr. N. Gnanasekhar	Junior Assistant		
Mr. S. Anjaneyulu	Junior Assistant		
Mrs. B. Silpa	Junior Assistant		
Mr. A. Jayagopal	Junior Assistant		

## 2. Academic Programmes

From the academic year 2020-21, IIT Tirupati increased its intake of students in the B.Tech programme from 203 to 237. 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

The Institute, during the academic year 2020-21, started M.Tech in the area of Geotechnical Engineering in Civil and Environmental Engineering. Earlier, the areas of Environmental and Water Resources Engineering, Structural Engineering, and Transportation and Infrastructure Engineering started during 2019-2020. M.Tech programmes in the disciplines of Computer Science & Engineering, Electrical Engineering (Signal Processing and Communications) and Mechanical Engineering (Design and Manufacturing) were launched in the academic year 2018-19. A total of 69 students were admitted to the M.Tech programme during the aforementioned academic session. The Institute also started M.Sc. programme in Physics and Chemistry during the academic year 2020-21 and the Mathematics and Statistics launched during the 2019-20 academic year. A total of 42 students admitted in the programme. 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. This section of the report details about the student statistics and fellowships available.

### 2.1 STUDENT STATISTICS

#### B. Tech Programme

In the academic year 2020-21, 224 students joined the Institute against 237 admitted seats. Out of total of 224 students who joined, 175 were boys, and 49 were girls. IIT Tirupati takes pride in claiming to retain the

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

Year	General		EWS		OBC		SC		ST		Total
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2016	47	9	-	-	25	8	16	2	8	1	116*
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****

\* including 1 preparatory course student

\*\* including 2 preparatory course student

\*\*\* including 3 preparatory course student

\*\*\*\* including 10 preparatory course student

maximum percentage (21.87%) 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 20.5%. The break-up of the students admitted into various programmes is summarized year wise in Tables 2.1 to 2.5. The total number of students enrolled in the Institute are summarised in Table 2.6.

### M. Tech Programme

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

Year	Boys	Girls	Total
2018	49	9	58
2019	44	15	59
2020	63	6	69

### 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

### M. S. (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

### Ph.D. 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

Table 2.6: Details of the Students enrolled in the Institute

Programmes	Boys	Girls	Total
B.Tech	662	150	812
M.Tech	81	21	102
M.Sc.	30	20	50
MS (Research)	24	8	32
Ph.D.	100	42	142
<b>Total</b>	<b>897</b>	<b>241</b>	<b>1138</b>

## 2.2 FINANCIAL ASSISTANCE PROVIDED

### B.Tech Scholarship

Table 2.7: Details of the scholarships offered to the B. Tech students

Sl. No.	Type of Scholarship	Details of Scholarship	No. of students				
			2016	2017	2018	2019	2020
1.	The Institute 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	28	42	48	54

Sl. No.	Type of Scholarship	Details of Scholarship	No. of students				
			2016	2017	2018	2019	2020
2.	The Institute 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	8	11	-	4	11
3.	The Institute 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	12	3	10	22	39
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	23	12	11	08	Details are yet to be submitted by the students

### M.Sc. Scholarship

Merit Scholarship – 12 students,

Free Studentship – 8 students

50% Free studentship – 6 students

### Fellowship Available to M.S. (Research), and PhD Scholars

The students admitted to M. Tech get HTTA (Half Time Teaching Assistance) of Rs. 12,400/month, and M.S. (Research), and PhD students get an HTRA (Half Time Research Assistantship) of Rs. 12,400/month, and Rs. 31,000/month, respectively.

# 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 classrooms, 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 last 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.

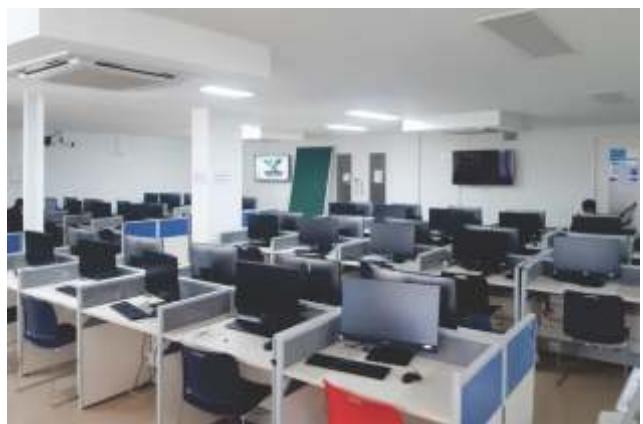
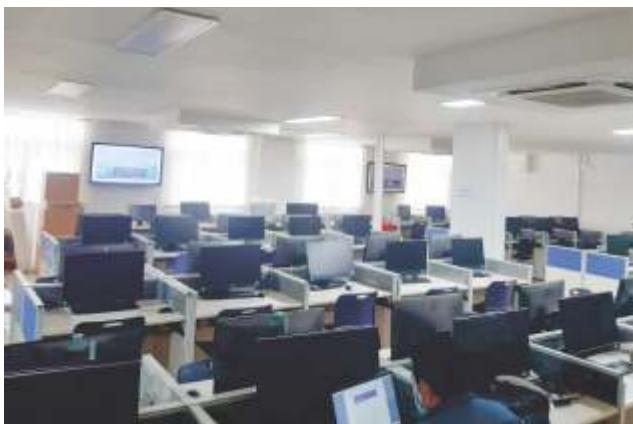
With the pandemic outbreak, the Institute has created online teaching infrastructure to facilitate the classes for the students from home. In this regard, the Institute has purchased 4K PTZ Cameras, and 4K Streaming switches for live streaming. In addition, 55-inch smart LED Display, Interactive Projector,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

## 3.2 COMPUTING & NETWORK FACILITIES

### 3.2.1 Computer Laboratories

The computer centre is responsible for managing the hardware such as the computers, printers, audio, video equipment. The team is involved in maintaining two computer laboratories of CC of the capacity 60



▲ Fig. 1 & 2 Computer Laboratories

each, classroom AV setup, video conferencing, and printer services. The vertical ensures proper working of cameras, audio-video setup to provide hassle-free online classes, and video conferencing

at the boardroom. They troubleshoot the issues from the PCs, laptops, printers, etc., and coordinate with the vendor/OEM to fix the issues as and when required.

The computer centre takes care of the institute-wide procurement of the related hardware and peripherals such as All-in-ones, laptops, hard disks, printers, etc., and stock maintenance. They ensure that the proper installation and support with the assets procures as and when required. They also provide service and support to organise institute-wide events, workshops, conferences, talks, recruitment interviews, etc. The vertical also issues PCs to the new faculty and staff.



▲ Fig. 3 Hardware Repair Station

## Networking Infrastructure

IIT has a 1 Gbps internet ILL (full form) 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 are connected through Cambium E1000 - RF Point-to-Point connection.

The computer center 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 of internet facility using either of the following two channels:

1. Wired Internet Services are made available to all the eligible users across the campus.
2. Wireless Internet Services: The campus is also enabled with Wi-Fi. The Wi-Fi services are made available to all the academic and administrative buildings as well as 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 analogue and digital telephony services. The services are being provided using the Openscape 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, Eduroam service that offers seamless internet connectivity to students, researchers, and staff is available in the Institute.



Fig. 5 ► IP PBX Setup

◀ Fig. 4  
Sophos-330 XG  
firewall and  
network rack



## 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, Kaspersky Antivirus, etc. 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, intranet portal, admissions, course proposal, CSRC, feedback, services, recruitment etc. The vertical also looks after the institutional email services to the IITT community.

To timely serve various service requests from the stakeholders, the Computer Center has implemented a ticketing system - CC Support System ([ccss.iitt.ac.in](http://ccss.iitt.ac.in)).



▲ Fig. 6 Software Support System

## 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 customised virtual servers/machines for various departments requiring heavy to moderate computing infrastructure with 24x7 operational availability. The data center is built using the VMware virtualisation platform on HP, Supermicro servers and HP 3PAR SAN storage.

The Computer Centre has set up an HPC cluster—Lotus, to conduct 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 of 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 six queues - cpu15d, cpu7d, cpu3d, cpu2d, cpu1d, cpu1h, and gpu4d, with appropriate resources grouped together.

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 / computer setup procured using project funding. It takes responsibility for providing necessary infrastructure such as rack space, network connections and comfort cooling.

### Workflow and Office Automation

The Institute aims to achieve operational efficiency, transparency and accountability by enabling its



▲ Fig. 7 Smart Racks with HPC and GPU clusters



▲ Fig. 8 Vmware virtualisation Setup



▲ Fig. 9 Racks hosting Project Servers/Workstations

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. This process has zeroed in on nine modules, including 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 twelve months in the Institute.

### 3.3 SCIENCE LABORATORIES

For the undergraduate students of the first year and Ph.D. scholars, Physics and Chemistry laboratories with state-of-the-art facilities have been developed on the temporary campus. During the year 2020-21, the laboratories got further equipped with added experimental setups. Following are the details of the science laboratories on the campus:

#### 3.3.1 Chemistry Laboratory

The undergraduate chemistry laboratory was established in January 2016. First-year B.Tech. students experience well designed and concept-oriented experiments relating to chemical sciences and engineering. Some of the exciting experiments of the Chemistry laboratory 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 M.Sc. and Ph.D. research lab has been established in 2020, equipped with modern facilities for conducting M.Sc. practicals, Master's project work and Ph.D. research.



▲ Fig. 10 A view of Chemistry Laboratory

### Major equipment available in the chemistry laboratory

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Computing Facility: 7 Workstations, each having Dual Socket with 20 processors &amp; 128 GB RAM, running at a clock speed of 3.1 GHz.</li> <li>• UV-Vis-NIR Spectrometer</li> <li>• FTIR-ATR</li> <li>• Inverted Microscope (Digital Color Camera with Accessories)</li> <li>• UV-Photoreactor</li> <li>• Table Top Refrigerated Centrifuge</li> <li>• Digital Polarimeter</li> <li>• Multimode Microplate Reader</li> <li>• Freezer (-80 °C)</li> </ul> | <ul style="list-style-type: none"> <li>• Type I &amp; III Water Purifying System</li> <li>• CO<sub>2</sub> Incubator</li> <li>• HPC Cluster and Accessories</li> <li>• Rotary Evaporator</li> <li>• Fume Hood to Handle Hazardous Chemicals</li> <li>• Bio-Safety Cabinet</li> <li>• Distilled Water Plant - 4 Litre Capacity</li> <li>• Digital colorimeter</li> <li>• Melting Point Apparatus</li> <li>• Water Baths</li> <li>• Oil Free Portable Vacuum Pumps</li> </ul> |
|---|---|

### 3.3.2 Physics Laboratory

The Department of Physics has teaching laboratories for the first-year undergraduate program and for the postgraduate program. 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.

#### Masters 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

The available equipment are as follows:

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Compound pendulum</li> <li>• Planck's constant apparatus</li> <li>• Ultrasonic Interferometer</li> <li>• Equipotential lines mapping setup</li> <li>• Hall effect apparatus</li> <li>• Newton rings setup</li> <li>• Spectrometer</li> <li>• Digital Storage Oscilloscope</li> <li>• Four probe method apparatus</li> <li>• LCR circuit</li> <li>• Stefan constant setup</li> </ul> |
|--|

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.



▲ Fig. 11 Physics Laboratory I: View of arrangement of various general physics experiments



▲ Fig. 12 PG Physics Lab II: View of the dark room housing the optics and atomic and molecular physics experiments.

### Major Equipment Installed

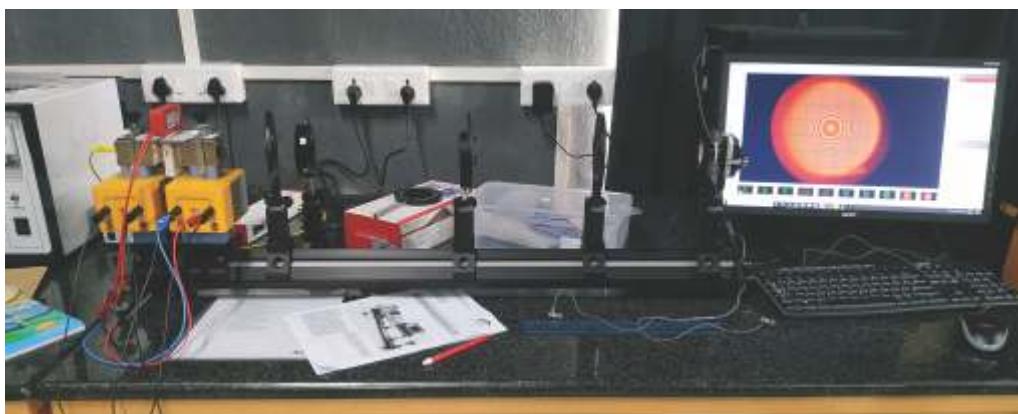
The following are the major equipment installed:

**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.



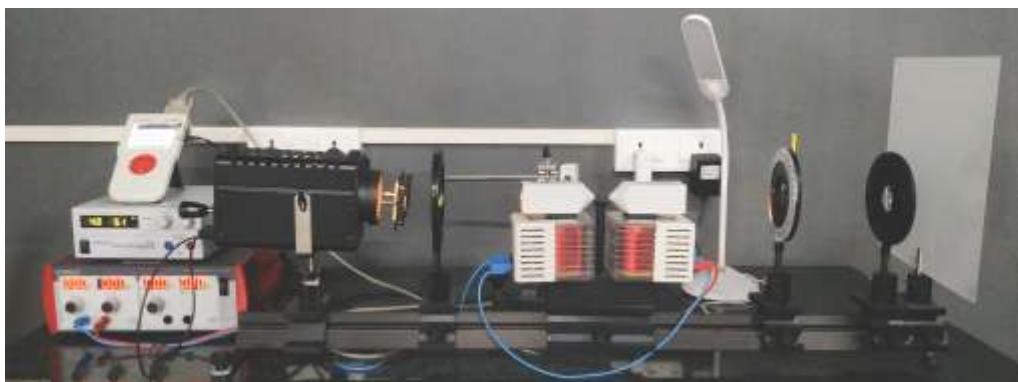
◀ Fig. 13 Single slit diffraction setup

**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.



◀ Fig. 14 Zeeman effect apparatus

### 3. Faraday Effect Setup



◀ Fig. 15 Faraday Effect setup

### 4. UV-VIS Spectroscopy of Atoms and Molecules



◀ Fig. 16 UV-VIS emission and absorption spectroscopy of gas and liquid phase systems

### 5. Coupled Pendulum Setup



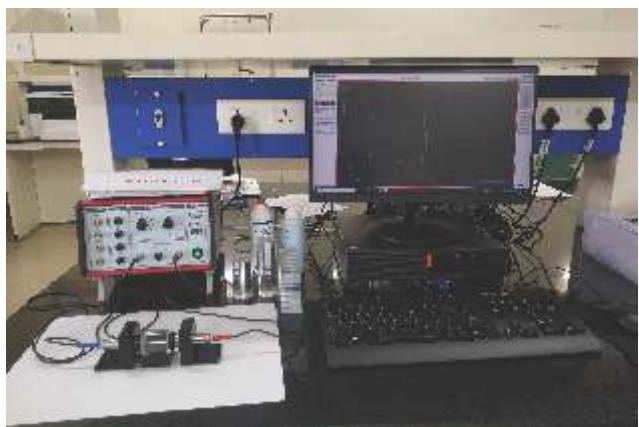
◀ Fig. 17 Coupled Pendulum setup along with a high-resolution camera

## 6. Millikan's Oil Drop Apparatus



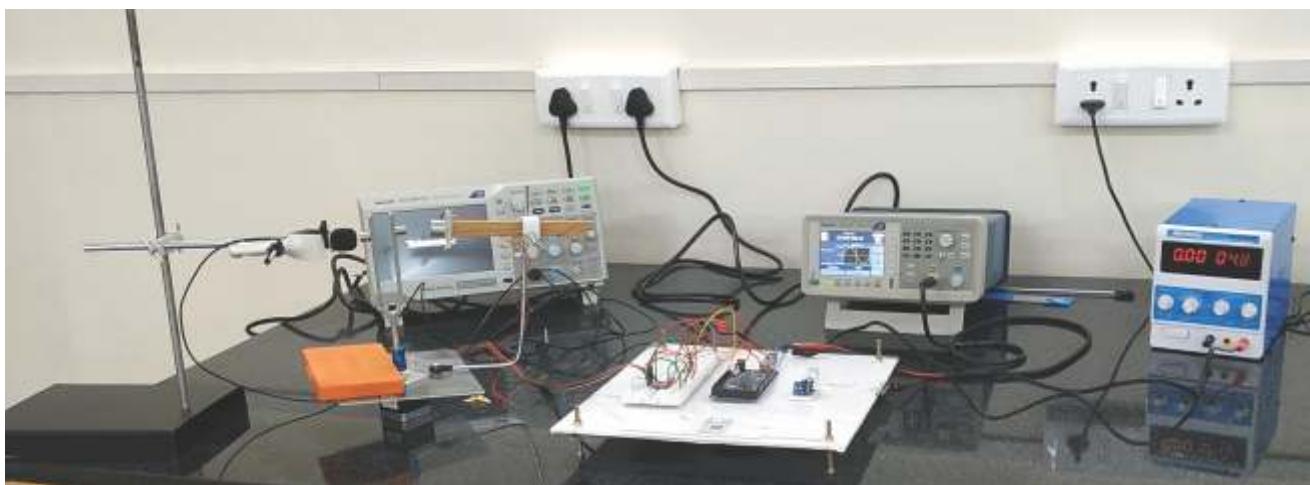
▲ Fig. 18 Millikan's Oil Drop apparatus to determine the charge of an electron

## 7. Ultrasonic Waves in Solids



▲ Fig. 19 Ultrasonic waves in solids apparatus with various acrylic solids

## 8. Radiation from Tuning Fork



▲ Fig. 20 Radiation from tuning fork setup

## 9. Hall Effect Apparatus



▲ Fig. 21 Hall effect apparatus for metals

## 10. Gouy's Method for Magnetic Susceptibility



▲ Fig. 22 Gouy's balance for measurement of the magnetic susceptibility

## 11. Apparatus to Measure Heat Capacity of Solids



▲ Fig. 23 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).



▲ Fig. 24 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.



▲ Fig. 25 Ferromagnetic hysteresis apparatus

## 14. LCR Meter for the Dielectric Constant Measurement



◀ Fig. 26 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.



◀◀ Fig. 27 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:

- Machine Shop
- Carpentry
- Fitting
- Foundry
- 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 utilised by various scholars for their research works on machining and fabrication of their setup.



▲ Fig. 28 A View of Carpentry & Fitting Shop, Central Workshop



▲ Fig. 29 A View of Pneumatic & Hydraulic Training Kit, Central Workshop



▲ Fig. 30 A View of Lathe Machines, Central Workshop



▲ Fig. 31 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 2020-21 are hereunder:

#### 3.5.1 Civil and Environmental Engineering Laboratories

The Civil Engineering Laboratories are located in the Lab-1 block in our permanent campus, Yerpadu. The laboratory is of size 5400 sq. ft having facilities to instruct UG/PG laboratory classes and conduct high-quality research. The following are the major laboratory facilities present:

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

### 3.5.1.1 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 summarised below.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Stress analysis in a thin-walled cylinder</li> <li>• Buckling behaviour of Struts</li> <li>• Deformation of straight beam</li> <li>• Deformation of bars under bending or torsion</li> <li>• Bending stresses in beam</li> <li>• Torsion testing machine</li> </ul> | <ul style="list-style-type: none"> <li>• Analysis of statically indeterminate beam</li> <li>• Analysis of suspension Bridge</li> <li>• Three Hinged arch</li> <li>• Unsymmetrical bending of beams</li> <li>• Pendulum impact tester</li> </ul> |
|--|---|



◀ Fig. 32 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



▲ Fig. 33 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.



◀◀ Fig. 34 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.

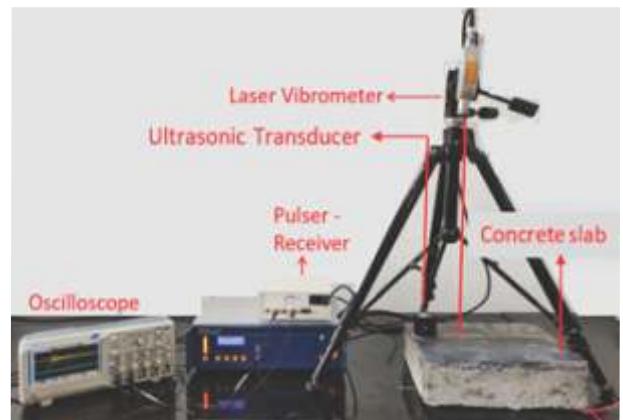
- ▶ Fig. 35 A view of Electromechanical 5kN Actuator mounted in load frame
- ▶ Fig. 36 2.5kN Electromechanical UTM



### Nondestructive Testing

A laser vibrometer system capable of non-contact sensing of ultrasonic surface oscillation has been acquired. This is expected to expedite non-destructive assessments of concrete structures.

- Fig. 37 ▶ Laser vibrometer based system for ultrasonic measurements on the concrete surface



▲ Fig. 38 Family of Compressive Testing Machine

### Compressive Testing Machine

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

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

### 3.5.1.2 Transportation Engineering: Advanced Pavement Systems (APS) Laboratory

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

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

#### A) Asphalt Binder Characterization Equipment

Semi-automated penetrometer, Ring and ball apparatus, Ductilometer, Rotational viscometer, Dynamic shear rheometer and Pressure aging vessel

#### B) Asphalt Concrete and Cement Concrete Mixtures Characterization Equipment

Asphalt mixer, Pan mixer, Marshall Compactor, Marshall stabilometer and Vacuum pycnometer, Superpave gyratory compactor, Los Angeles Abrasion test

Major research facilities available:

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

- Uniaxial cyclic compression
- Indirect tensile modulus, creep compliance, and strength
- Indirect tensile fatigue
- Four-point bending on both asphalt concrete and low-strength cement concrete
- Dynamic modulus
- Resilient modulus
- Triaxial test
- Semi-circular bending



▲ Fig. 39- 30-kN Universal Testing Machine



▲ Fig. 40 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

### 3.5.1.3 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:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• 2000kN Load Controlled Compression Testing Machine (CTM)</li> </ul>                   | <ul style="list-style-type: none"> <li>• Cement Mortar Vibrator, Table Vibrator and Poker Vibrator</li> </ul>                                 |
| <ul style="list-style-type: none"> <li>• Vee Bee Consistometer, Flow Table, Compaction Factor Apparatus, Slump Cone</li> </ul> | <ul style="list-style-type: none"> <li>• Pan type concrete mixer 130-litre capacity and Drum type concrete mixer 60-litre capacity</li> </ul> |
| <ul style="list-style-type: none"> <li>• Pycnometer and Cylindrical Metal Measure</li> </ul>                                   |   |



► Fig. 41. 2000 kN Load Controlled Compression Testing Machine  
Fig. 42. 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

### 3.5.1.4 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.



▲ Fig. 43. Automated direct shear apparatus

◀ Fig. 44. 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.



▲ Fig. 45. Automated stress-path static triaxial apparatus with permeability measurement



▲ Fig. 46. 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.



- ▶ Fig. 47. Automated electro-mechanical 20 kN actuator cyclic triaxial apparatus with bender element facility
- ▶ Fig. 48. Automated double-wall chamber unsaturated triaxial apparatus with 50 kN load frame
- ▶ Fig. 49. MASW setup with 24-channel seismograph to measure in-situ shear wave velocity

### 3.5.1.5 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.



▲ Fig. 50. A View of Environmental Engineering Wet Lab

### Environmental Engineering Laboratories

- Advanced Instrumentation Facility
- Air and Water Quality Laboratory
- Microbiology Laboratory

### Major Analytical Instrumentation Facilities

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• UV/Vis Spectrophotometer</li> <li>• Fluorescence Spectrophotometer</li> <li>• Inductively Coupled Plasma Mass Spectrometer (ICP-MS)</li> <li>• Gas Chromatography – Triple Quadrupole Mass Spectroscopy (GCMS- MS)</li> <li>• Single zone tube furnace</li> <li>• High-Performance Liquid Chromatography</li> <li>• Ion Chromatography</li> </ul> | <ul style="list-style-type: none"> <li>• Digital storage oscilloscope</li> <li>• FT-IR</li> <li>• Total organic carbon analyser with a solid sample module</li> <li>• Fluorescence microscope</li> <li>• Respirable dust PM10 sampler</li> <li>• Fine particulate PM 2.5</li> <li>• Indoor air quality monitor</li> </ul> |
|--|---|



► Fig. 51.  
Views of Analytical  
Instrumentation Facility



### 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



▲ Fig. 52. View of few equipment in Hydraulics & Water Resources Lab

surfaces, Bernoulli's principle, flow measurement devices, the impact of jets on surfaces, frictional losses in pipes, and flow over weirs and notches.

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.

### **3.5.1.7 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.

### **3.5.1.8 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.



▲ Fig. 53. View of the Seismological Observatory Station Setup



### **3.5.2 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:

### 3.5.2.1 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 Laboratory 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:

- 30 GPU Workstations with four RTX 2080 Ti Graphics Cards in each
- 3D fringe projection Profilometry System
- Cytocube Model-R, portable slide profiler with software

- 20 ADSP KIT ADZS-SC589-EZLITE sponsored by ADI
- GigEVision and Stereo Vision Cameras
- 12 TMS320C6748 by Texas Instruments



▲ Fig. 54. Asus Z10PE-D8 Workstations (Available - 26)



▲ Fig. 55. Supermicro Workstations (Available - 4)



▲ Fig. 56. 3D Fringe Projection System



▲ Fig. 57 Cytocube Model-R portable slide profiler



### 3.5.2.2 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).

### **3.5.2.3 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.

### **3.5.2.4 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 1<sup>st</sup> 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).

### **3.5.2.5 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.

### 3.5.2.6 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.



▲ Fig. 58 Wireless Communication and Network (WCN) Laboratory

Major equipment procured in this financial year are as follows:

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



▲ Fig. 59 USRP-SDR Kit Setup with Desktop



◀◀ Fig. 60 Overall View of the Lab: Equipped with high end computing facilities and SDR Kit

### 3.5.3 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 2020-2021 are hereunder:

#### 3.5.3.1 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 venturi meter/orifice meter, estimating meta-centric height of floating bodies, to flow visualisation using streamlines.

##### 3.5.3.1.1 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:

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



▲ Fig. 61 A view of Fluid Mechanics Laboratory

##### 3.5.3.1.2 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.



▲ Fig. 62 Rockwell Hardness Tester



▲ Fig. 63 Thick Cylinders

### 3.5.3.1.3 Dynamics Laboratory

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

### 3.5.3.2 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:

- Two-cylinder CRDi Diesel engine setup
- Single cylinder petrol engine setup with open ECU
- Bomb calorimeter
- Vapour compression refrigeration system
- Air conditioning trainer setup
- Dunuoy Ring tensiometer
- Rheometer



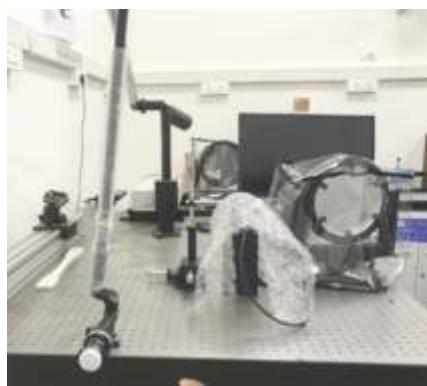
◀ Fig. 64  
Two-cylinder CRDi Diesel engine setup



◀ Fig. 65  
Bomb calorimeter



▲ Fig. 66 Rheometer



▲ Fig. 67 Particle Image velocimetry (PIV) setup



▲ Fig. 68 Gas Sorption Analyser

### 3.5.3.2.1 Heat Transfer Laboratory

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

- Thermal conductivity measurement of solids and fluids
- Linear and Radial heat conduction setups

- Free and forced convection over different objects
- Pool boiling and condensation experimental setup
- Heat exchanger setup with tube in tube, shell and tube, Plant and fin and jacketed vessel heat exchangers
- Different temperature measurement instruments and their calibration
- Thermal conductivity measurements of insulating materials
- Experimental setup to verify Kirchhoff's law and Stephen Boltzmann Law



▲ Fig. 69 Stephen Boltzmann Law experiment



▲ Fig. 70 Thermal conductivity measurement setup

### 3.5.3.3 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.



Fig. 71 Coordinate Measuring Machine



▶ Fig 72  
Surface Roughness  
Tester

▶ Fig 73  
Digital Height gauge



### 3.5.3.4 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



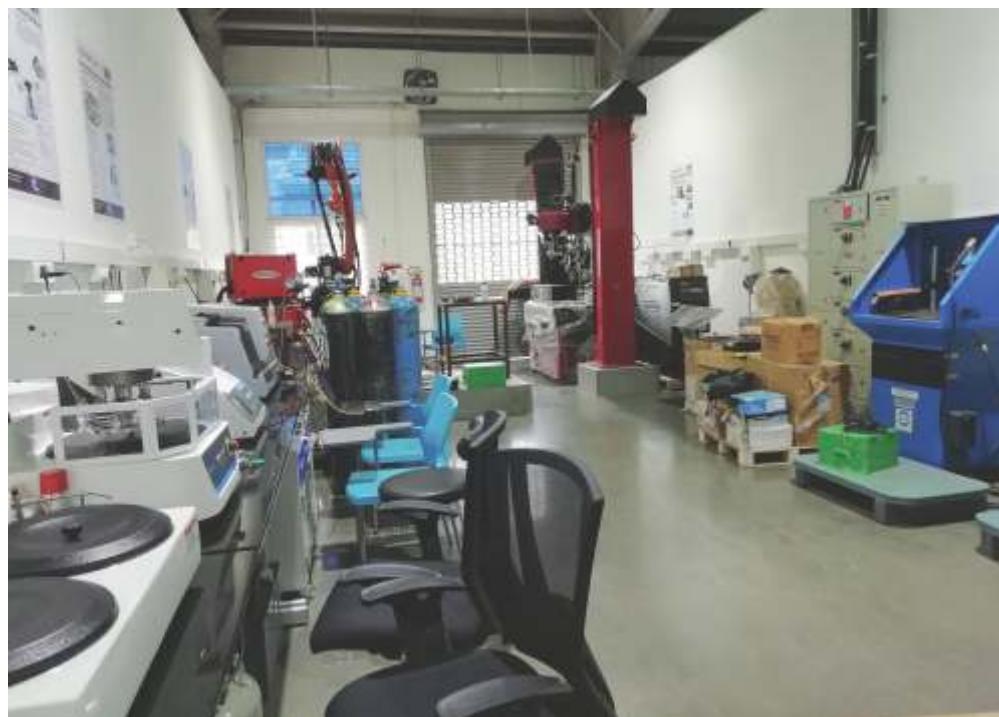
▲ Fig. 74 CNC WIRE CUT EDM



▲ Fig. 75 CNC Milling

### 3.5.3.6 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.



◀ Fig. 76  
A view of joining and metallography (JAM) laboratory

The JAM lab consists of the below-mentioned list of equipment:

Joining facilities	Metallography facilities
• Shielded Metal Arc welding process	• Precision cutting machine
• Gas Tungsten Arc welding process	• Hot mounting press
• Robotic Gas metal arc welding process	• Double disc polishing machine
• Submerged arc welding process	• Single disc automatic polishing machine
• Down draught tables	• Stereomicroscope
	• Upright metallurgical microscope
	• Heat treatment furnace (1200°C)
	• Heat treatment furnace (1600°C)
	• Melting furnace (1500°C)

### 3.6 CENTRAL LIBRARY



▲ Fig. 77 A view of Central Library

The central library of the Institute was established in the year 2015 with a 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 collection including 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 has 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 other information or research-related queries.

During this period, the central library added 682 printed books, including textbooks and reference books on Engineering, Science, and Humanities and Social Sciences.

Along with renewing the existing collection of e-resources, a significant number of new e-resources have been added to the library collection, 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.

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

- Books 7700
- CD-ROM 80
- Newspapers 08
- e-Books 592
- e-Journals 8000+
- PrintJournals 10+
- Databases 26
- Standards 03

#### **e-Shodh Sindhu Consortium Membership**

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

# 4. Research Publications & 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:

## 4.1 RESEARCH PUBLICATIONS

During the period April 2020 – March 2021, a total of 118 research articles were published in various journals of high repute, along with 2 books, 11 book chapters, and 13 newspaper articles by the faculty members of the Institute.

### Journals

#### Chemical Engineering

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## 4.2 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 82 research papers in conferences/seminars during the year 2020-21.

### Chemical Engineering

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1. A. Chaitanya, and **K. P. Naveen**. "Coexistence of LTE-Unlicensed and WiFi: Optimization and Game-Theoretic Frameworks," *SPCOM '20 International Conference on Signal Processing and Communication*, IISc, Bangalore, 19-24 July 2020, pp. 1-5.
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## Mechanical Engineering

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2. A. Ramesh, and **S. Sundar.** "Estimation and Study of Drum Brake Noise Using a Comprehensive Nonlinear Vibroacoustic Model." *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, Institute of Noise Control Engineering, vol. 261, no. 1, October 2020, pp. 5531-5540.
3. A. Yella, and **S. Sundar.** "Comparative Study of Transient Forces as a Source of Structure-Borne Noise on Two and Four-wheeler Drum Brakes." *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, Institute of Noise Control Engineering, vol. 261, no. 1, October 2020, pp. 5541-5552.
4. A. Yella, and **S. Sundar.** "Comparative Study of Transient Forces as a Source of Structure-Borne Noise on Two and Four-wheeler Drum Brakes." *49<sup>th</sup> International Congress and Exhibition on Noise Control Engineering*, Inter-Noise 2020, South Korea, Seoul, 23-26 August 2020.
5. M. S. Bhaskaran, and **G. K. Rajan.** "A Note on the Dissipation of Interfacial Waves." *Surface, Ocean and Lower Atmospheric Study (SOLAS) Indian Ocean Meeting*, Indian Institute of Tropical Meteorology, Pune, 30 September 2020.
6. M. S. Bhaskaran, and **G. K. Rajan.** "Details of a New Model for the Dissipation of Ocean Swell." *65<sup>th</sup> International Congress of Indian Society of Theoretical and Applied Mechanics (ISTAM)*, Gandhi Institute of Technology and Management, Hyderabad, 9-12 December 2020.
7. M. S. Bhaskaran, and **G. K. Rajan.** "On a New Model for the Dissipation of Interfacial Waves." *2<sup>nd</sup> International Conference on Recent Advances in Fluid and Thermal Science - ICRAFT 2021*, BITS-Pilani, Dubai, 19-21 March 2021.
8. M. S. Subramanyam, and **E. Anil Kumar.** "Viability Study of Stand-alone Hydrid Energy Systems for Telecom Base Station." *7<sup>th</sup> International Conference on Advances in Energy Research*, 18 October 2020, pp. 1061-1070.
9. R. S. Prakash, P. Boggavarapu, **A. Madan Mohan**, and R.V. Ravikrishna. "Corroboration of New Breakup Modes during Secondary Breakup of Water and Surrogate Fuels." *National Aerospace Propulsion Conference (NAPC)*, Bangalore, 17-19 December 2020
10. R. Sharma, K. Sarath Babu, and **E. Anil Kumar.** "Thermodynamic Performance Analysis of Adsorption Cooling and Resorption Heating System Using Ammoniated Halide Salts." *7<sup>th</sup> International Conference on Advances in Energy Research*, 18 October 2020, pp. 695-706.

## Physics

1. A. Ganesan, **P. C. Deshmukh**, and S. T. Manson. "Photoionization of the n=4 Subshells Along the Xe Isonuclear Sequence." *51<sup>st</sup> Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, Portland, Oregon, USA, 1 – 5 June 2020.
2. A. Razavi, R. Hoseyni, D. Keating, S. T. Manson, J. Jose, and **P. C. Deshmukh**. "Relativistic Effects on Subshell Energies for Super-heavy Elements." *51<sup>st</sup> Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, Portland, Oregon, USA, 1 – 5 June 2020.
3. C. R. Munasinghe, R. K. Hosseini, S. T. Manson, and **P. C. Deshmukh**. "Relativistic Effects in the Photoionization of Spin-Orbit Doublets Well Above Threshold." *51<sup>st</sup> Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, Portland, Oregon, USA, 1 – 5 June 2020.
4. J. Jose, **P. C. Deshmukh**, A. Razavi, R. Hoseyni, D. Keating, and S. Manson. "Relativistic Effects in the Photoelectron Dynamics of Z=118." *51<sup>st</sup> Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, Portland, Oregon, USA, 1 – 5 June 2020.
5. J. Jose, **P. C. Deshmukh**, A. Razavi, R. Hoseyni, D. Keating, and S. Manson. "Relativistic Effects in the Photoelectron Angular Distribution of S-states of Superheavy Elements." *51<sup>st</sup> Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, Portland, Oregon, USA, 1 – 5 June 2020.
6. S. Banerjee, **P. C. Deshmukh**, and S. T. Manson. "Photoemission Time Delay in Quadrupole Ionization Channels from Free and Confined Xenon." *51<sup>st</sup> Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, Portland, Oregon, USA, 1 – 5 June 2020.
7. T. Chakrabarty, I. Heinmaa, **B. Koteswara Rao**, and R. Stern. "Contradiction of One-Dimensional Magnetism in InCuPO<sub>5</sub> from MAS-NMR Experiments." *National Conference on Physics and Chemistry of Materials*, Indore, 14-16 December 2020.

## Mathematics and Statistics

1. **A. Lahiri**, and R. Nargunam. "Persistence in Daily Returns of Stocks with Highest Market Capitalization in the Indian Market." *ISBISKOCHI2020: International Virtual Conference on Advanced Statistical Techniques in Business and Industry*, CUSAT Kochi, 28 – 30 December 2020.
2. **I. Das**, and S. Mukhopadhyay. "Selection of Designs for Model Misspecification in Generalized Linear Models: A Review." *22<sup>nd</sup> Annual Conference of SSCA*, vol. 1, no. 1, 2020, pp. 145-142.
3. **P. Mariappan**, and R. Flanagan. "GPU Accelerated Radiofrequency and Microwave Ablation for Image-guided Interventions on a Web-framework." *Computer Assisted Radiology and Surgery*, Munich (Virtual), vol. 15, no. 1, June 2020.
4. **P. Mariappan**. "A Point Source Model to Represent Heat Distribution Without Calculating the Joule Heat During Radiofrequency Ablation.", *86<sup>th</sup> Annual Conference of the Indian Mathematical Society (IMS 2020)*, Vellore, 17 – 20 December 2020.
5. **P. Mariappan**. "GPU Accelerated Radiofrequency and Microwave Ablation for Image-guided Interventions on a Web-framework." *Computer Assisted Radiology and Surgery (CARS 2020)*, Munich, Germany, 23 – 27 June 2020.

## Humanities and Social Sciences

1. **A. Raghuramaraju**. "Gandhi, Ambedkar and Gramsci." *Webinar on Gandhi, Ambedkar and Gramsci*, School of Social Sciences and Centre for Ambedkar Studies, University of Hyderabad, Hyderabad, 27 July 2020.
2. **A. Raghuramaraju**. "Mahatma Gandhi on the Idea of the Normal." *International Symposium on Mahatma Gandhi's Principles: In the Perspective of Alcoholism and the Road Crashes*, IIT Kanpur and La Trobe University Australia in SPARC #1442 Programme, 29 August 2020.
3. **A. Raghuramaraju**. "Mahatma Gandhi on Compassion." *Discussion on Gandhian Perspective and the Five Facets of Indian Culture*, Swami Vivekananda Cultural Centre and The Consulate General of India, Durban, South Africa, 17 October 2020.

4. **A. Raghuramaraju.** "The Student and Teacher relationship between Mahatma Gandhi and Gurudev Rabindranath Tagore." *Webinar on Gandhi and his contemporaries*, 23-24 December 2020.
5. **C. S. Bahinipati**, and U. Patnaik. "What Motivates Farmers to Undertake Farm-level Adaptation Options in India? A Systematic Review of Literature." *Water Security and Climate Change conference*, Hanoi, Vietnam, 1-4 March 2021.
6. D. Biswal, and **C. S. Bahinipati**. "Exploring a New Paradigm for Crop Insurance in India: Integrating Behavioural Economics Approach for Farmer's Choice of Crop Insurance." *7<sup>th</sup> Management Doctoral Colloquium and VGSOM Research Scholars Day*, 3-4 February 2021.
7. **C. S. Bahinipati**, R. A. Sirohi, and S. S. Rao. "What Affects Urban Households' Energy Consumption Patterns? *Technological innovation and behavioural interventions*." *Urban ARC 2021*, Indian Institute for Human Settlements (IIHS), Bengaluru, 14-16 January 2021.
8. **C. S. Bahinipati**, and U. Patnaik. "What Motivates Farmers' for Farm-level Adaptation Options in India? A Systematic Review of Literature." *International workshop cum training on 'Green Growth Strategies for Climate Resilience and DRR: Policies, pathways and tools*. Institute for Social and Economic Change (ISEC), Bengaluru, 26-28 November 2020.
9. D. Biswal, M. Singh, and **C. S. Bahinipati**, "The Rising Trends of COVID-19 in India: Reflections from Behavioural Economics." *Doctoral Colloquium in Management and Development (DOCMAD, 2020)*, Institute of Rural Management Anand, 7 November 2020.
10. **C. S. Bahinipati**, and U. Patnaik, "What Motivates Farmers' Adaptation Behaviour to Climate Change in India? A Systematic Review of Literature." *Writeshop on Climate Change and Communities Resilience: Insights from South Asia*, South Asian Network for Development and Environmental Economics (SANDEE), 8-11 October 2020.
11. **C. S. Bahinipati**, and U. Patnaik, "Human Development, Inequality and Flood Damages: Empirical Evidence from the Indian States." *2020 HDCA Conference on New Horizons: Sustainability & Justice*, Auckland, New Zealand, 30 June – 2 July 2020.
12. **P. S. Dwivedi**, "Coeval Concerns of the Primeval Texts: Understanding the Personae of Sita from an Ecosophical Perspective." *1<sup>st</sup> Rupkatha International Open Conference (Virtual)*, 22 August 2020.

### **4.3 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, 327 lectures were delivered by IITT faculty members.

#### **Chemical Engineering**

1. **K. Krishnaiah:** "Mind of Teacher." St. Joseph College of Engineering & Technology, Palai, Kerala, (Faculty Development Program by AICTE), 9 February 2021.
2. **K. Krishnaiah:** "Mind of Teacher." St. Joseph's College of Engineering & Technology, Palai, Kerala, 8 December 2020.
3. **K. Krishnaiah:** "Research & Time Management." *Short Term Webinar Course on Research Skill Development*, GITAM University, Hyderabad, 27 June 2020.
4. **K. Krishnaiah:** "What is Engineering?" *Orientation Program of 1<sup>st</sup> year students*, Gitam University, Visakhapatnam, Hyderabad and Bangalore, 20 August 2020.
5. **KSMS Raghavarao:** "Chemical Engineering in Food Processing: Research and Industrial Applications." GITAM Institute of Science, Visakhapatnam, 26 February 2021.
6. **KSMS Raghavarao:** "Emerging Food Processing Technologies: Prospects and Challenges for Food and Nutrition Security." *ATAL-FDP (Faculty Development Program)*, Tezpur University, 04-08 January 2021.
7. **KSMS Raghavarao:** "Future Food for Sustainability and Nutritional Security." *4<sup>th</sup> AMIFOST*, Amity Institute of Food Technology, Noida, 21 December 2020.
8. **KSMS Raghavarao:** "R&D in Food Processing Technologies new R&D paradigms in Food Processing sector." *Agro Food Tech Summit and Expo (AFTS-E) 2021*, Agrovision Foundation, 25 March 2021.
9. **KSMS Raghavarao:** "Technological Advancements in Chemical Process Industries." SVU College of Engineering, Tirupati, 26 February 2021.

10. **N. Singh:** "Recent Trends in Materials for Next-Generation Applications." BMS College of Engineering, Bangalore, 1-5 February 2021.
11. **N. Singh:** "Nanomaterials for Environmental Applications: Characterization by Analytical Tool." Dept. of Chemistry, MNIT Jaipur & Dept. of Chemistry, NIT Jalandhar, 17-21 November 2020.
12. **N. Singh:** "Renewable Energy Intervention in Industry, Domestic and Commercial Applications." Rajeev Gandhi Memorial College of Engineering & Technology, Nandyal, Andhra Pradesh, 15-27 February 2021.
13. **Sasidhar Gumma:** "Challenges and Opportunities in Carbon Capture." Chaitanya Bharati Institute of Technology, Hyderabad, 25 February 2021.
14. **T. Nallamilli:** "Surfactant polysaccharide interactions in food systems." COMPFLU-2020, Indian society of Rheology & IIT Bombay, 10-12 December 2020.
15. **T. Sunil Kumar:** "Role of Electrostatic Precipitators in Removing Particulate Matter from Polluted Air." *STTP on Industrial Pollution & Control Strategies*, Department of Chemical Engineering, Anurag University, Hyderabad, 24 August 2020.
16. **T. Sunil Kumar:** "Simultaneous Reaction and Distillation." SVU College of Engineering, Tirupati, 26 February 2021.

## Civil and Environmental Engineering

1. **A. Ganguli:** "Nondestructive Testing and the Concrete Infrastructure Industry." Construction Industry Development Council (CIDC) & Indian Society of Trenchless Technology, India Construction Week & No Dig India Show 2020, 1-5 December 2020.
2. **A. Gowri:** "Simulation Models for Disordered Traffic Conditions." *Faculty Development Program on Urban Mobility: Challenges and Opportunities*, TKM College of Engineering, Kollam, Kerala, Online, 8 September 2020.
3. **A. M. Krishna:** "Concepts of foundation Design." *Refreshers Training programme for AP housing Engineers organized*, IIT Tirupati, 8-11 October 2020.
4. **A. M. Krishna:** "Dynamic Characterization of Northeast Indian Soils using Various Methods for Seismic Site Response Studies." *TEQIP-III FDP on Recent Developments in Civil Engineering*, Jorhat Engineering College, Jorhat. 13 - 17 July 2020.
5. **A. M. Krishna:** "Dynamic Characterization of Soils using Various Methods for Seismic Site Response Studies." *National Conference on Emerging Trends In Civil Engineering*, KL University, Vaddeswaram, Guntur, 26-27 June 2020.
6. **A. M. Krishna:** "Dynamic Characterization of Soils Using Various methods for Seismic Site Response Studies." *National Conference on Geo-Science and Geo-Structures*, National Institute of Technology Jamshedpur, 04 September 2020.
7. **A. M. Krishna:** "Dynamic Properties of Soils and their Methods of Evaluation." *Online Faculty Development Programme on Earthquake Geotechnics*, NIT Andhra Pradesh, Tadepalligudem, 22-26 September 2020", 21 September 2020.
8. **A. M. Krishna:** "Geotechnical Concerns in Analysis and Design of Earthquake Resistant Structures." *Online Short-Term Training Programme on Earthquake Analysis of Tall Buildings*, Srinivasa Ramanujan Institute of Technology, Anantapuram, 10 August 2020.
9. **A. M. Krishna:** "Ground Engineering for Mitigation of Liquefaction." *1<sup>st</sup> Indo-Japan Webinar Series on Geotechnics for Disaster Mitigation*, 11 June 2020.
10. **A. M. Krishna:** "Sustainable Utilization of Scrap-Tire Derived Geomaterials for Civil Engineering Applications." Sree Vidyanikethan Engineering college, Tirupati, 21 May 2020.
11. **Janaki Ramaiah:** "Geotechnical aspects of municipal solid waste landfills." Dept. Civil Engineering, NIT Andhra Pradesh, 16 October 2020.
12. **Janaki Ramaiah:** "Geotechnical design aspects of municipal solid waste landfills." Dept. Civil Engineering, Assam Engineering College, Guwahati, 17 July 2020.

13. **K. P. Biligiri:** "Advanced Pavement Systems in the Context of Sustainable Transportation Infrastructure." Thapar Institute of Engineering and Technology, Patiala, Punjab, India, 30 January 2021.
14. **K. P. Biligiri:** "Advancements in Sustainable Pavement Technologies: Innovative Materials, Construction Best Practices, and Asset Management Toolkits." BMS College of Engineering, Bengaluru, Karnataka, India, 25 February 2021.
15. **K. P. Biligiri:** "Asphalt-rubber as a Pavement Preservation Strategy and Use of Artificial Intelligence in Pavement Asset Management." *Short Term Training Program on Recent Advances in Pavement Material Testing and Design*, Misrimal Navajee Munoth Jain Engineering College, Chennai, India, 16 December 2020.
16. **K. P. Biligiri:** "Asphalt-Rubber Pavement Systems: Emphasis on Performance-based Designs and Sustainability." Kerala Highway Research Institute, 22 May 2020.
17. **K. P. Biligiri:** "Automation in Pavement Construction & Asset Management." *TEQIP-III Sponsored Workshop on Automation and Robotics in Construction (ARC) Industry*, Indira Gandhi Institute of Technology, Sarang, Odisha, India, 16 March 2021.
18. **K. P. Biligiri:** "New Generation Pervious Concrete Pavements as Sustainable Solution management." *Building Resilience into Road Infrastructure, International Road Federation (IRF) Asia-Pacific Virtual Conference, Connecting Asia-Pacific with Smart, Safe, and Resilient Roads*, 17 March 2021.
19. **K. P. Biligiri:** "Permeable Concrete & Asphalt-rubber: Sustainable & Durable Roadways." *Vaibhav Summit*, organized by DRDO for Prime Minister's Office, Government of India, 11 October 2020.
20. **K. P. Biligiri:** "Pervious Concrete as a Green Infrastructure Solution: Design, Construction and Lifecycle Analysis." *Short Term Training Program on Recent Advances in Pavement Material Testing and Design*, Misrimal Navajee Munoth Jain Engineering College, Chennai, India, 15 December 2020.
21. **K. P. Biligiri:** "Pervious Concrete as a Sustainable Solution for Rurban Setups." Vignana Bharathi Institute of Technology, Hyderabad, Telangana, India, 5 October 2020.
22. **K. P. Biligiri:** "Pervious Concrete: Sustainable Pavement Technology and Best Management Practices." Rajiv Gandhi University of Knowledge Technologies, R. K. Valley, Kadapa, Andhra Pradesh, India, 10 September 2020.
23. **K. P. Biligiri:** "Regional Perspectives: Climate Vulnerability Assessment – Methodologies and Decision Information on the Road to Dubai with the IRF." *Connecting Asia-Pacific with Smart, Safe, & Resilient Roads*, International Road Federation (IRF) Asia-Pacific Virtual Conference, 18 March 2021.
24. **K. P. Biligiri:** "Research to Practice: Perspective from Academia L2M Digital Meet of TRC4Highway (Lab to Market digital Meet of Textile Reinforced Concrete for Highway)." CSIR-Structural Engineering Research Centre, Chennai, India, 8 December 2020.
25. **K. P. Biligiri:** "Special Toolkits in Pavement Construction & Asset Management VNR." Vignana Jyothi Institute of Engineering and Technology, Hyderabad, Telangana, India, 25 August 2020.
26. **K. P. Biligiri:** "Sustainable Pavement Materials & Best Construction Practices." Visvesvaraya National Institute of Technology Nagpur, Maharashtra, India, 23 October 2020.
27. **K. P. Biligiri:** "Sustainable Pavement Systems: Emphasis on Innovations & Education." Shri Vishnu Engineering College for Women, Bhimavaram, Andhra Pradesh, India, 9 October 2020.
28. **K. P. Biligiri:** "Sustainable Pavement Technologies: Innovative Materials and Futuristic Designs." Kerala Highway Research Institute, 29 May 2020.
29. **K. P. Biligiri:** "Sustainable Pavement Technologies: Toolkits in Construction and Best Management Practices." Indira Gandhi Institute of Technology, Sarang, Odisha, India, 11 September 2020.
30. **K. P. Biligiri:** "Sustainable Transportation Infrastructure: Emphasis on Green Roadways." Koneru Lakshmaiah Education Foundation, Vaddeswaram, Andhra Pradesh, India, 26 June 2020.
31. **K. P. Biligiri:** "Use of Computational Toolkits in Pavement Construction and Management." AICTE Sponsored Two-Week Faculty Development Program, *ACCE Series 1: Advanced Computational Tools in Structural Modeling and Analysis and Transportation and Traffic Systems*, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, Telangana, India, 24 November 2020.

32. **M. Nithyadharan:** "Sustainable construction practices in IIT Tirupati: An Overview of Precast Construction Cold-formed Steel Wall panel building systems." AP State Housing Corporation Limited, 8-11 October 2020.
33. **R. K. Srivastav:** "Applications of Remote Sensing and GIS Progress and Future Prospects." Department of Civil Engineering, KKR & KSR Institute of Technology and Sciences, Guntur, Andhra Pradesh, 17 July 2020.
34. **R. K. Srivastav:** "Climate Change and Floods - Application of Machine Learning Techniques." Indian Institute of Technology (ISM) Dhanbad, 28 February 2021.
35. **R. K. Srivastav:** "Russian-Indian Scientific AI and CPS Webinar." Russian Academy of Science and DST, 28 October 2020.
36. **R. Oinam:** "Advances in Repair, Rehabilitation and Retrofitting Methodologies/Practices." Sree Vidyanikethan Engineering College, Tirupati, 6 July 2020.
37. **R. Oinam:** "Application of Energy Dissipation Device in Earthquake Resistant Design of Structures." Srinivasa Ramanujan Institute of Technology (SRIT), Ananthapuramu, Andhra Pradesh, India, 7 Jan 2021.
38. **R. Oinam:** "Design, Construction and Rehabilitation of Hillside Buildings." Mizoram University, 11 September 2020.
39. **R. Oinam:** "Five Days Workshop under TEQIP-III: Application of Energy Dissipation Device in Earthquake Resistant Design of Structures." NIT Sikkim, 4 March 2021.
40. **R. Oinam:** "One day consulting engineers meet: Supplementary cementitious materials and their performance - Strength and Durability." UltraTech Cement Ltd, 12 March 2021.
41. **R. Oinam:** "Performance-based Design of Steel Structures." Govind Ballabh Pant Institute of Engineering and Technology (GBPIET)." Pauri Garhwal, Uttarakhand, India, 22 January 2021.
42. **R. Oinam:** "Plain and Reinforced Concrete Code of Practice; Earthquake Resistant Design of Structures; Masonry Construction Practices; Retrofitting of Reinforced Concrete Slab." AP State Housing Corporation Limited, 8-11 October 2020.
43. **R. Oinam:** "Resilient and sustainable low-cost housing construction." KKR & Ksrinstitute of Technology & Sciences, Guntur, Andhra Pradesh, India, 15 February 2021.
44. **R. Oinam:** "Seismic Rehabilitation of Reinforced Concrete Structures using Global and Local Techniques." KKR & KSR Institute of Technology and Sciences, Guntur, 17 August 2020.
45. **R. Oinam:** "Seismic Strengthening Strategy for Existing Non-ductile Reinforced Concrete Buildings." ITM Group of Institutions, Gwalior, 24 August 2020.
46. **S. M. Maliyekkal:** "Nanotechnology Enabled Water Filters: A Sustainable Way for Point-Of-Use Water Purification." Sree Vidyanikethan Engineering college, 15 October 2020.

## Computer Science and Engineering

1. **A. G. Joseph:** "Introduction to Reinforcement Learning." *FDP on Artificial Intelligence*, Rajagiri School of Engineering and Technology, Ernakulam, Kerala, 20 October 2020.
2. **G. Ramakrishna:** "GPU Computing Module." *Online Course - HPC Shiksha Program - A National Super Computing Machine Initiative*, 27 January 2021.
3. **K. R. Mopuri:** "Fooling Intelligent Machines." MVS Engineering College, Hyderabad, 28 January 2021.
4. **S. Chimalakonda:** "What Is Software Engineering Anyway? Reflections on 50 Years of Software Engineering and the Road Ahead!" ACM India Eminent Speaker Talk, ACM/IEEE/CSI Chennai Chapter, 12 December 2020.
5. **S. Chimalakonda:** "What Is Software Engineering Anyway? Reflections on 50 Years of Software Engineering and the Road Ahead!" ACM India Eminent Speaker Talk, ACM Student Chapter, Rao Bahadur Y. Mahabaleswarappa Engineering College, 19 December 2020.
6. **S. Chimalakonda:** "What Is Software Engineering Anyway? Reflections on 50 Years of Software Engineering and the Road Ahead!" ACM India Eminent Speaker Talk, 2 June 2020.
7. **V. R. Badarla:** "Networking Aspects of Internet of Things." JNTU Ananthapuram, 22 October 2020.
8. **V. R. Badarla:** "Information Centric Networking for IoT." JNTU Ananthapuram, 23 October 2020.

9. **V. R. Badarla:** "Networking Aspects of Internet of Things." JNTU Ananthapuram, Kalikiri Campus, 10 November 2020.
10. **V. R. Badarla:** "Next Generation Networking for Internet of Things." JNTU Ananthapuram, Kalikiri Campus, 13 November 2020.
11. **V. Mahendran:** "Opportunities in the Next-Gen Wireless Networks in the Era of IoTs." *FDP on Internet of Things and Real Time Applications*, IIT BHU, Varanasi, 21 September 2020.
12. **V. R. Badarla:** "Connectivity Technologies for Internet of Things." Mahatma Gandhi Institute of Technology Hyderabad, 10 December 2020.
13. **V. R. Badarla:** "Connectivity Technologies for Internet of Things." SRM University, Amaravathi, AP, 22 January 2021.
14. **Y. Kalidas:** "Machine Learning Facts and Mythos." *IEEE PELS sponsored Virtual workshop on - Machine Learning Applications for Power Engineers*, Vellore Institute of Technology, 19 November 2020.
15. **Y. Kalidas:** "Machine Learning Problem Formulation and Applications." Institution of Electronics and Telecommunications Engineers Tirupati, 9 September 2020.
16. **Y. Kalidas:** "Machine Learning Problem Formulation and Applications." *AICTE ATAL sponsored FDP on Machine Learning for Information Retrieval*, NIT Kurukshetra, 5 November 2020.
17. **Y. Kalidas:** "Machine Learning Problem Formulation and Applications." *TEQIP course on Machine Learning and Artificial Intelligence*, IIT Indore, 29 December 2020.

## Electrical Engineering

1. **K. P. Naveen:** "Optimization, Game-Theory, and Learning Techniques for LTE-Unlicensed." *AICTE Sponsored Short-Term Training Programme (STTP)*, Annamachary Institute of Technology, Tirupati, 20 November 2020.
2. **N. V. L. Narasimha Murty:** "Electrical Characterization of Wide Bandgap Semiconductors for Harsh Environments." *FDP on Advanced Materials for a New Generation of Nanoelectronic Devices (AMND-2021)*, VIT, Chennai, 7 February 2021.
3. **R. Sai S Gorthi:** "Applications of Deep Neural Networks in Image Processing Applications." E&ICT Academy, NIT Warangal, 14 August 2020.
4. **R. Sai S Gorthi:** "Neural Networks and ML Classification Methods." Vikram Sarabhai Space Center (VSSC), ISRO, 27 August 2020.

## Mechanical Engineering

1. **A. Basak:** "Phase field modeling of phase transformations." *Modeling, Simulation and Experimental Approaches of Mechanical Systems*, Government College of Engineering, Kalahandi, Bhawanipatna, Odisha, 24 - 28 August 2020.
2. **A. Kumar:** "Advance Solid State Welding Process: Friction Stir Welding and Its Applications." Guest Lecture based on Subject Syllabus of Mechanical Engineering, G. H. Raisoni College of Engg., Nagpur, 16 October 2020.
3. **A. Kumar:** "Friction Stir Processing of Nano Metal Matrix Composites and opportunities for Next Generation Composites in India." *FDP on Green Technology & Sustainability Engineering*, GITAM School of Technology, Bengaluru, 18 November 2020.
4. **A. Kumar:** "Friction Stir Processing of Nano Metal Matrix Composites and opportunities for Next Generation Composites in India." STTP, Recent Advances in Tribology and Surface Engineering, Saintgits College of Engineering, Kottayam, Kerala, India, 14 October 2020.
5. **A. Kumar:** "Friction Stir Processing of Nano Metal Matrix Composites and opportunities for Next Generation Composites in India." Faculty Development Program on *Advances in Materials Engineering and Sustainable Manufacturing*, Mechanical Engineering Department, Federal Institute of Science and Technology, Angamaly, Ernakulam, Kerala, 12 August 2020.
6. **A. Kumar:** "Friction Stir Processing of Nano Metal Matrix Composites and Opportunities for Next Generation Composites in India." Faculty Development Program on *Nanocomposites and Nanomaterials and its Characterization*, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi, Kannur, Kerala, 13 June 2020.

7. **A. Kumar:** "Functional Materials." AICTE sponsored Short Term Training Program on *Recent Advances in Materials and Manufacturing (RAMM2020)*, Department of Mechanical Engineering, Gayatri Vidya Parishad College of Engineering, Visakhapatnam, Andhra Pradesh, 9 September 2020.
8. **A. Kumar:** "Metal casting advanced materials." AICTE sponsored Short Term Training Program on *Recent Advances in Materials and Manufacturing (RAMM2020)*, Department of Mechanical Engineering, Gayatri Vidya Parishad College of Engineering, Visakhapatnam, Andhra Pradesh, 4 July 2020.
9. **A. Kumar:** "Modern Materials Welding and Processing Technologies." Faculty Development Program at Department of Mechanical Engineering, National Institute of Technology (NIT) Surat, Gujarat, 13 October 2020.
10. **A. Kumar:** "The role and impact of 3D printing technologies in casting." Faculty Development Program on *3d Printing Technology and its Application in Engineering Education*, Mechanical Engineering Jaipur Engineering College, Kukas, Jaipur, 26 September 2020.
11. **A. Kumar:** "Tribology of Metal Matrix Composites." Faculty Development Program on *Tribology for Reliability-2020*, Department of Mechanical Engineering, GITAM School of Technology, Bangalore/SRM Institute of Science and Technology, Kattankulathur, Chennai, 9 October 2020.
12. **B. Subramanian:** "Wind Energy Opportunities and Challenges." *Recent Advances in Renewable Energy Technologies for Sustainable Development*, NIT Andhra Pradesh, India, 27 September 2020.
13. **D. V. Kiran:** "Rapid Prototyping and Artificial Intelligence for Industrial Applications." St. Martin's Engineering College, Hyderabad, 26 March 2021.
14. **G. K. Rajan:** "Invited to deliver a talk on the dispersion and dissipation of interfacial waves at the fifth." *International Conference on Applications of Fluid Dynamics - ICAF D 2020*, VIT-AP University, AP, India, 14 December 2020.
15. **M. Mohan A:** "Optical Diagnostics for sprays and combustion." NIT Andhra Pradesh, 8 October 2020.

## Chemistry

1. **C. P. Rao:** "Protein-Inorganic Sustainable Hybrid Nano- Materials: A Multidimensional Paradigm." *International Conference on Chemical Sciences in Sustainable Technology and Development*, NIT Surat, India, 1-3 December 2020.
2. **D. Mondal:** "Noise-induced symmetry breaking of self-regulators: An asymmetric phase transition towards homochirality." *National Symposium on Recent Trends in Chemical Sciences*, Department of Chemistry, IIT Tirupati, 3-4 October 2020.
3. **D. Mondal:** "Noise-induced symmetry breaking of self-regulators: An asymmetric phase transition towards homochirality." *Statistical Mechanics in Chemistry and Biology*, Department of Physics, IIT Tirupati, 23-26 January 2021.
4. **D. Mondal:** "The Origin of Homochirality: A perspective from Statistical Mechanics." *Role of Chemistry in Human Benefit: Three Tales*, jointly organized by Department of Chemistry, AJC Bose College, Kolkata and Indian Chemical Society, India, 17 July 2020.
5. **G. Roy:** "Biomimetic Studies on the Detoxification of Neurotoxic Organomercurials." *Advancement of Chemical Sciences in Sustainable Drug Development*, Department of Chemistry, National Institute of Technology, Manipur, 20 October 2020.
6. **G. Roy:** "Biomimetic Studies to Detoxify Neurotoxic Organomercurials: Environmental Pollutant Methylmercury and Antimicrobial Agent 'Thimerosal'." *Recent Trends in Chemical Sciences – Environmental Chemistry 2020 (RTCS-ENV 2020)*, Indian Chemical Society (ICS), 26-29 December 2020.
7. **G. Roy:** "Unraveling the Potential Application of Recently Discovered Endogenous Selone, Selenoneine and its Derivatives in the Biological System." *Recent Advances in Organic and Biomolecular Chemistry (RAOBC21)*, Department of Chemistry, National Institute of Technology Sikkim, 22-26 March 2021.
8. **N. K. S. Reddy:** "Stereoselective synthesis of biologically active spirooxindole scaffolds." *Chemical Science Frontiers: The Virtual International Conference (CSF: TVIC-2020)*, Department of Chemistry, UkaTarsadia University, Gujarat, 29-30 May 2020.
9. **R. Biswas:** "Theoretical Spectroscopy and Hydrophobic Hydration." *Statistical Mechanics in Chemistry and Biology (SMCB-2021)*, jointly organized by IIT Tirupati, IIT Goa and IISER Tirupati, January 2021.

10. **R. Biswas:** "Theoretical Spectroscopy and Hydrophobic Hydration." Department of Chemistry, Indian Institute of Technology Goa, December 2020.

## Physics

1. **A. Sharma:** "Program coordinators' aspirations." CAMOST inauguration ceremony, IIT Tirupati, Tirupati, 14 August 2020.
2. **A. Sharma:** "Towards the development of cold atom-ion quantum networks." *Advances in Atomic, Molecular, and Optical Science 2020*, organized by IIT and IISER Tirupati, and co-hosted by CAMOST and DSU, Bengaluru, 18 December 2020.
3. **B. Koteswararao:** "Exotic behavior in S = 5/2 Highly Frustrated Magnets." *Basic Research and Analysis in Nano Science*, Acharya Nagarjuna University, India, 19 March 2021.
4. **P. C. Deshmukh:** "Engaging UG Physics Students in Pedagogical and Research Projects." Cambridge university press, 7 July 2020.
5. **P. C. Deshmukh:** "How come Newton's laws work?" Indian Association Of Physics Teachers (IAPT) RC-7 (Gujarat), ESSENCETECH, Department Of Science & Technology, Government of Gujarat, and Gujarat Council on Science and Technology (GUJCOST), 8 April 2020.
6. **P. C. Deshmukh:** "Role of symmetry in the laws of nature." Providence college, Calicut, 8 August 2020.
7. **P. C. Deshmukh:** "Scattering Time Delay in Quantum Information Processing." International conference on fundamental science and quantum technologies using atomic systems, Physical Research laboratory, Ahmedabad, 30 September 2020.
8. **P. C. Deshmukh:** "The only principle that required explanation in terms of two different phenomena - An interesting topic from Electrodynamics." JBAS College for Women, Chennai, 26 May 2020.
9. **P. C. Deshmukh:** "Time, and Time Delay in Atomic Dynamics." Indian Society for Atomic and Molecular Physics (ISAMP), 12 June 2020.
10. **R. S. Manna:** "A journey through low-temperature physics with various exotic phases." Faculty Development program, PSCMR College of Engineering & Technology, Vijayawada, India, 18 June 2020.
11. **R. S. Manna:** "Frustration effect in quantum magnetic systems." Quantumtine (Physics Day) at Indian Institutes of Science Education and Research (IISER) Tirupati, India, 21 November 2020.
12. **R. S. Manna:** "Frustration in quantum magnetic systems." Colloquium at Indian Institute of Technology Bhilai, India, 22 October 2020.
13. **R. S. Manna:** "Low-temperature physics with various exotic phases." International Webinar on *Advancements in Condensed Matter Physics* – Assam University, India, 7 August 2020.

## Mathematics and Statistics

1. **B. Ravinder:** "Linear Transformations, Matrices, and Jordan Canonical Forms." *Online Workshop on Numerical Linear Algebra*, Assam University, Silchar, 19 September 2020.
2. **I. Das:** "Multivariate Doubly Inflated Negative Binomial Distribution Using Gaussian Copula." Department of Statistics, S.V. University, Tirupati, 7 September 2020.
3. **P. Mariappan:** "Applications of Finite Element Method for Bioheat Equation." *Online Workshop Advanced Numerical Techniques in Science and Engineering (ANTSE)*, Pandit Deendayal Energy University, Gandhinagar, Gujarat, 28 February 2021.
4. **P. Mariappan:** "Applications of Numerical Linear Algebra." *Online Workshop on Numerical Linear Algebra*, Assam University, Silchar, 20 September 2020.
5. **P. Mariappan:** "Direct Methods, Gaussian Elimination and LU Decomposition." *Online Workshop on Numerical Linear Algebra*, Assam University, Silchar, 21 September 2020.

6. **P. Mariappan:** "Finite Element Method Basics." *Online Workshop Advanced Numerical Techniques in Science and Engineering (ANTSE)*, Pandit Deendayal Energy University, Gandhinagar, Gujarat, 28 February 2021.
7. **P. Mariappan:** "Group and Ring Theory." *Online Faculty Development Program on Algebra and Number Theory*, Ramco College of Engineering, Rajaplayam, Tamilnadu, 13 May 2020.
8. **P. Mariappan:** "Iterative Methods." *Online Workshop on Numerical Linear Algebra*, Assam University, Silchar, 24 September 2020.
9. **P. Mariappan:** "Mathematical Modelling for Cancer Treatment and COVID19." *Virtual Faculty Development Program, Moving to Master Science in Technology*, Sriramulu College of Engineering and Technology, Vijayawada, IIT Tirupati, 20 July 2020.
10. **P. Mariappan:** "Mathematical Modelling for Cancer Treatment." *One Day National Webinar*, The MDT Hindu College, Tirunelveli, 20 July 2020.
11. **S. Rajesh:** "Diagonalization of Matrices." Btech students' seminar Einstein College of Engineering, Tirunelveli, Tamil Nadu, 23 July 2020.
12. **S. Rajesh:** "Diagonalization of Matrices", Btech students' seminar, Amrita School of Engineering, Chennai, Tamilnadu, 9 February 2021.
13. **S. Rajesh:** "Fixed Point Property of Nonexpansive Mappings." Faculty Development Program on Fixed Point Theory, Manipal University, Jaipur, 18 September 2020.
14. **S. Rajesh:** "Sequence in Real Numbers." MSc students' seminar, Government College, Kattapana, Kerala, 20 October 2020.
15. **V. Ragavendra:** "Applications of Differential Equations in Science and Engineering." *Online Faculty Development Program*, NIT Warangal, 1 January 2021.
16. **V. Ragavendra:** "Recent trends in PDEs: Theory and Computations." NIT Andhra Pradesh, 2 November 2020.

## Humanities and Social Sciences

1. **A. Raghuramaraju:** "Cooperative Learning." AICTE sponsored Faculty Development Program, JNTU College of Engineering, Anantapur, 16 December 2020.
2. **A. Raghuramaraju:** "The Relationship between teacher and a student in an engineering education." AICTE sponsored Faculty Development Program, JNTU College of Engineering, Anantapur, 14 December 2020.
3. **A. Raghuramaraju:** "And over Or: The Relationship between Science and Religion." BITS, Hyderabad, 17 July 2020.
4. **A. Raghuramaraju:** "Classical Indian texts in modern philosophy: Bhagavad Gita." Two Weeks Refresher Course on *India Studies: Thinking Through India: Intellectual Traditions in India Contemporary Challenges*, UGC Human Resource Development Centre, Panjab University, 8 February 2021.
5. **A. Raghuramaraju:** "Deleuze and Guattari for India: Relooking at the relationship between literature and politics in the West and in India." One Week Online Faculty Development Program on *Philosophical Methodologies in Higher Education: Research and Teaching*, Ramanujan College, University of Delhi, 24 March 2021.
6. **A. Raghuramaraju:** "Enquiry in Upanishad, Compilation in Badarayana and Comparison in Gaudapada." One Week Online Faculty Development Program on *Philosophical Methodologies in Higher Education: Research and Teaching*, organized by Ramanujan College, University of Delhi, 23 March 2021.
7. **A. Raghuramaraju:** "Enquiry in Upanishads, compilation in Badarayana and comparison in Goudapada." 2<sup>nd</sup> Refresher Course in Philosophy, HRDC-JNU, 12 October 2020.
8. **A. Raghuramaraju:** "Mahatma Gandhi's Engagement with the Other." Indian Cultural Centre, High Commission of India, Male, Maldives, 22 September 2020.
9. **A. Raghuramaraju:** "Rallying around Bhagavad Gita: Lokamanya Bal Gangadhar Tilak and Mahatma Gandhi." School of Humanities, Social Sciences and Management, Indian Institute of Technology Bhubaneswar, 26 February 2021.
10. **A. Raghuramaraju:** "Revisiting Author and Writers from Indian National Movement: A Case Study of Mahatma Gandhi's Radical Interpretation of Bhagavad Gita." Bengaluru Historians Society, 31 October 2020.

11. **A. Raghuramaraju:** "Revisiting the Lively Activities in Indian Philosophy." Dr. Sarvepalli Radhakrishnan Memorial Lecture, Department of Philosophy, Kamala Nehru College, the University of Delhi, 10 November 2020.
12. **A. Raghuramaraju:** "The Emerging Trends in Indian Political Philosophy." College of Education, Government of Andhra Pradesh, Amaravati, 5 August 2020.
13. **A. Raghuramaraju:** "The Mahabharata in Indian National Movement: The Radical Interpretation of Bhagavad Gita by Mahatma Gandhi." International Institute of Indic Studies, University of Latvia, 20 March 2021.
14. **A. Raghuramaraju:** "The Philosophy of Krishnachandra Bhattacharyya." Department of Philosophy, Tel Aviv University, Israel, 4 June 2020.
15. **A. Raghuramaraju:** "The relationship between Ethical theories and Social Practices." AICT Two Week Faculty Development Programme on *Professional Morals, Work Ethics and Accountability for Teachers in Technical Education*, VRS Engineering College, Vijayawada, 19 October 2020.
16. **A. Raghuramaraju:** "The Relationship between Utility and Professional Practices." AICT Two-week Faculty Development Programme on *Professional Morals, Work Ethics and Accountability for Teachers in Technical Education*, organized by VRS Engineering College, Vijayawada, 26 October 2020.
17. **B. Kumar:** "Nurturing Morals, Work Ethics & Accountability for Technical Teachers." Department of Computer Science, Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, 7-19 December 2020.
18. **B. Kumar:** "Professional Morals, Work Ethics, Accountability for Teachers in Technical Education." Department of Computer Science, Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada during 19-31 October 2020.
19. **C. S. Bahinipati:** "Funding sources and how to develop a successful research grant proposal." Pan-NIT Humanities and Social Sciences Research Conclave, NIT Warangal, 9 January 2021.
20. **C. S. Bahinipati:** "Regression analysis with cross-sectional data, RCT and Quasi-experimental design." Summer School, Computational Social Science, Kannur University, Thavakkara, Kerala, 24 February 2021.
21. **P. S. Dwivedi:** "Writing as a Process" in MPHEQIP World Bank sponsored national workshop on 'Intellectual Property Rights and Research Skills' (01-05 March 2021), organised by the Dept. of English, Govt. Maharaja PG College, Chhattarpur, M. P., 03 March 2021.
22. **P. S. Dwivedi:** "Emotional Intelligence", at AICTE sponsored One-week FDP on Capacity Building, organised by the Dept. of Humanities, JNTUA, Ananthpur, 01 February 2021.
23. **P. S. Dwivedi:** "Social Skills" at AICTE sponsored One-week FDP on Capacity Building, organised by the Dept. of Humanities, JNTUA, Ananthpur, 04 February 2021.
24. **P. S. Dwivedi:** "Assessment and Testing" at AICTE sponsored One-week FDP on 'Student induction Programme (14-19 December 2020), organised by the Dept. of Humanities, JNTUACEA, &DFD&IQAC, JNTU Ananthpur, 18 December 2020.
25. **P. S. Dwivedi:** "Academic Writing", at AICTE sponsored One-week FDP on 'Student induction Programme (14-19 December 2020), organised by the Dept. of Humanities, JNTUACEA, &DFD&IQAC, JNTU Ananthpur, 17 December 2020.
26. **P. S. Dwivedi:** "Assessment, Evaluation, and Testing", at TEQIP course on 'Advance Digital Pedagogy and ICT Tools: Challenges and Opportunities in Online Teaching' (18-22 November 2020), the Dept. of Humanities and Social Sciences, IIT Roorkee, UK, 19 November 2020.
27. **P. S. Dwivedi:** "Interpersonal Skills", at TEQIP Phase-III Sponsored National Workshop on Teamwork Skills for Career Development of the Professional students, hosted by JNTU, Ananthpur and Bikaner Technical University, 31 October 2020.
28. **P. S. Dwivedi:** "Evaluation and Testing", in an Online One-Week Faculty Development Programme on Capacity Building for Teaching Effectiveness, sponsored by AICTE, at Dr. H. S. Gour Central University, Sagar, M. P., 05 October – 09 October 2020.
29. **P. S. Dwivedi:** "Understanding Academic Writing: Enabling the Enablers", in an Online One-Week Faculty Development Programme on Capacity Building for Teaching Effectiveness, sponsored by AICTE, at Dr. H. S. Gour Central University, Sagar, M. P., 05 October – 09 October 2020.

30. **P. S. Dwivedi:** "Understanding Indian Aesthetics from Philosophico-Linguistic Perspective", in an Online Refresher Course on Literature, Culture and Media: Innovative Trends in Knowledge Creation, UGC-Human Resource Development Centre (HRDC), Dr. H. S. Gour Central University, Sagar, M. P. 1 October 2020.
31. **P. S. Dwivedi:** "Comparative Poetics: A Study with Special Reference to Indian Tradition of Knowledge", in an Online Refresher Course on Literary Theory, Criticism and Research, Human Resource Development Centre (HRDC), Pandit Ravishankar Shukla University (PRSU), Raipur, CG, 5 September 2020.
32. **P. S. Dwivedi:** "Indian Theories of Language", in an Online One-Week Faculty Development Programme on Indian Literature and Languages: Paradigms and Praxis, SRM University, Sikkim, 18 May 2020.
33. **V. Kashyap:** 'Motivation and Motivational Skills.' JNTUA college of engineering, Anantapur, Andhra Pradesh, 14 December, 2020.
34. **V. Kashyap:** "Leadership." UGC-HRDC, Sri Venkateswara University, Tirupati, 5 March 2021.
35. **V. Kashyap:** "Problem Solving." JNTUA College of Engineering, Anantapur, Andhra Pradesh, 3 February 2021.
36. **V. Kashyap:** "Team building." JNTUA College of Engineering, Anantapur, Andhra Pradesh, 17 December 2020.
37. **V. Kashyap:** "Team building." JNTUA College of Engineering, Anantapur, Andhra Pradesh, 1 February 2021.

## 4.4 SPONSORED PROJECTS/CONSULTANCIES

IIT Tirupati faculty members are actively engaged in research and teaching. Research potential of the Institute can well be understood by looking at the total number of sponsored research projects, and consultancies granted in such a brief span of time. A total of 47 sponsored research projects, and 26 consultancies were sanctioned to the Institute faculty members during April 2020 – March 2021.

### Sponsored Projects

1. **K. P. Biligiri:** "Development of a Methodical Approach to Incorporate the Effect of Vehicle Type in IRC:37-2018 Performance Prediction Models," funded by Nation Highway Authority of India, amount sanctioned - Rs. 68.35 Lakhs, May 2020 - April 2023.
2. **K. P. Biligiri:** "Development of Encapsulated Asphalt-Rubber PAVEmnt (EARPAVE) Product for Road Applications," funded by Petroleum Conservation Research Association (PCRA), amount sanctioned - Rs. 42.54 Lakhs, 2021-23.
3. **P. V. Sampath:** "A data-intensive groundwater modelling approach for evaluating sustainability of groundwater use," funded by Department of Science and Technology, amount sanctioned - Rs. 27.86 Lakhs, August 2018 - August 2021.
4. **S. M. Maliyekkal:** "Development of a new generation reusable antimicrobial N95 Respirator," funded by Science and Engineering Research Board - SERB, amount sanctioned - Rs. 24.75 Lakhs, October 2020 - October 2021.
5. **S. M. Maliyekkal:** "Antimicrobial Peptide-Graphene Decorated Anti Biofouling Reverse Osmosis RO Membranes for Desalination and Water Recycling (IITB & IITT)," funded by Department of Science and Technology, amount sanctioned - Rs. 37 Lakhs, 2020-2023.
6. **S. M. Maliyekkal:** "Development of a Portable Optical Cavity Sterilization Unit (Co-PI)," funded by Science and Engineering Research Board - SERB, amount sanctioned - Rs. 24.1 Lakhs, 2020-2023.
7. **S. M. Maliyekkal:** "National Facility of Cryo-Electron Microscopy: Remotely Operable, 24x7 for academia and Industry(Co-PI)," funded by SERB, amount sanctioned - Rs. 2860.335 Lakhs, 2020-2025.
8. **B. Radhika:** "Development of a Methodical Approach to Incorporate the Effect of Vehicle Type in IRC:37-2018 Performance Prediction Models (CO-PI)," funded by National Highway Authority of India, amount sanctioned - Rs. 68.35 Lakhs, 2020-2021.
9. **A. Gowri:** "Lateral Movement of Vehicles on Urban Roads in Disordered Traffic: Characterization, Evaluation and Modeling," funded by Science and Engineering Research Board - SERB, amount sanctioned - Rs. 33 Lakhs, 2020-2023.
10. **R. K. Srivastav:** "Technology Innovation Hub in Positioning and Precision Technologies (Team Member)," funded by DST, amount sanctioned - Rs. 1000 Lakhs, 2020-2024.

11. **R. K. Srivastav:** "Modelling of Storm-water Network using Mike + Urban," funded by DHI, India, amount sanctioned - Rs. 0.75 Lakhs, 2020-2021.
12. **S. Chimalakonda,** "An Approach for Incremental Generation of Knowledge Graphs from Source Code and Requirements," funded by Robert Bosch Engineering and Business Solutions Ltd., Bangalore, India, amount sanctioned - Rs. 15,73,530, November 2020 - November 2021.
13. **S. Chimalakonda,** "SurviveCovid-19++ - A Game for Improving Awareness of Social Distancing and Health Measures for Covid-19 Pandemic," funded by Richard Lounsbery Foundation, USA, amount sanctioned - \$12,000, May 2020 - April 2021.
14. **R. K. Gorthi (PI), S. Krishna (Co-PI), S. Gorthi (Co-PI), and P. Vyawahare (Co-PI):** "Indo-Norwegian Collaboration in Intelligent Offshore Mechatronics Systems (INMOST)," in collaboration with UiA, NTNU, NORCE, NIT Goa, IIT Tirupati, IIT Palakkad and IIT Indore, funded by The Research Council of Norway, amount sanctioned - 34 Lakhs, 2021-2023.
15. **P. Mohapatra (PI, India), and N. Pappas (PI, Sweden):** "Physical Layer Secrecy for IoT Networks with Heterogeneous Traffic," funded by DST India - VR Sweden (Indo-Sweden Project), amount sanctioned - 18.33 Lakhs, September 2020 - September 2023.
16. **P. Mohapatra (PI):** "Ultra-Reliable Machine to Machine Communication with Short Packets for Mission Critical Applications," funded by SERB, amount sanctioned - 13.71 Lakhs, December 2020 - December 2022.
17. **P. Mohapatra (PI):** "Information Theoretic Limits of Secure Communication for Cache Aided Wireless Network," funded by MATRICS-SERB, amount sanctioned - 6.6 lakhs, December 2020 - December 2023.
18. **P. Mohapatra (PI):** "Securing Wireless Network using Physical Layer Techniques under Active attack," funded by NFSG - IIT Tirupati, amount sanctioned - 20 Lakhs, June 2020 - June 2023.
19. **P. Vyawahare (PI):** "Opinion dynamics in social networks with cooperative-competitive interactions," funded by SERB, amount sanctioned - 19.9 Lakhs, December 2020 - December 2022.
20. **K. P. Naveen:** "Design of a WiFi Testbed for Demonstrating LTE/5G Unlicensed," funded by Arista Networks India Pvt. Ltd. under Corporate Social Responsibility (CSR), amount sanctioned - 4 Lakhs, March 2021 - March 2022.
  
21. **G. P. Roy:** "National Facility for Cryo-Electron Microscopy: Remote Operable, 24X7 for Academia and Industry," leaded by IITM, funded by SERB (IRHPA), amount sanctioned – Rs. 2860.3352 lakhs, December 2020 – December 2025.
22. **R. Biswas:** "National Facility for Cryo-Electron Microscopy: Remote Operable, 24X7 for Academia and Industry," leaded by IITM, funded by SERB (IRHPA), amount Sanctioned – Rs. 2860.3352 lakhs, December 2020 – December 2025.
23. **P. Gandeepan:** "Metallaphotoredox Catalysis for Sustainable Difluoromethylation," funded by SERB, amount sanctioned – Rs. 28,52,520, December 2020 - December 2022.
24. **P. Gandeepan:** "National Facility for Cryo-Electron Microscopy: Remote Operable, 24X7 for Academia and Industry," leaded by IITM, funded by SERB (IRHPA), amount sanctioned – Rs. 2860.3352 lakhs, December 2020 – December 2025.
25. **K. S. Reddy N:** "Development of Organocatalytic Heterogeneous Catalysis and Applications Towards the Synthesis of Templates Mimicking Bioactive Compounds," funded by DST (INSPIRE - Faculty Award), amount sanctioned – Rs. 35 Lakhs, January 2021 – December 2025.
26. **S. Ray:** "Fluctuations in Single-molecule Biophysical Processes: Dynamics and Energetics," funded by DST (INSPIRE - Faculty Award), amount sanctioned – Rs. 35 Lakhs, January 2021 - January 2026.
27. **T. Thriveni:** "Accelerated Carbonation of Municipal Solid Waste and Industrial Byproducts for CO2 Sequestration-Scope for Climate Change Mitigation," funded by DST (Women Scientists Scheme (WOS-A)), amount sanctioned – Rs. 31,18,392, January 2021 - January 2023.
28. **A. Sharma:** "Development of a portable atomic frequency standard based on Coherent Population trapping (CPT) for quantum technology applications," funded by SERB, amount sanctioned – Rs. 28,27,000, November 2020 - November 2022.

29. **A. Sharma:** "Towards precision laser spectroscopy of mercury atoms," funded by IIT Tirupati, amount sanctioned - Rs. 22,50,000, November 2020 - November 2023.
30. **A. Sharma:** "Setting up of Quantum Technology Laboratory," funded by the Center for Atomic, Molecular and Optical Science & Technology, IITT-IISERT joint initiative, amount sanctioned - Rs. 3,95,00,000, October 2020 - October 2025.
31. **R. K. Gangwar**, S. M. Maliyekkal, **A. Sharma** and V. Devanathan: "Development of a Portable Optical Cavity Sterilization Unit," funded by SERB, amount sanctioned - Rs. 22,19,378, August 2020 - August 2021.
32. **R. K. Gangwar:** "Setting up of Plasma processing Laboratory," funded by the Center for Atomic, Molecular and Optical Science & Technology, IITT-IISERT joint initiative, amount sanctioned - Rs. 30 Lakhs, October 2020 - October 2025.
33. D. V. Kiran, S. M. Maliyekkal, **R. K. Gangwar:** "Development of N-95 equivalent respirator," funded by Amara Raja Batteries Ltd., amount sanctioned - Rs. 20 Lakhs, July 2020 - November 2020.
34. **V. P. Majety:** "First principles modeling of attosecond quantum dynamics in atomic and molecular systems," funded by IIT Tirupati, amount sanctioned - Rs. 20 Lakhs, August 2020 - August 2023.
35. **P. Mariappan:** "Acoustic Propellant Management for Fuel Tanks of Spacecraft and Launchers Upper Stages," funded by NUMA Innovation Ltd and European Space Agency, amount sanctioned - Euros 14400, April 2020 - March 2021.
36. **S. Giri:** "Sponsored Research, Inspire Faculty Award," funded by SERB, amount sanctioned Rs. 7 Lakhs, January 2020 - January 2021.
37. **Ravinder:** "Sponsored Research, Inspire Faculty Award," funded by SERB, amount sanctioned Rs. 7 Lakhs, April 2020 - April 2021.
38. **C. S. Bahinipati:** "Development of Case Studies on COVID-19" funded by Institute for Global Environmental Strategies (IGES), Japan, amount sanctioned - USD 4,000, 2020-2021.
39. **C.S. Bahinipati**, and S.V.R.K. Prabhakar: "Understanding and Addressing Systemic Risks Behind the Socio-economic Impacts of COVID-19 in India and Japan: Developing a Roadmap for a Resilient and Sustainable Future," funded by ICSSR-JSPS, amount sanctioned - Rs. 5.9 Lakh, 2021-2022.
40. **Anup Basak:** "Grain boundary-induced melting and martensitic transformation: Phase field study," funded by the Science and Engineering Research Board, Government of India, amount sanctioned - Rs 30.31 Lakh, December 2020—December 2022.
41. **D. V. Kiran:** "Development of a new generation reusable antimicrobial N95 respirator," funded by SERB, amount sanctioned - Rs. 30 Lakh, December 2020- February 2021.
42. **D. V. Kiran:** "Design and development of reusable N95 mask and sterilization unit," funded by Amara Raja Batteries Limited, amount sanctioned - Rs 20 Lakh, May 2020 - December 2021.
43. **D. V. Kiran:** "Smart manufacturing platform for hybrid tandem wire arc additive manufacturing process," funded by SERB, amount sanctioned - Rs 43 Lakh, March 2021- March 2024.
44. **Y. Kalidas:** "Deep learning algorithms for molecular structural data analysis with applications in drug discovery and bioinformatics", funded by SERB, amount sanctioned - Rs. 19.17 Lakh, December 2019 - December 2021.

## Consultancies

1. **K. P. Biligiri:** "Proof Checking of Repair and Strengthening Proposal for Rigid Pavement Distress Report of NH-12A from design Ch. 245.375 to Ch. 316.468 of Kewardha to Simga Section to two-lanes with paved shoulders in the State of Chhattisgarh," funded by Dilip Buildcon Limited, amount sanctioned - Rs. 4.95 Lakhs, 2021.
2. **K. P. Biligiri:** "Resilient Modulus Testing on Dense Bituminous Macadam from NH275 Sections," funded by Dilip Buildcon Limited, amount sanctioned - Rs. 2.124 Lakhs, November 2020-May 2021.
3. **M. Nithyadharan:** "Proposal for Model design for cost effective & prefabricated Godown in AP," funded by Commissioner and Director of Agricultural Marketing, amount sanctioned - Rs. 3.5 Lakhs, October 2020- December 2020.

4. **M. Nithyadharan:** "Proof Checking of Structural Design of CoC Building under Tirupati Smart City," funded by AECOM India Pvt Ltd, amount sanctioned - Rs. 7.5 Lakhs, October 2020-March 2021.
5. **B. Radhika:** "Analysis of structural design adequacy for bridge piers of flyovers," funded by Western Andhra Tollway Limited Subsidiary of L&T, amount sanctioned - Rs. 10.85 Lakhs, July 2020-August 2020.
6. **R. Oinam:** "SITE-BM," funded by RDA Civil Engineering Systems Pvt Ltd, amount sanctioned - Rs. 0.4 Lakhs, January 2021-February 2021.
7. **R. Oinam:** "Approval of proposed retrofitting strategy in bridge pier at Garuda Varathi Smart corridor project," funded by AFCONS Infrastructure Pvt Ltd, amount sanctioned - Rs. 1.5 Lakhs, March 2021-April 2021.
8. **R. Oinam:** "Wind load certification for Pre-Engineered Buildings at Paradip Odisha," funded by Interarch Building Product Pvt Ltd, amount sanctioned - Rs. 1 Lakhs, March 2021-April 2021.
9. **M. Krishna:** "Vetting of the design of Gabion Wall along the existing bund of Swarnamukhi river as part of the beautification of riverfront at Srikalahasti," funded by Tirupati Urban Development, amount sanctioned - Rs. 2.5 Lakhs, December 2020-January 2021.
10. **S. Jain:** "Source Apportionment, Emission Inventory and Carrying Capacity studies for Vijayawada City," funded by Andhra Pradesh pollution Control Board, amount sanctioned - Rs. 106.63 Lakhs, November 2020-November 2021.
11. **S. Jain:** "Environmental Quality within vicinity of 3 km of M/s Srikalahasti Pipes Ltd.," funded by Sri Kalahsthi Pipe Ltd, Amount Sanctioned - Rs. 10 Lakhs, January 2021-February 2021.
12. **B. J. Ramaiah:** "Laboratory testing plastic concrete cylindrical specimens to be used for the diaphragm wall at Polavaram Gap-1 area," funded by Water Resource Development Andhra Pradesh, amount sanctioned - Rs. 3.42 Lakh, October 2020-November 2020.
13. **B. J. Ramaiah:** "Recommendation of SBC for Craft Village facility, Srikalahasti based on laboratory testing of soil samples," funded by Sandilya Consulting Engineers, amount sanctioned - Rs. 0.35 Lakh, March 2020-November 2020.
14. **B.J. Ramaiah:** "Laboratory testing of plastic concrete samples at GAP-1 of Polavaram Project, A.P.," funded by Megha Engineering and Infrastructure Ltd, amount sanctioned - Rs. 3.43 Lakh, December 2020-December 2021.
15. **B.J. Ramaiah:** "Vetting of conceptual design drawing for slope stabilization works at 0 km to 2.4 km TCC Tasking and Sector-III, Road TCC-Maza, Border Roads," funded by SPAR Geo Lmt., amount sanctioned - Rs. 0.7 Lakh, December 2020-January 2021.
16. **B. J. Ramaiah:** "Slope stability and seepage analysis of upstream cofferdam at Polavaram irrigation project, Polavaram, Andhra Pradesh," funded by Megha Engineering and Infrastructure Ltd, amount sanctioned - Rs. 4.00 Lakhs, December 2020-January 2021.
17. **B. J. Ramaiah:** "Laboratory testing of plastic concrete specimens from Gap-1 of Polavaram irrigation project, Polavaram, Andhra Pradesh," funded by WRD, Andhra Pradesh, amount sanctioned - Rs. 33.85 Lakhs, 2020-2021.
18. **B.J. Ramaiah:** "Laboratory testing of soil samples for measuring safe bearing capacity and permeability," funded by Rural Water Supply and Sanitation Division, Andhra Pradesh amount sanctioned - Rs. 3.00 Lakhs, 2020-2021.
19. **T. S. Kumar:** "Development of a 10 LPD 2G Bioethanol Plant by a Continuous Process," Consultancy project funded by ASN Fuels Pvt Ltd, Bangalore, amount sanctioned - Rs. 3 lakhs, September 2020-August 2021.
20. **T. S. Kumar:** "Development of a Prototype of a Continuous Air Heater with Recycle," Consultancy project funded by Opustayz Hospitality Solutions Pvt Ltd, Bangalore, amount sanctioned - Rs. 2 lakhs, April 2020-October 2020.
21. **Y. Kalidas,** "Machine learning algorithms for anomaly detection in multivariate time series data," funded by Toshiba Software India Pvt. Ltd., amount sanctioned - 11.5 Lakhs, May 2020 – Mar 2021.

## 4.5 AWARDS & ACHIEVEMENTS

1. **K. P. Biligiri:** Conducting a Session on *Sustainability and Resilience Aspects of Roadway Infrastructure*, in Goverment of India Vaibhav Summit through Champion Institute IIT Tirupati, October 2020
2. **K. P. Biligiri:** Organized a session on *Sustainability and Resilience Aspects of Roadway Infrastructure*, in *Vaishwika Bharatiya Vaigyanik Summit*, Government of India, October 2020.

3. **K. P. Biligiri:** ESF College of Expert Reviewers, nominated by European Science Foundation, France (April 2021-Present), November 2020.
4. **K. P. Biligiri:** Lead Guest Editor, Special Issue in MDPI Journal, infrastructures, Switzerland, June 2020 – Present.
5. **K. P. Biligiri:** Associate Editor, Resources, Conservation and Recycling, Elsevier, UK, January 2021 – Present.
6. **K. P. Biligiri:** Member, Committee AKM30, Standing Committee on Asphalt Materials Selection and Mix Design, Transportation Research Board of the National Academies, Washington, DC., USA, 2020 – 2023.
7. **Y. Kalidas:** Best Paper Award, CVIP 2020, Best Paper Presentation, 16 December 2020.
8. **K. R. Mopuri:** IUPRAI Best Doctoral Dissertation Award - 2018, Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI), PhD Thesis, 19 December 2020.
9. **V. R. Badarla:** Member of an 8-member Working Group, Ministry of Education, Govt of India, to study the feasibility of Accreditation for IITs, 11 January 2021.
10. **KSMS Raghavarao:** Adjunct Professor, Dept. of Food Science & Technology, Kaligir Campus, JNTU Anantapur, 23 June 2020.
11. **KSMS Raghavarao:** Adjunct Professor, Dept. of Food Science & Technology. GITAM University Vizag, 9 March 2021.
12. **T. S. Kumar:** Patent granted for *Counter Current Continuous Multistage Wall Heated Fluidized Bed Dryer*, Indian Patent No. 359229, Date: 23 February 2021.
13. **C. P. Rao:** Honor awarded for J. C. Bose National Fellowship by the DST (now handled by SERB). This has been transferred to IIT Tirupati (coinciding with his joining IITP) with the current validity till March 2021.
14. **C. P. Rao:** Member of the Senate, NIT Surat, September 2020 – August 2022.
15. **C. P. Rao:** Member, Board, IIT Tirupati, August 2020 – December 2021.
16. **D. Mondal:** Review Editor, Editorial Board of Biophysics in the journal 'Frontiers in Physics', Switzerland, May 2020.

## 4.6 MEMBERSHIP OF PROFESSIONAL BODIES

1. **S. Gumma:** American Institute of Chemical Engineers (AIChE).
2. **S. Gumma:** International Adsorption Society.
3. **C. P. Rao:** Life Member, Chemical Research Society of India.
4. **C. P. Rao:** Life Member, Crystallographic Society of India.
5. **C. P. Rao:** Life Member, Biological Chemistry Society of India.
6. **C. P. Rao:** Life Member, Society for Carbohydrate Chemists & Technologists of India.
7. **G. Roy:** Life Member, Chemical Research Society of India.
8. **P. Gandeepan:** Life Member, Chemical Research Society of India.
9. **P. Gandeepan:** Professional Member, Institute of Scholars (InSc), Bengaluru, India, March 2020-Present.
10. **A. Sharma:** Shastri Mobility Program (SMP) Award by the Shastri-Indo Canadian Institute (SICI) in April 2020 for a research visit to Dr. Amar Vutha's research group at the University of Toronto, Canada, pertaining to the project titled "Towards spectroscopy of molecular ions relevant to the interstellar medium".
11. **A. Sharma:** Core committee member for the Technology Innovation Hub on Positioning and Precision Technologies (PPT) vertical under the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) awarded to IIT Tirupati, October 2020. Also, vertical coordinator for quantum positioning and precision spectroscopy verticals under the TIH on PPT at IIT Tirupati.
12. **A. Sharma:** Appointed program coordinator, CAMOST (IIT Tirupati) to coordinate the academic and research activities under the aegis of CAMOST, a joint center established between IIT Tirupati and IISER Tirupati.
13. **R. K. Gangwar:** Investigator, under quantum positioning and precision spectroscopy vertical for the Technology Innovation Hub on Positioning and Precision Technologies (PPT) vertical under the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) awarded to IIT Tirupati, October 2020.

14. **R. K. Gangwar:** Principal Investigator, CAMOST (IIT Tirupati) to establish a cold plasma assisted processing laboratory under CAMOST, a joint center established between IIT Tirupati and IISER Tirupati.
15. **G. K. Rajan:** Life Member of the American Physical Society - Division of Fluid Dynamics, starting from Jan 2021.
16. **A. Raghuramaraju:** Member, Board of the School of Education and Humanities, Mizoram University, Mizoram 20 March 2020 – 19 March 2023.
17. **C. S. Bahinipati:** Member, Human Development and Capability Association.
18. **A. Kumar:** Indian Institute of Foundrymen (IIF).

## 4.7 EXTENSION/EXTRACURRICULAR ACTIVITIES

1. **A. Basak:** Reviewed papers for international journals such as Scientific Reports, Mathematics and Mechanics of Solids, Crystals, Metals.
2. **A. Ganguli:** Chaired a session in NDE of concrete structures ISNT NDE Virtual Conference & Exposition; 5-7 December 2020.
3. **A. K. Manna:** Served as an external reviewer for a Ph.D. Thesis, Department of Physics, NIT Karnataka, Surathkal.
4. **A. Kumar:** Reviewer for Indian Journal of Human Development; Routledge India.
5. **A. Kumar:** Started research collaboration with IIT Mandi India, Chiba University Japan, Tampere University and Aalto University Finland.
6. **A. Raghuramaraju:** Reviewer of Cambridge University Press, History of Philosophy Quarterly; University of Illinois Press, Politics and Religion; Cambridge University Press, Indian Philosophical Quarterly.
7. **A. Sharma:** Submitted a proposal on hybrid quantum networks to the VAIBHAV Summit 2020 national coordination committee.
8. **A. Sharma:** Thesis committee member of two students working towards their Ph.D. degree under the guidance of Prof. S. Sunil Kumar, Asst. Professor, Dept. of Physics, IISER Tirupati.
9. **A. Sharma:** White paper on science policy directions/ideas for future possibilities related to the searches for axions/ milli-charged dark matter submitted to the Office of the PSA, GoI through the HEP Working Group (India) for the Mega-Science Vision 2035 along with Dr. Basudeb Dasgupta (TIFR) and Dr. Ranjan Laha (IISc).
10. **B. Janaki Ramaiah:** "Applications of dilatometer & Seismic dilatometer in geotechnical engineering" (webinar), jointly organized with IGS Tirupati Chapter and Indian Society of Earthquake Engineering, 02 July 2020.
11. **B. Janaki Ramaiah:** "Basics and Applications of Surface Wave Techniques for Seismic Site Characterization" (webinar), jointly organized with IGS Tirupati Chapter, 04 June 2020.
12. **C. P. Rao:** Reviewed the PhD thesis and conducted the oral viva-voce examination of 5 students from different institutes and universities during 2020-21.
13. **C. P. Rao:** Served on the committee for SERB and also reviewed several research proposals.
14. **C. P. Rao:** Serving currently on the Doctoral Committee of two students from IISER Tirupati and one student from SRM Chennai.
15. **C. S. Bahinipati:** Associate Editor, SN Business and Economics Journal, Springer.
16. **C. S. Bahinipati:** Member of Doctoral Advisory Committee, Ashoka Trust for Research in Ecology and Environment, Bengaluru, 30 December 2020.
17. **C. S. Bahinipati:** Review Editor – Climate and Economics, Frontiers in Climate Journal.
18. **C. S. Bahinipati:** Reviewer for Journal of Environmental Management; Climate and Development; International Journal of Climate Change Strategies and Management; Urban Climate; Journal of Public Affairs; Progress in Disaster Science; SN Business and Economics Journal; Environmental Quality and Management; Disasters; Land Use Policy; IEEE Computer Graphics and Applications; Quality and Quantity; Annals of Public and Cooperative Economics; Poverty and Public Policy; International Journal of Sustainable Energy; Rural Society; Review of Development Economics; Environmental Science and Pollution Research; Environment, Development and Sustainability; Water policy; Weather, Climate and Society.

19. **D. Mondal:** Served as Doctoral Committee Member, Department of Chemistry, Vellore Institute of Technology, India.
20. **G. K. Rajan:** Chaired a technical paper-presentation session on Non-reactive Flow Modeling and Simulations in the second *International Conference on Recent Advances in Fluid and Thermal Science - ICRAFT 2021*, Organized by BITS-Pilani, Dubai, 21 Mar 2021.
21. **G. Ramakrishna:** Served as instructor for GPU Computing Module, a part of Online Course on HPC Shiksha Program - A National Supercomputing Machine Initiative - January 27, 2021 - Feb 3, 2021.
22. **G. Roy:** Reviewed several SERB research proposals during March 2020 – October 2020.
23. **G. Roy:** Served as Doctoral Committee member of Mr. Sathish R, School of Advanced Sciences, VIT Vellore, Date of meeting: 06 August 2020.
24. **G. Roy:** Served as Doctoral Committee member of Ms. Varsha U.V, School of Advanced Sciences, VIT Vellore, Date of meeting: 06 August 2020.
25. **G. Roy:** Session Chair, RTCS-ENV 2020 Symposium, Indian Chemical Society, 26-29 December 2020.
26. **K. P. Biligiri, A. Gowri, and K. N. Satyanarayana:** Organized "Government of India Vaibhav Summit Session on Sustainability and Resilience Aspects of Roadway Infrastructure," 11 October 2020.
27. **K. P. Biligiri:** "COVID-19 Mobility Data Analysis: Observations on using de-identified and aggregated data for social impact analysis in India," Case Studies in PC Quest Bureau, in collaboration with Facebook, 19 March 2021.
28. **K. P. Biligiri:** Chaired a session in the 3<sup>rd</sup> International Conference on *Smart Villages and Rural Development (COSVARD 2020)*, 7-8 December 2020.
29. **M. Mohan:** Reviewer for Journals: Sadhana, FUEL, Applied Energy, Journal of flow visualisation and image processing, Energies.
30. **M. Nithyadharan, and B.J. Ramaiah:** Organized Refreshers Training programme for AP housing Engineers, Online, 8-12/Oct/2020.
31. **P.C. Deshmukh:** Editorial board member of Physica Scripta, an international journal of IOP.
32. **P. Gandeepan:** Doctoral Committee member of Mr. Sumit Kumar, School of Advanced Sciences, VIT Vellore, Date of meeting: 21 December 2020.
33. **P. Gandeepan:** Doctoral Committee member of Ms. A Girijarani, School of Advanced Sciences, VIT Vellore, Date of meeting: 19 March 2021.
34. **P. Gandeepan:** Doctoral Committee member of Ms. Preethi R, School of Advanced Sciences, VIT Vellore, Date of meeting: 25 January 2021.
35. **R. Biswas:** Experts to Board of Studies (BOS) of K. S. R. M. College of Engineering, Kadapa, Andhra Pradesh, 2019 – present.
36. **R. K. Srivastav:** "Geo-Spatial Application in Disaster Management" (webinar), jointly organised with National Institute of Disaster Management (NIDM), 6 October 2020.
37. **S. Gumma:** Co-Chair for Adsorbent Materials: MOFs Session, Annual Meeting of American Institute of Chemical Engineers 2020, 16-20 November 2020.
38. **S. Gumma:** Member, Board of Studies in Chemical Engineering, Chaitanya Bharati Institute of Technology, Hyderabad.
39. **S. Gumma:** Member, Board of Studies in Chemical Engineering, Rajiv Gandhi University of Knowledge Technology (RGUKT).
40. **S. Chimalakonda:** Chaired a session in the 14<sup>th</sup> Innovations in Software Engineering Conference (ISEC 2021), on February 25 – 27, 2021.
41. **S. Chimalakonda:** Co-Chaired the 14<sup>th</sup> Innovations in Software Engineering Conference, ISEC 2021, on February 25 – 27, 2021.
42. **S. Chimalakonda:** Co-Coordinated the "Track 8 - Technology-Enhanced Language Learning (TELL)", the 20<sup>th</sup> International Conference on Advanced Learning Technologies and Technology-enhanced Learning (ICALT 2020) (Online), Tartu, Estonia, on July 06 - 09, 2020.
43. **Venkata Ramana Badarla:** Served as the Workshop Co-Chair in 16<sup>th</sup> International Conference on Information Systems Security (Online), IIT Jammu, December 16-19, 2020.

# 5. Memorandums of Understanding Signed by IIT Tirupati

MoUs and academic associations with the universities, research institutes and laboratories, and industry of international repute are prioritised to nurture collaborative educational and research activities. IIT Tirupati has inked Memorandums 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.

## IIT Mandi

An MoU was signed between IIT Tirupati and IIT Mandi to establish a long-term strategic partnership for academic and research collaborations. The agreement mainly focuses on research and teaching visits from one campus to the other so that the two institutes might benefit from the best that both have to offer. The MoU was signed on June 2, 2020.

## Central Food Technological Research Institute (CSIR-CFTRI)

IITT and CSIR-CFTRI signed on MoU on August 26, 2020, to establish academic and research collaborations in the area of Food Technology, which is one of the thrust areas of the Institute.

## ASN Fuels Pvt. Ltd.

IITT entered into an MoU with ASN Fuels Pvt. Ltd. on October 01, 2020, to collaborate on the pilot project of scaling up of the production of 2<sup>nd</sup> Generation Bioethanol with funding from Hindustan Petroleum.



## National Highways Authority of India

IITT entered into an MoU with the National Highways Authority of India (NHAI) on October 19, 2020, to conduct research and implement new and novel technologies on National Highways in India under the "Adopt a Highway" program. As a part of the MoU, the following roadway stretches were adopted by IITT: Renigunta to Naidupeta (NH-71), and Tirupati to Chennai (NH-275).

## Rajiv Gandhi University of Knowledge Technologies (RGUKT)

An MoU was signed between IITT and RGKUT, Andhra Pradesh, on October 31, 2020. Both institutions have agreed to facilitate collaborative research work and establish academic and scientific relationships as part of the MoU. Further, the MoU aims at promoting mutual support in conducting PG and Ph.D. programmes.

## IISER TIRUPATI

An MoU was signed between IITT and IISER Tirupati on November 04, 2020, to establish a long-term strategic partnership for academic and research collaborations. As part of the MoU, both Institutes have agreed to work jointly on the development of translational research activities like start-up and incubation facilities and the development of multimedia courses, etc., for effective teaching. The Institutes have further consented to developing and sharing common research and infrastructure facilities.

# 6. 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 two workshops, one symposium, and three webinars/conferences. The Institute, for the benefit of its faculty and students, invites scholars from across the world for delivering special talks on various topics. 29 lectures as invited special talks, and three lectures under distinguished lecture series were hosted 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.

## 6.1 ACADEMIC ORIENTATION PROGRAMMES

The Institute conducted its 6<sup>th</sup> Orientation Programme on November 16, 2020, to induct the 2020-2024 batch of B. Tech students. The students and their parents were briefed about the academic programme and the facilities available at IIT Tirupati. An interactive session followed it for the parents with the Director and The Deans of the Institute. Also, the 3<sup>rd</sup> and the 2<sup>nd</sup> Orientation Programmes (Joint) for M.Tech and M.Sc students respectively were held on August 24, 2020. The Orientation Programmes for MS/PhD scholars were conducted on August 24, 2020 for July 2020 batch, and on January 06, 2021 for January 2021 batch.

## 6.2 WORKSHOPS AND CONFERENCES ORGANISED

### National Symposium on Recent Trends in Chemical Sciences (NSRTCS-2020)

The Department of Chemistry organised a two-day symposium on Recent Trends in Chemical Sciences to discuss some cutting-edge topics across the broad range of chemical sciences on October 03-04, 2020. Therefore, this symposium had nine invited lectures from eminent speakers and oral presentations by young research scholars from various institutes across the country that brought an opportunity to the young researchers to gain knowledge on the recent trends in chemical science research.

### Active Learning in Online Education

Centre for Continuing Education (CCE), IIT Tirupati, organised a Faculty Development Workshop on "Active Learning in Online Education" on October 03, 2020. The workshop was conducted by Dr. Rucha Joshi, Faculty at Department of Biomedical Engineering, University of California, Davis, USA.

### Advances in Atomic, Molecular, and Optical Sciences (AAMOS)

An online international conference was held on a sliding timetable enabling global participation during December 14-18, 2020. It was organised jointly by the Centre for Atomic, Molecular, Optical Sciences

Technologies (Joint Initiative of IIT Tirupati and IISER Tirupati) and Dayananda Sagar University, Bengaluru. The conference was convened by an international committee of distinguished scientists from Australia, Japan, India, Ireland, and USA. Thirty-seven talks over five days were delivered at AAMOS '20 by leading experts from across the world.



### **Workshop on Last-mile Challenges**

Dr. K. P. Naveen (IIT Tirupati) and Dr. Ashwin Ashok (Georgia State University) organised a workshop on "Last-mile Challenges and Standardisation Opportunities in Smart Infrastructure (LastMileS '21)," held in conjunction with the 13<sup>th</sup> International Conference on Communication Systems & Networks (COMSNETS '21), January 05, 2021.

### **Statistical Mechanics in Chemistry and Biology (SMCB-2021)**

The "Statistical Mechanics in Chemistry and Biology (SMCB-2021)" conference was jointly organised by IIT Tirupati, IISER Tirupati, and IIT Goa over an online platform on January 23-25, 2021. Dr. Rajib Biswas coordinated this event from IIT Tirupati. The technical sessions consist of 25 technical talks delivered by the researchers working in various parts of the country and 31 flash presentations from the young masters, graduate, and post-doctoral research scholars working in this field. The conference has received overwhelming responses from the community. More than 300 participants registered for the conference across the country and a few from overseas as well.



### **Advances in Materials Processing and Mechanical Testing (AMPMT)**

The Department of Mechanical Engineering organised an international webinar on February 01-02, 2021 on "Advances in Materials Processing and Mechanical Testing (AMPMT)" to bring together international leading academic scientists and industries to share their experiences and research findings in all aspects of Advances in Materials Processing and Mechanical Testing. It provided a premier interdisciplinary platform for researchers, academicians, and industry personal to discuss the most recent innovations, trends, and challenges encountered and the solutions adopted in Materials Processing and Mechanical Testing. Dr. Ajay Kumar was the coordinator for this international webinar in which more than 200 people participated. Speakers from the USA, UK and Finland were invited to deliver talks. There were talks from industries also.

Thrust Areas of the webinar were as follows:

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Advanced Materials and Processing</li> <li>• Artificial Intelligence and Big Data in Manufacturing</li> <li>• Smart manufacturing</li> <li>• Additive manufacturing</li> </ul> | <ul style="list-style-type: none"> <li>• Advanced machining and Joining Technologies</li> <li>• Ultra-precision manufacturing</li> <li>• Sustainable manufacturing</li> <li>• Materials Testing</li> </ul> |
|---|--|

### **6.3 COLLOQUIUM/INVITED TALKS**

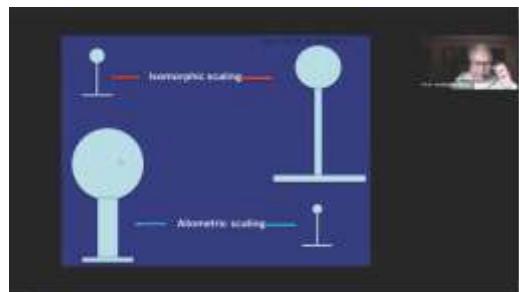
The Institute, for the benefit of its faculty and students, invites scholars from across the world for delivering special talks on various topics. A list of such invited talks is given below:

1. Dr. N. V. Choudary, Scientist Emeritus, HPCL corporate R&D center delivered a talk on "Petroleum Refining - Past, Present and Future" at a seminar jointly organised by the Department of Chemical Engineering, IIT Tirupati and Indian Institute of Chemical Engineers Regional Center Guwahati, November 26, 2020.
2. Dr. B. Ravi, GM R&D, HPGRDC, delivered a talk on "HPCL Refineries, Processes, Project and Research" at a seminar organised by the Department of Chemical Engineering, IIT Tirupati, November 23, 2020.
3. Gaurav Kumar, Senior Research Engineer, Air Products and Chemicals Inc., Allentown, USA, delivered a talk on "B. Tech: A fork in a long road" at a seminar organised by the Department of Chemical Engineering, IIT Tirupati, November 07, 2020.
4. Dr. Karthik Ramanathan, Deputy Engineering Director, delivered a talk on "Perspectives in Modeling and Simulation" at a seminar organised by the Department of Chemical Engineering, IIT Tirupati, February 17, 2020.
5. Prof. Satyanarayana Kalidindi, Director IIT Tirupati, Dr. Akshay Bellare, President Honeywell India, Sridhar Krishnamurthy, Arjas Steel, B.K. Sethuram, MD, India-SEA-ANZ, Celanese, and Prof. S. Pushpavanam, Institute Chair Professor, IIT Madras, delivered a talk on "A career in Chemical Engineering", June 12, 2020.
6. Prof. G. Ambika, IISER Tirupati, delivered a talk on "Multiple Time Scale Phenomena in Complex Systems", October 19, 2020.
7. Prof. A. V. Mahajan, IIT Bombay, delivered a talk on "Novel states in magnetism: low-dimensional systems and spin liquids", October 26, 2020.
8. Professor Goverdhan Mehta, an eminent scholar, delivered the inaugural lecture in a monthly lecture series titled "Chemistry Beyond Classroom: Connecting to the Experts", organised by the Department of Chemistry, IIT Tirupati, November 2020.
9. Sunil Kumar S, IISER Tirupati delivered a talk on "A novel experimental approach to probe the effect of environment on fluorescence properties of molecular ions", November 19, 2020.
10. Padmabati Mondal, IISER Tirupati delivered a talk on "Photophysics and photochemistry of Indole and Indole derivatives: A quantum chemical study", February 19, 2021
11. Anand Kumar Jha, IIT Kanpur delivered a talk on "Partial coherence: Applications in quantum state measurement, imaging and communication", March 25, 2021

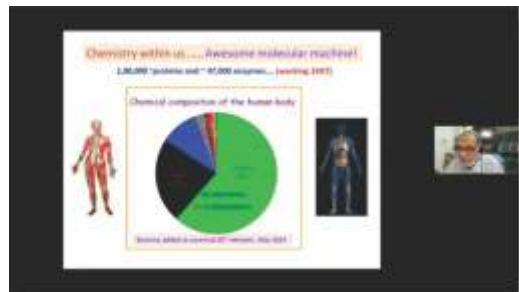
12. Dr. Somrita Ray delivered a talk on "Chemistry to Detect Crime and Prevent Accidents" in a new seminar series titled "Chemistry Beyond Classroom: Connecting to the World", organised by the Department of Chemistry, IIT Tirupati, March 2020.
13. Dr. Falconer, Professor, University of St Andrews, Scotland, delivered a lecture on "Symmetry and Enumeration of Fractals", October 6, 2020.
14. Prof. Massopust P, Technical University of Munich, Germany, delivered a lecture on "Attractors of Trees of Maps, Sequences of Maps between Spaces with Applications to Fractal Interpolation", October 20, 2020.
15. Dr. Senthil Raani K S, Assistant Professor, IISER Behrampur, delivered a lecture on "Measures on  $R^n$ ", September 29, 2020.
16. Dr. Nakamura, Professor Emeritus, Hokkaido University, Japan delivered a lecture on "Invitation to Inverse Problem: MRE, which uses interior measurements and EIT, which used boundary measurements", October 14, 2020.
17. Dr. Anurag Prasad, Risk Analysis Expert, McKinsey Knowledge Center, Gurugram, delivered a lecture on "Statistical Modeling for Credit Risk", November 17, 2020.
18. Dr. Shilpak Banerjee, Assistant Professor, Indraprastha Institute of Information Technology Delhi, delivered a lecture on "Anosov-Katok type examples in ergodic theory", November 24, 2020.
19. Dr. Gunja Sachdeva, Post-Doctoral Fellow, Max Plack Institute of Mathematics, Bonn, Germany, delivered a lecture on "Special Values of L-functions", February 9, 2021.
20. Dr. Narasimha Kumar, Associate Professor, Department of Mathematics, IIT Hyderabad, delivered a lecture on "On mod-p congruences for Drinfeld modular forms of level pm", February 16, 2021.
21. Dr. Hong-Kun Xu, Professor, School of Science, Hangzhou Dianzi University, China, delivered a lecture on "Subgradient Methods in Infinite Dimensional Hilbert Spaces", March 16, 2021.
22. Dr. Tanvi Jain, Associate Professor, Indian Statistical Institute, Delhi, delivered a lecture on "Entrywise products and powers of matrices", March 23, 2021
23. Dr. Tushar Das, Associate Professor, University of Wisconsin, LA Crosse, USA, delivered a lecture on "From the division algorithm to fractal geometry via dynamical systems", March 30, 2021.
24. Dr. Venu Madhav Govindu, Department of Electrical Engineering, Indian Institute of Science, Bengaluru, delivered a talk on "Gandhi's Economic Swaraj", on the occasion of Gandhi Jayanthi, October 02, 2020.
25. Dr. Anik Bhaduri, Director, Sustainable Water Future Programme, Future Earth, Associate Professor, Australian Rivers Institute, Griffith University, Brisbane, Australia, delivered a talk on "Digitalisation towards sustainable water futures", December 10, 2020.
26. Prof. N. R. Bhanumurthy, Vice-Chancellor, Dr. B. R. Ambedkar School of Economics University, Bengaluru, delivered a talk on "COVID-19 and the Indian Economy", November 26, 2020.
27. Prof. Rajib Shaw, Graduate School of Media and Governance, Keio University, Japan, delivered a talk on "Living with Uncertainties: COVID-19 and Beyond", November 19, 2020.
28. Mr. Anil Rachamalla, Founder of End Now Foundation, delivered a talk on "Consent & Data – Why Consent is different for Online?", organised as part of National Cyber Security Awareness Month by the Department of Computer Science and Engineering, October 28, 2020.
29. Mr. Anil Rachamalla, Founder of End Now Foundation, delivered a talk on "Digital Detox - Is it time to Log Off?", organised as part of National Cyber Security Awareness Month by the Department of Computer Science and Engineering, November 11, 2020.

## 6.4 DISTINGUISHED LECTURE SERIES

- Prof. Amitabha Ghosh, Former Director, Indian Institute of Technology Kharagpur, delivered a lecture on "Scaling Laws: The Science of Miniaturization" on December 02, 2020.
- Prof. Goverdhan Mehta, University Distinguished Professor, and Dr. Kallam Anji Reddy Chair, School of Chemistry, University of Hyderabad, and Former Director, IISc Bangalore, delivered a lecture on "Dimensionality of Chemistry - A 21 Century Science for Global Sustainability," on November 27, 2020.
- Prof. Gen Nakamura, Professor Emeritus of Hokkaido University, Japan, delivered a lecture on "Invitation to Inverse Problems: MRE, which uses Interior Measurements and EIT, which uses Boundary Measurements," on October 14, 2020.



▲ Prof. Amitabha Ghosh delivering the lecture



▲ Prof. Goverdhan Mehta delivering the lecture

## 6.5 LAUNCH OF NEW ACADEMIC PROGRAMMES

### Inauguration of the M.Sc. Physics program

The Department of Physics organised an online inauguration ceremony on August 31, 2021, to officially launch the M.Sc. Physics programme at IIT Tirupati. The inauguration address was given by Prof. T. V. Ramakrishnan, Emeritus Professor of Physics, Banaras Hindu University.

### A Bird's Eye View at the Excitements & Challenges in Chemistry

The Department of Chemistry organised a program to launch the Master's program in Chemistry at IIT Tirupati on August 31, 2020. The Department has invited twelve eminent professors of Chemistry from various parts of the country. The resource persons discussed various aspects of cutting-edge research on chemical sciences and ignited the students with excitement in chemistry to the incoming students.

# 7. 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 activities were hit by the Covid19 pandemic. Undeterred by the restraints of the online platform, the Institute continued to conduct events virtually. In a first, the SPIC MACAY Heritage Club organised a number of online concerts. Further, the Institute celebrated its sixth Institute Day during this period. The entire event was streamed on YouTube. This section of the report details the various events organised by the Institute during the year 2020-21.

## The Sixth Institute Day

The sixth Institute Day of IIT Tirupati was celebrated on its Permanent Campus on March 4, 2021. The occasion was graced by the esteemed presence of the Hon'ble Vice President of India, Shri M. Venkaiah Naidu, as the chief guest of the event. The event formally began with the welcome address by Prof. K. N. Satyanarayana, Director, IIT Tirupati, followed by the speech of the Hon'ble Vice President. The Hon'ble Vice President awarded medals to the toppers of the various branches, and distributed prizes to the winners of various events held during the academic year 2019-20. The vote of thanks was proposed by Prof. N. Venkaiah, Dean of Student Affairs, IIT Tirupati.



## Inauguration of CAMOST, A Joint Initiative by IIT Tirupati and IISER Tirupati

The Center for Atomic, Molecular, Optical Sciences Technologies (CAMOST), a joint initiative of IIT Tirupati and IISER Tirupati, was inaugurated on August 14, 2020, in the gracious presence of Dr. Arabinda Mitra (Scientific Secretary, Office of the Principal Scientific Advisor, Government of India). Dr. Mitra highlighted the growing need for such a center to serve as a nodal hub for several ongoing and upcoming scientific National Missions related to Interdisciplinary Cyber Physical Systems (ICPS), Artificial Intelligence (AI), Quantum Technology Applications (QTA), and the Supercomputing Mission (SCM). CAMOST is a culmination of several joint projects in the field of AMO sciences undertaken by the two institutes in the past few years. Prof. P. C. Deshmukh (Adjunct Professor of Physics, IIT Tirupati) serves as the Mentor and Convener of CAMOST. The administrative council of CAMOST consists of Prof. K. N. Satyanarayana, Director, IIT Tirupati, and Prof. K. N. Ganesh, Director, IISER Tirupati. The scientific advisory committee is constituted by distinguished AMO scientists from India and abroad.

## 74<sup>th</sup> Independence Day Celebrations on the Permanent Campus

The 74<sup>rd</sup> Independence Day celebrated on August 15 2020 (Saturday). The Dean, Students' Affairs, hoisted the National flag on the Permanent campus. The Independence Day Celebrations followed the necessary COVID guidelines like wearing a mask, physical distancing etc. For those who failed to attend the program due to COVID-19 situation, the live telecast of the program and the recorded cultural programs by the students were arranged.



## SPIC MACAY

SPIC MACAY Heritage club @ IIT Tirupati takes a sincere effort to keep the Institute fraternity involved with the Indian Culture and Heritage and in this direction organised an online Flute Concert on November 7, 2020 by Sri Shashank Subramanyam accompanied by Shertalai. R. Ananthakrishnan on Mridangam and Sri. H.N. Bhaskar on Violin. It was a fantastic experience.

The SPIC MACAY Heritage Club organised another online Qawwali program by Warsi Brothers on December 26, 2020. The music was magical, and the performance was excellent.

The third virtual treat under SPIC MACAY Heritage Club was a violin recital on January 23, 2021, by Padmashri A. Kanyakumari. Vidwan Triplicane K. Sekar accompanied her on Thavil, Vidwan S. Sunil Kumar on Kanjira and Sayee Rakshith on violin. It was a scintillating program.



Despite the constraints of the online platform, the students and faculty along with their family members enjoyed a mellifluous Carnatic Music recital by Dr. S. Sowmya on April 17, 2021 -another event of SPIC MACAY Heritage club. Embar Sri S Kannan accompanied her on the Violin, Neyveli Sri R Narayanan on the Mridangam, Chandrasekara Sharma on the Ghatam and Kumari Subashri on the Tanpura. The artistes gave a mesmerising musical performance and clearly explained the intricacies and philosophies behind such a beautiful form of art and culture. It was a wonderful evening.

### **72<sup>nd</sup> Republic Day Celebrations on the Permanent Campus**

On January 26, 2021, the Institute celebrated the 72<sup>nd</sup> Republic Day on Yerpedu Campus. Director Dr. K. N. Satyanarayana unfurled the National flag followed by the National Anthem and March Past by security staff. The Republic Day celebrations were conducted keeping in mind the necessary COVID guidelines. For those who failed to attend the program due to COVID-19 situation, the live telecast of the program and the recorded cultural programs by the students were arranged.



### **International Yoga Day Celebrations**

Fitness club IIT Tirupati celebrated International Yoga Day on June 21 2020 on Zoom platform.

Mr. S. Amaranth, Yoga Therapist and Nutritionist, Asthanga Yoga Fitness Research Centre, Tirupati took the yoga session. Students, Faculty and staff participated in the virtual session.



### **MEDHA: Women's Forum of IIT Tirupati**

"Medha" – Women's Forum & Internal Complaints Committee (ICC) arranged an engaging online webinar by Prof. Sita Kumari on the topic of "Women and Constitution" on December 1, 2020.

Medha organised recreational activities for Women faculty and Staff on March 12, 2021, between 3:00 pm and 5:00 pm.

To mark the celebrations of the International Women's day, Medha organised a talk on "Women Empowerment - Significance and Impact" by Dr. Seema Vinayak, Director of Solid-State Physics Laboratory. Ms. Divya deliberated on the uniqueness of the MEDHA logo on the occasion. The celebration also included a video presentation by the girl students of the Institute on the theme "How great you feel about being a woman and importance of women's day" and a song by Ms. Chaitali.

# 8. 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 rent 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 1 A(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.

## 8.1 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.



◀ A view of the temporary campus

Following are the facilities that are available on the temporary campus:

<ul style="list-style-type: none"> <li>• Auditorium - 200 Seater</li> <li>• National Knowledge Network (NKN) Virtual Classroom</li> <li>• 30 Seater Class room - 2</li> <li>• 60 Seater Class room - 8</li> <li>• 120 Seater Class room - 1</li> <li>• Faculty Cabins and Lounge</li> <li>• Guest Faculty room</li> <li>• Staff room</li> <li>• Research Scholars room</li> <li>• Meeting rooms</li> <li>• Board room</li> <li>• Centralized Wi-Fi</li> <li>• Administration Office</li> </ul>	<ul style="list-style-type: none"> <li>• Electronics Laboratory</li> <li>• Physics Laboratory</li> <li>• Chemistry Laboratory</li> <li>• Workshop Computer Lab</li> <li>• Innovation Laboratory</li> <li>• Kitchen-cum-Dining Facility</li> <li>• Cafeteria</li> <li>• Gymnasium</li> <li>• Passenger Lift</li> <li>• 24x7 – 365 days DG Backup for entire campus</li> <li>• RO system (2x500 Litres per hour)- For the purpose of drinking and cooking</li> <li>• Necessary facilities have been created for the access of the specially-abled</li> </ul>
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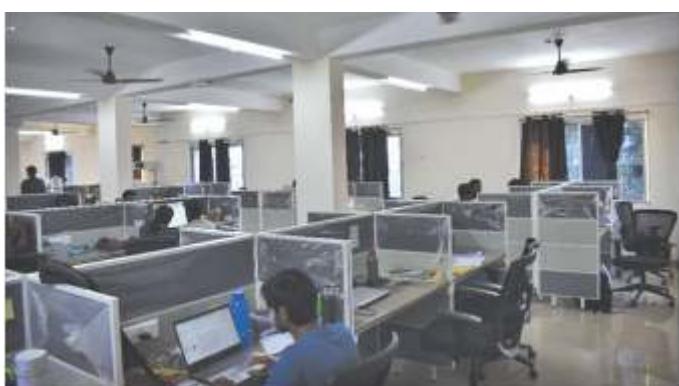


A view of the Annexe Building

### Annexe Building

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



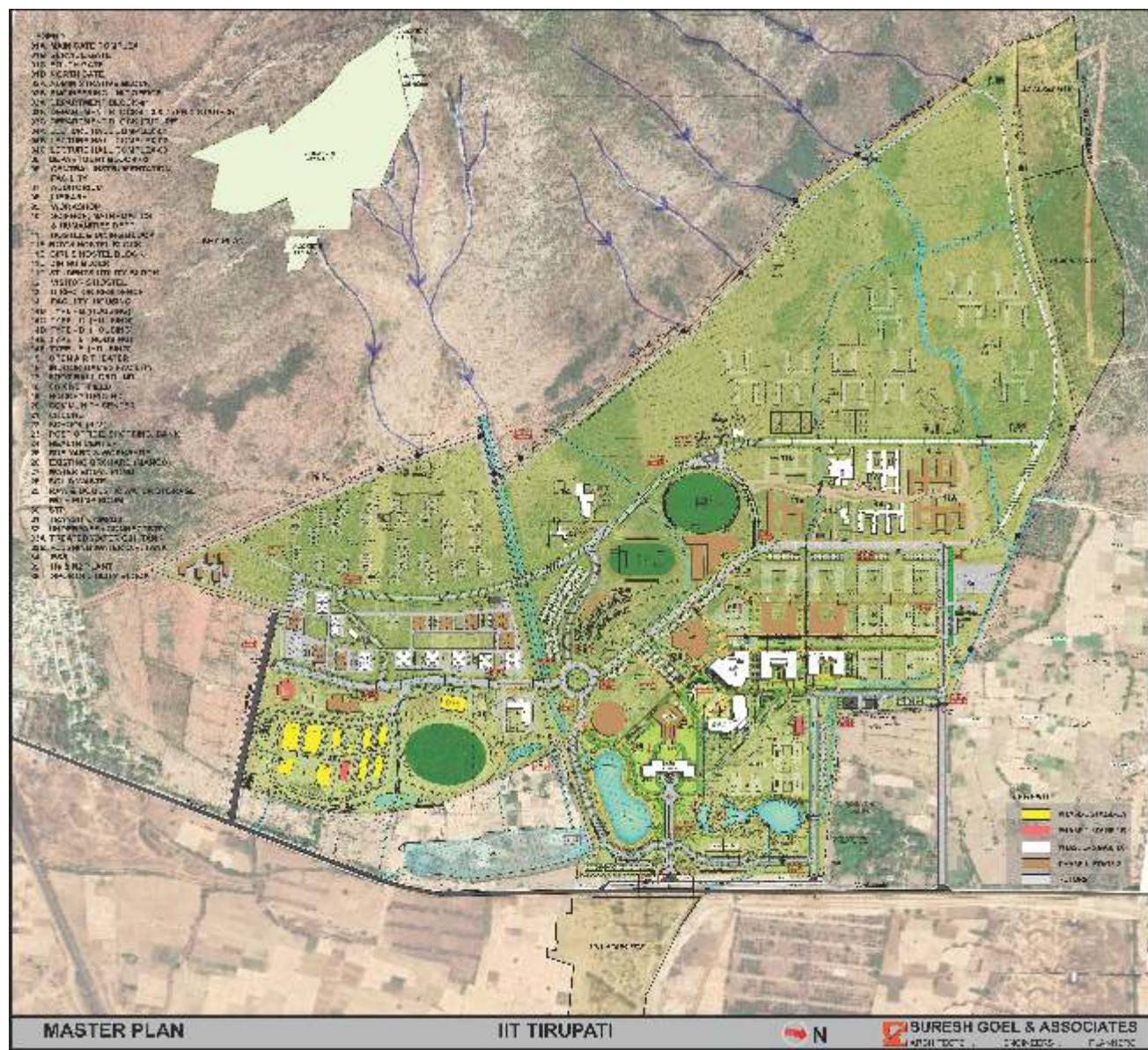
▲ A view of the cubicles for research scholar

## 8.2 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 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 capture and storage of runoff. This will cater to about 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 gain.

It has been planned that the permanent campus would be constructed in phases. A complete campus to cater to 2,500 students, 250 faculty members and 275 staff members is planned to 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 2022, and the rest of the facilities will be ready in 2024 in Phase 2. 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)
- 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 the 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.



Ariel 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



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



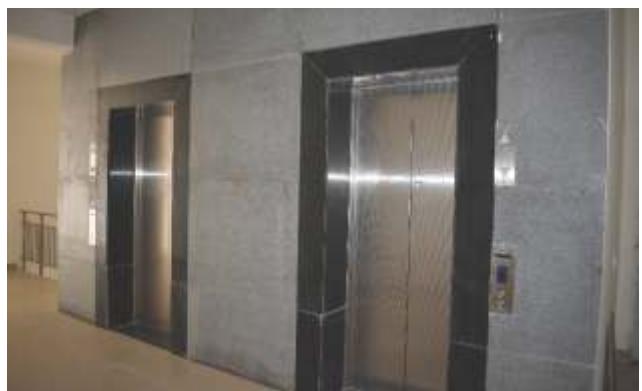
▲ Typical view of a 120-seater class room in Class Room Building

### **Hostel Block-F (Sixth Hostel)**

This hostel with 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 = 1,24,184 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 ready for occupation in a phased manner beginning from September 2021 to 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 having 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 Tennis courts and half practice court
- Two volleyball courts
- 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 Chemistry, Civil Engineering, Chemical Engineering, Mechanical Engineering, and Physics Departments.



▲ Rendering View of Department Block-1

#### **Status as on March 31, 2021**

Foundation work and ground floor slab completed. The first-floor wall concreting in progress.



▲ 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 on March 31, 2021**

Foundation work, ground floor, and the first-floor slab completed. The second-floor wall concreting in progress.



▲ Department Block-2 construction

#### **Lecture Hall Complex**

A 240-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

### **Administrative Building (G+4)**

This building houses offices of the Director, Deans, Registrar, and various Administrative and Academic sections.



▲ Rendering view of administrative block

**Status as on March 31, 2021:** Foundation work in progress.



▲ Administrative block construction

### **Hostel - 1 and Hostel - 2**

#### **Buildings:**

Each hostel will house 495 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 on March 31, 2021:** Foundation work and first floor slab completed.



◀ Hostel Block-1  
construction

**Status as on March 31, 2021**

Foundation work completed.



Hostel Block-2 ►►  
construction at the site

#### Residential zone:

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

#### Director Residence: 1 (G+1)

Ground floor slab completed.  
First-floor slab shutter work in  
progress



Director's residence ►►  
construction at the site

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

Each floor has four flats. Foundation work has been completed. Stilt floor and column concreting are in progress.

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) up to the second floor have been completed. The foundation work for the other two Blocks (C1 and C4) have also been completed.

◀ Type-C3 block construction

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

Each floor has six flats. Stilt, ground and first-floor slab completed.

#### **Status as on March 31, 2021:**

Second-floor column concrete work in progress.

Type-D Block ► construction



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

Each floor has eight flats.

#### **Status as on March 31, 2021:**

Foundation work completed; stilt floor and column concreting in progress.

◀ Type-E block construction

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

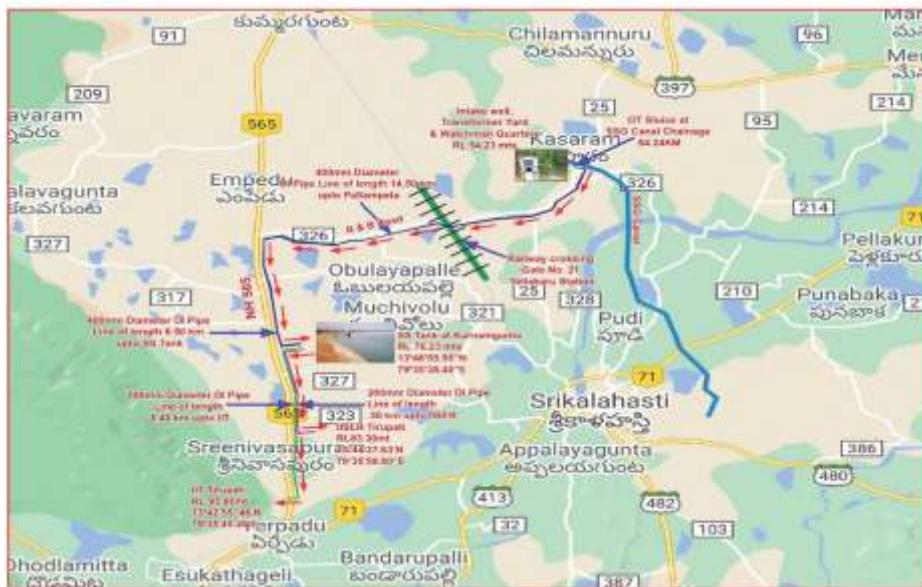
Each floor has eight flats. Foundation work completed; stilt floor and column concreting are in progress.

#### External Services

1. Road formation work is in progress.
2. Pond formation and excavation is in progress.
3. Electrical substation plinth beam 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 raw 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). Work is in progress.



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

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

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

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



### 8.3 STUDENT HOSTELS AND OTHER FACILITIES

IIT Tirupati constructed 6 Hostels for boys and one Hostel for Girls on the Permanent Campus 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, IIT Tirupati also hired 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 health care 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.



▲ An aerial view of the hostels on the permanent campus



▲ Hostel in Laksminagar Colony near temporary campus

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 24x7 Wi-Fi facility connected through point-to-point radio from the main building of the Institute, washing machines, TV, water coolers, geysers, and common rooms.

### 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 24/7 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 Centres includes Defibrillator, Multipara Cardiac monitor, ECG machine, Autoclave, O<sub>2</sub> concentrator/O<sub>2</sub> cylinder, etc.



◀ A view of  
Health Centre

We managed the covid pandemic successfully by following the method of tracing, tracking and treatment. We 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.

### **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 available. The guest house has a centralised kitchen-cum-dining hall.



▲ Guest house facility at KCR Towers



▲ Guest House facility on the permanent campus

# 9. Student Events

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 on academics, photography, music, drama, dance, technology, astronomy, trekking, volunteering social services etc. This section of the report summarises the following events and activities organised by the students:

- (a) Technical and techno-cultural events
- (b) NSS activities
- (c) Student clubs
- (d) Sports-related activities

## 9.1 TECHNICAL EVENTS

The following technical events were organised in the year 2020-2021:

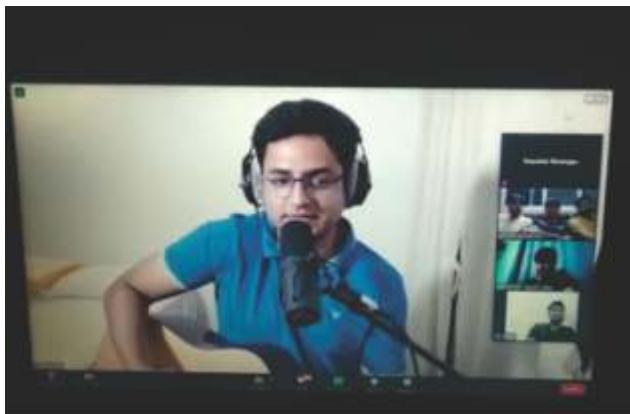
### Inter IIT Tech Meet 9.0

IIT Tirupati secured 17<sup>th</sup> position in this year's online version of the Inter IIT Tech Meet. A contingent of 35 students from IIT Tirupati participated in this Tech Meet, hosted by IIT Guwahati, from 26<sup>th</sup> to 28<sup>th</sup> March 2021. Though IITT students could not participate in all the events organised in this edition, the Institute still bagged a bronze medal in AgroBot challenge, a design-based event.

There were several participants from our Institute in each category. The teams have performed well under all technical constraints such as network, bandwidth issue, pandemic issue, mental pressure, etc. Yet, the students bagged a bronze medal in one of the events and stood out in many of the events.

## 9.2 TIRUTSAVA - 2021: THE FOURTH TECHNO-CULTURAL FEST

Tirutsava 2021, the fourth edition of the annual techno-cultural festival of IIT Tirupati, was held between 26<sup>th</sup> and 28<sup>th</sup> Feb this year in a virtual mode. Students from almost all 23 IITs and colleges from all around the country participated in the event. This meant that the scale became bigger and better than ever. The event was kicked off in the auspicious presence of the CEO of Amara Raja Batteries Shri Vijayanand Samudrala. Students enthusiastically participated in the various literary, technical and cultural events spread out over the three days. In addition, there were technical workshops in AI, ML, Ethical Hacking and IoT fields and guest lectures by eminent personalities. Tirutsava 2021 hosted a Robotics Ideation event, allowing participants to interact with experts and gain potential investors for their ventures. The Coding Ninja sponsored coding event was a big hit among the technical events especially because of the exciting cash prizes and goodies. This year, there were two pro-show artists to ramp up the energy levels: singer Gajendra



**RULES**

- There will be a few logos or images or other elements which will be shown to the participants and they have to identify what action needs to be taken to solve them. They have to click off that logo or image if they have that button in their ticket.
- The participants will have about 7-8 seconds to tick until the next draw is drawn.

Full Name - Mark all entries on ticket correctly  
Glasses - Mark all corner entries on ticket correctly  
Mobile - Mark all entries in middle row of ticket correctly

- 25% bonus cash/10 between participants who first to solve us the ticket will be allocated as a prize.
- Give a while free bonus whenever it will not be presented again. These participants must have solved at least one question.
- No repeat is entitled to a maximum of two persons out of which only one can be a cash prize.
- While claiming the prize, participant must show us the ticket. Delayed claims will not be entertained.

**Virat Kohli**  
**BATSMAN**

**BASE PRICE - 300 L**

Verma, and stand-up comedian Kenny Sebastian. The online version of the fest gave a chance for students all over the country to take part in the events hosted during the fest. On the whole, the event proved to be a memorable experience for all.

### 9.3 NATIONAL SERVICE SCHEME (NSS) ACTIVITIES

The overall aim of the National Service Scheme 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 majority 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 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 2020 - 2021 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. Under the four clubs (Secretariat, Schools, Old age homes and Orphanage, UBA and Rural Development, Health and Blood Camp) that work within NSS, we could organise various activities towards social welfare and environmental issues.

The various events organised under various clubs and in collaboration with reputed NGOs in the academic year 2020 - 2021 are as follows:

Four activities were organised as part of the Gandhi Jayanti Celebration on October 2, 2020, to commemorate the 151<sup>st</sup> birth anniversary of the Father of Nation, Mahatma Gandhi.

### a. Gandhi Punyaha

As part of the Gandhi Jayanti celebrations hosted at IIT, Tirupati, students, professors, and other administrative officials participated in cleaning the Institute premises on the auspicious morning of October 20. This was especially carried out to present their appreciation towards the services of the housekeeping staff. The housekeeping team was given a paid leave on the day, and token gifts of N-95 masks and sanitisers were distributed among them. Students who were residing at their homes, given the situation of the COVID-19 pandemic, showed their appreciation by cleaning their own house or locality and submitted photos of their endeavour to the NSS team.



### b. Kamalini

KAMALINI was a campaign for the self-production of sanitiser. Seeing the urgency and requirement of sanitisers as an essential commodity in this demanding time, the NSS Unit produced 1200 liters of sanitiser in collaboration with the Department of Chemical Engineering, IIT Tirupati. The NSS Unit distributed the produced sanitisers to five villages adopted by the Institution and to a local orphanage. Kamalini sanitisers were also used for internal requirements of the Institute.



### c. Mahatma

MAHATMA provided a platform for IIT Tirupati students to take on pilot projects to solve some technologically associated problems of the common people from different sectors of society and propose feasible smart solutions. This event was announced on October 2, 2021, as part of the Gandhi Jayanti celebrations of the year. After careful review by the selection committee, three proposals were financially aided by the Institution and guided by a Faculty Advisor.

#### **d. No Plastic Week:**

NO PLASTIC WEEK was an anti-plastic campaign successfully driven by professors, students, and staff of IIT Tirupati by boycotting the usage of plastic for a whole week. This event was conducted on the day succeeding the day of Gandhi Jayanti. Participants refrained from using plastic products for the entire week and committed to upcycling and recycling waste plastic products as part of the No Plastic week.

Two activities were held as part of **NSS Day on September 24, 2020**

##### **i. Let's Plant a Tree**

Faculty, staff and students, who were residing on campus, actively participated in the NSS Day celebrations by planting saplings. They extended their share towards the environment while following the social distancing norms and safety protocols issued by the Ministry of Health and Family welfare in view of the COVID-19 pandemic in the Permanent Campus of IIT Tirupati. This initiative was undertaken to offer aid towards reforestation and environment conservation.

##### **ii. Online Restoration Campaign of Planting Saplings**

Students residing in their native places actively participated in the restoration campaign by planting a sapling at their localities and shared their experiences online. NSS, IIT Tirupati was, thus, able to work extensively pan-India through the active participation of the volunteers. The participants also posted photos of their activity in and around their homes online to showcase the team's initiative and encourage further undertakings of such activities.

Two online activities were conducted during this academic year under the **Team Rural Development and UBA, NSS IITT**.

##### **i. Best Out of Waste**

A two-week long activity, from February 14 to 28<sup>th</sup>, was conducted for the students, during which they came up with innovative ideas to upcycle their household waste products. This activity brought out the creativity within the students by urging them to utilise the waste in their houses. The students were asked to send pictures of their creative output. The team received up to 75 photos with a total participation of 16 members. This helped in reducing waste products while yielding creativity from the volunteers.



## ii. Eco-friendly Home

The second activity by Rural development and UBA was 'Eco-Friendly Home'. It was conducted from February 14 to February 28, 2021. The activity was meant to inculcate feelings of ecological responsibility in the students and make them aware of the difficulties in bringing about a change in society. There are many eco-unfriendly activities taking place in their homes and localities. So, for this activity, students were asked

to identify such activities, search for solutions to the problems and finally, implement the change. Students are also required to write a document explaining how they brought about the change.



NSS, IIT, TIRUPATI was able to conduct three innovative activities in this **challenging time under the Schools and Elderly Homes Division:**

### i. Science Hack

Students organised an online project competition, Science Hack 2021 where students had to identify a science experiment and record a video of the demonstration. We had around 30 students (from schools situated in different parts of the country) participate in the event, trying out various experiments enthusiastically.



### ii. Mind Maps and Notes

The students formulated mind maps, notes and useful educational resources for high school students. The topics ranged from mathematics, science to history and geography. A strong dataset of notes and mind maps on high school topics has been created with the participation of students who spent 570+ hours on the task. Different languages that were used for notes and mind maps helped students with diverse backgrounds to understand concepts quickly and it was duly shared with school students for use.



### iii. Science Labs

Science labs was a digital library of various science experiments, with descriptions and processes, compiled by NSS volunteers. The database was shared with nearby schools in and around Yerpedu Mandal for easier learning and a better understanding of science concepts.

#### SOS Collaboration

NSS, IIT Tirupati Initiated a programme for the children of migrant workers staying inside the campus, in association with SOS for their nutrition and education. SOS Children's Villages is an NGO that works globally in 132+ countries to provide quality education, health and nutrition, women empowerment, etc. This venture has been nominated for the Nobel Peace Prize multiple times and received many prestigious awards, including the PHD Chamber of Commerce Award for outstanding contribution to social welfare, 2009. As part of the program, the school for the children in the campus was visited by the volunteers and they interacted with the students and faculty. No further action could be taken as planned as the second wave of Covid hit the country. The collaborative work has to be taken further ahead.

## 9.4 GCU- GUIDANCE AND COUNSELLING UNIT

The guidance and counselling unit (GCU) is also known as Saarthi. GCU aims to increase awareness about mental health among the IIT Tirupati community and to provide counselling support. This year, GCU got assistance from volunteers, Prof. Samiullah (Counsellor), Mrs Bhooma Krishnan (Counsellor), and from YourDOST.

Flagship activities that GCU runs throughout the year were counselling support and UG Buddies. GCU analysed the need for a female counsellor, and the joining of Mrs Bhooma Krishnan was a radical change for female students. Till now, female students hesitated to reach out for counselling support, but after her joining, we saw a steep rise in the counselling sessions taken by the female students.

For ease of communication, the GCU helpdesk, WhatsApp group was created. Every week google forms are circulated to book counselling sessions. It has increased the reach of GCU not only among the students but also among the faculty and staff. This year was very hard for all the students because of the Covid-19 epidemic; online counselling helped them. GCU played an excellent role in assessing red flags and giving them immediate counselling support.

Stats from the YourDOST's IIT Tirupati Engagement report:

- 241 Signups
- Average session time 31 min
- 202% Increased usage (225 sessions in 2019 to 681 sessions in 2020)
- 630 counselling sessions
- 27% Female users and 73% Male users

GCU started UG buddies that are peer-peer guidance groups. Group of B. Tech first-year students of the same department allotted with second-year B. tech guide, who help them with academic/ non-academic difficulties or queries. It has created an excellent bonding between freshers and second-year students.

Apart from this, GCU has also organised following webinars by Mrs Bhooma Krishnan. All the webinars received decent attendance:

1. It's okay to ask for help (November 19 2020)
2. New year resolution (December 28 2020)

## 9.5 STUDENT CLUBS AND ACTIVITIES

The student clubs play a pivotal role in organising events to extend life beyond the boundaries of text-books and exams to extra-curricular development. A number of events have been organised by the different clubs of the students during the session 2020-2021.

### Actomania- 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 spooky makeup contest on the occasion of Halloween. The members of the club created a short film for the Guidance and Counselling Unit (GCU) IITT which focused on the life of JEE aspirants outside and into an IIT. Plays and monologues were performed on the occasions of Gandhi Jayanti and Republic Day. The club also initiated a podcast series on its Instagram handle.



### Chaturanga-Chess Club

The club conducted rapid tournaments (longer time control) and blitz tournaments (shorter time controls) throughout the year. A workshop on “Understanding Chess Principles” was initiated by the club. Arjun M, an MS student of the Institute with a FIDE Chess rating of 1717, was the speaker for the event. To bring in more players into the game, an Inter Branch tournament was organised where all the departments of the Institute (CS, CH, CE, EE, ME) participated in a blitz team battle. The Electrical Engineering Department emerged victorious in the event, which had over 50 players representing their respective teams. The club participated and co-organised various inter-institute events like ALL INDIA CHESS LEAGUE, Quarantine chess tournaments, Inter -IIT Friendly Match with IIT Gandhinagar and IIT Dharwad, Chess 960 tournament- a variant Chess Tournament. Chess.com sponsored event, which had been conducted once every two months by IIT Bombay. The club



conducted an All India Online Chess Tournament during Tirutsava. This event had a great participation with over 150 players from institutions across India. This was held on Lichess Website, and players were proctored over a zoom call. A fun two player team variant called "Hand and Brain Chess" tournament was organised, which involved interaction of players over a zoom call. This promoted chess enthusiasm among the players even in online mode. Chaturanga Premier League (CPL) was organised with four teams: Bangalore Bishops, Mumbai Mates, Chennai Kings, and Delhi Dragons. Its format had close resemblance to that of IPL. Irani IITT Trophy was conducted between Andhra Pradesh and Telangana players.

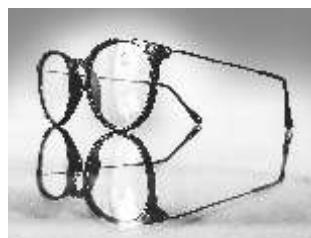
### **Artista - Art Club**

The art club conducted painting competitions for students in the academic year 2020-21 on the **artista** IITTP instagram handle. It conducted a doodle art competition and a Sanskriti Kala competition. Apart from these, the club conducted an introductory session for the freshers and collected art pieces from the students.



### **Photography and Film Club (PFC)**

The photography and films club (PFC) hosted a series of photography and video making competitions and conducted workshops on how to use Lightroom and Premiere Pro for the club members by various domain experts. The club released the Tirutsava Aftermovie 2020, the Fresher's Intro Video 2020 and a video showing a glimpse of the transit campus.



## Sargam - Music Club

Sargam, the music club, conducted a series of events in the academic year 2020-21, which included the introductory session for the fresher's, the 5<sup>th</sup> edition of the annual music event for the freshers, the republic day medley, the first ever online show by the club, solo singing competition for Tirutsava 2021, and 20+ hours of online sessions. In the online sessions discussions, fun and informative musical games, virtual meets with the alumni and impromptu composing were included.



## XCITE- Dance Club

The Xcite or the dancing club of IITT conducted choreography sessions for its club members every weekend during the past year. An introductory session was conducted for the fresher's, and they were encouraged to join the Xcite club. The club members also performed on Republic Day and Gandhi Jayanti on patriotic songs.



## Aranya - Trek Club

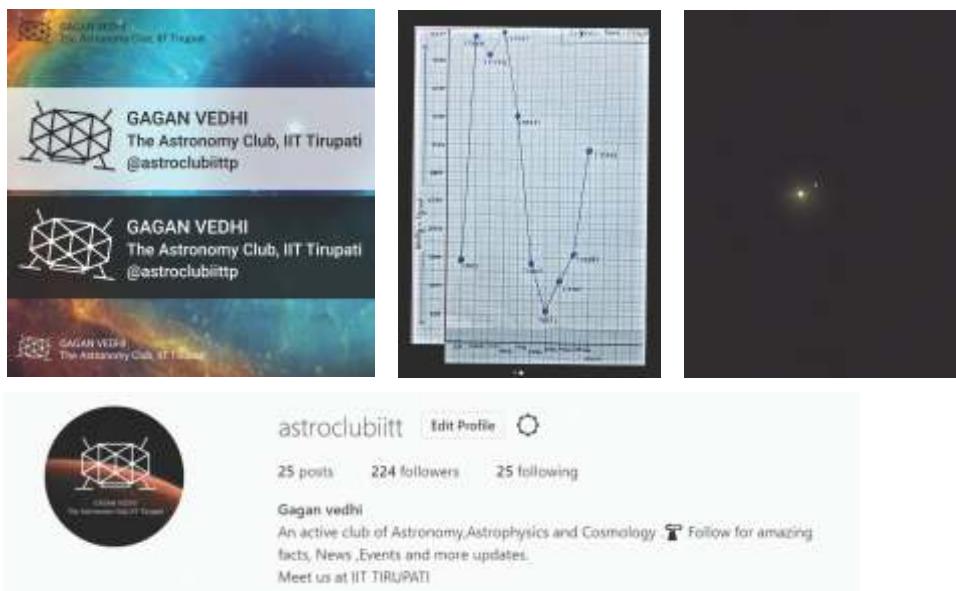
The core team of the club kept the club alive during the pandemic. The team held regular Zoom meetings to plan and execute the events to be conducted. The covid situation greatly affected club plans. However, the club conducted a quiz and an online scavenger hunt to introduce the students to some of flora and fauna of Andhra Pradesh. The students came to know about the exotic flora and fauna present in Andhra Pradesh. The prize was distributed among the top three winners of Scavenger Hunt.

## Digital Wizards: Coding Club

The Coding club was highly proactive despite the online medium. The first step of this was to have a good platform for communication and a logo. Discord was chosen for conducting workshops and to provide good content and material for topic wise studying and google classroom for communicating all the mails to registered club members. This club conducted four generic contests for all the students of the Institute under the series named Gear Up. Two additional contests were also held targeting the freshers to get a first-hand experience of competitive coding. A series of code discussion workshops were conducted twice a week starting from 24/12/2020 in coding platforms like Leetcode, Code-chef and discussion on topics like Trees, pointers, web and app development, GIT. The main aim of this series was to inculcate logical thinking and parallelly expose all the students to various flavours of difficulty levels and approaches. It also held a session on GSoC. During Tirutsava, it conducted multiple events like CTF, App and Web Development, Coding Event and Data Science Event. It also conducted a workshop to introduce some terms related to Inter IIT Tech Meet. Members of the Digital Wizard club also participated in the Saptang Lab's security vulnerability event and were placed at the 14<sup>th</sup> position.

## Gagan Vedhi - Astronomy Club

The club officially launched their new logo designed by Natesh Aravind S. The logo is a minimalistic line art of a satellite/ capsule ready to land (or take off) propulsively. Also, it is designed like a Truss specifically to emphasise the importance and the contribution of engineers for the advancement of astronomy and space technology. The club started a new Instagram handle @astroclubiitt to promote astronomy-related activities and facts to a wider audience and also to have a strong social media presence for the club. The club also has an official WhatsApp group, where members share resources. New information and headlines related to space news are immediately shared. The club has a dedicated team, Aurora, for handling the social media outreach. They had organised a special midnight quiz for Christmas and New Year. Two webinars were organised on Zoom on the Stellar Evolution and Basic Cosmology by Manish Tiwari and Akash Singh, respectively. Regular discussion sessions were initiated for team members. An article writing competition was organised, 'Universe of Time Travel', which attracted a good number of participants and the winning articles were featured in the club Instagram page. Astrophotographs taken by Bhasker Sri Harsha using his Telescope on the special astronomy phenomenon of the great conjunction of Saturn and Jupiter.



## Literary Club

The literary council was one of the first to shift its activities online during this period of Covid crisis by launching two Instagram pages to bring students together. Another online platform called film\_buffs\_iitt became the place for all student critics to aggregate and discuss their opinions, while Scribbles\_iitt provided a much-needed platform for the students to present their views. From poetry to quotes, from op-eds to rants, all were present as students adapted to the new normal, with both pages getting high interactions during lockdown. An online medium also meant increased collaboration between institutes. To take advantage of the same,

LAC conducted Eclectica, the first-ever inter-institute essay writing competition. The theme of the essay focused on cultural diplomacy and how India could use the same for its advantage. The event was a success, seeing participation from students all over. The biggest undertaking, however, was the launch of Udaan, IIT-Tirupati's first-ever student magazine. It was a massive effort, from conceptualisation to design to implementation, all completed in under three months. While Udaan was initially envisioned as a record of all student activities in the Institute, it turned out to be much more than that. Active participation from many talented people saw a wide variety of content being featured. From poems, articles, and stories to critical commentary and institute reporting, the wide variety of content we received for Udaan in its first edition shows us its potential to become the epicentre for student-made literary work.

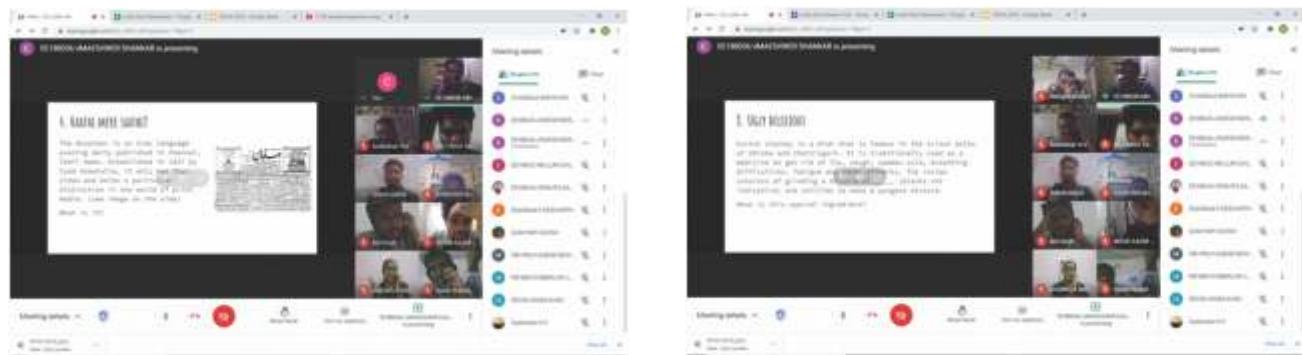
## Cultural Activities

Due to the pandemic, the broad spectrum of events that were formerly conducted on the campus was forced to shift online. The different cultural events were organised in the year 2020-2021. The activities of the cultural committee started with the celebration of the Onam festival. It was celebrated on the Zoom platform with the student community. The students played various games and had a fun time together even during these unprecedented times. Along with the Onam celebration, a traditional dress competition was held where students were awarded the title of Mr./Ms. Onam is based on the number of likes they got on their photo uploaded on the IITT cultural Instagram handle. The students performed a plethora of performances and recorded themselves on the occasion of Gandhi Jayanti, which was screened for everybody on YouTube. The limited number of students present in the permanent campus celebrated the festival of lights by making rangoli and lighting paper lanterns wishing for a better year ahead. A special talk was arranged for Pre-Christmas celebrations by Prof. Sambaiah from JNTU Pulivendula on the Zoom platform. The students performed cultural activities like singing, dancing and monologue on this occasion of national importance. The videos were recorded and screened on the Institute's YouTube channel.



## Quiz Club

The Quiz Club, from this academic year, began functioning as an independent club. In order to reach more students in Institute and get them interested in quizzing, "Trivial Pursuits" was started where interesting facts and reads from the web were creatively written to get the audience into quizzing. All the students warmly welcomed the club newsletter with positive feedback after it was initiated in the 6th semester. The club conducted a number of quiz contests like the E-Cell Biz-Edutainment Quiz in collaboration with the Entrepreneurship Cell, the Republic Day India quiz and the byte-sized quiz. An orientation programme was organised for freshers to give them an experience of Institute quizzing. It was a fun session where they were introduced to the various nuances involved in quizzing. The club has been conducting informal quizzing sessions every weekend from a plethora of topics including, but not confined to, general knowledge, sports, entertainment, business and technology, Music and Literature, among others. The club organised regular quizzing sessions throughout the lockdown, using platforms like Zoom and Google meet. In addition to this, the club members have participated in various online quizzing events like E-hilanth, Red brick Quiz fest etc.



## Debate Club

The Debate Club is one of the most active clubs in the Institute that intends to enhance the students' communication skills. The club has conducted Group Discussion Sessions to engage people and maintain an active public speaking culture. A Parliamentary Debate Session trial was organised using a new online platform – Discord. The freshers were introduced to the ethos of the debating club.

The third edition of the annual exposition competition, Standpoint, was held online as part of the Republic Day celebrations on January 26. Students presented a plethora of viewpoints on trending national issues.



The online semester provided several opportunities for the students to participate in debating events across the country. At Saarang 2021(IIT Madras fest), the debating team finished 9<sup>th</sup> out of 60 teams across the country, narrowly missing out on the Quarterfinals. The club formed a team to participate in the national debating circuit for the first time at the Varanasi Wordfest, IIT BHU. The team managed to win two out of five debates, finishing 5<sup>th</sup> on the overall speaker scores. For Tirutsava 2020, the club organised two events:

Technical Turncoats and JAM. Vaad-Vivaad 2021 provided the opportunity to experiment with different events. The first edition of an intra-Institute team debating event was organised. Eight teams of two students duked it out in fierce debates across a variety of topics.

## 9.6 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 the Faculty Advisor.

### FIT INDIA

#### **FIT India Freedom Run August 15 to October 2, 2020**

As per the Department of Higher Education, Ministry of Education guidelines, Fitness Club organised the 'Fit India Freedom Run' from August 15, 2020, to October 2, 2020. Freedom run was conducted thrice a week (on every Tuesday, Thursday and Saturday) for faculties, staff and students, and participants sent their recording and tracking through GPS.



#### **FIT India Cyclothon 2020**

FITNESS CLUB IIT Tirupati organised FIT India Cyclothon 2020 on December 13 (Sunday), December 20 (Sunday), December 27 (Sunday) at Yerpedu Transit Campus. The physical cycle run was conducted in the IIT Tirupati Transit campus between 8:00 am - 10:00 am on December 13 (Sunday), December 20 (Sunday), and December 27 (Sunday). Students/staff/faculty who were present on campus participated physically in a small group of 15 in 2-3 batches and followed COVID guidelines.



## New Year Meet with Director

Cultural Committee IIT Tirupati organised New Year Meet 2021 with the director on January 24 at Yerpedu Campus. All faculty and staff joined with their families. It was an excellent opportunity for newly joined faculty and staff members to get acquainted with the IIT Tirupati community and permanent campus. There was a walk around the Institute campus with the Director and recreational activities for students, faculty and staff members. People assembled for breakfast at the picnic spot near construction site and played games.



## Azadi Ka Amrit Mahotsav

'Azadi Ka Amrit Mahotsav' is an initiative of the Government of India to celebrate and commemorate 75 years of Independence of progressive India and the glorious history of its people, culture and achievements. The Prime Minister, Shri Narendra Modi inaugurated the 'Azadi Ka Amrit Mahotsav' from Sabarmati Ashram, Ahmedabad on March 12, 2021. The celebrations started 75 weeks before our 75th anniversary of Independence and will end on August 15, 2022.

In line with the same, IIT Tirupati began the celebrations of commemoration of 75 Years of India's Independence on March 19, 2021. Dr. Ajay Kumar, Cultural Advisor, delivered the welcome speech and released the 75-Week programme. The inaugural address was delivered by Prof. K.N. Satyanarayana, Director of the Institute. Prof. A. Raghuramaraju, Department of Humanities and Social Sciences, delivered a talk on 'The Uniqueness of Indian Freedom Movement'. The occasion highlighted the glimpse of the glory of Sanatan Bharat and also the glow of modern India, and provided the IIT Tirupati community an insight into the spirit of freedom struggle. The festival also emphasized the need to honour and take the stories of lesser-known freedom fighters to people.





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