2023-24 Odd semester

Volume 2 issue 19

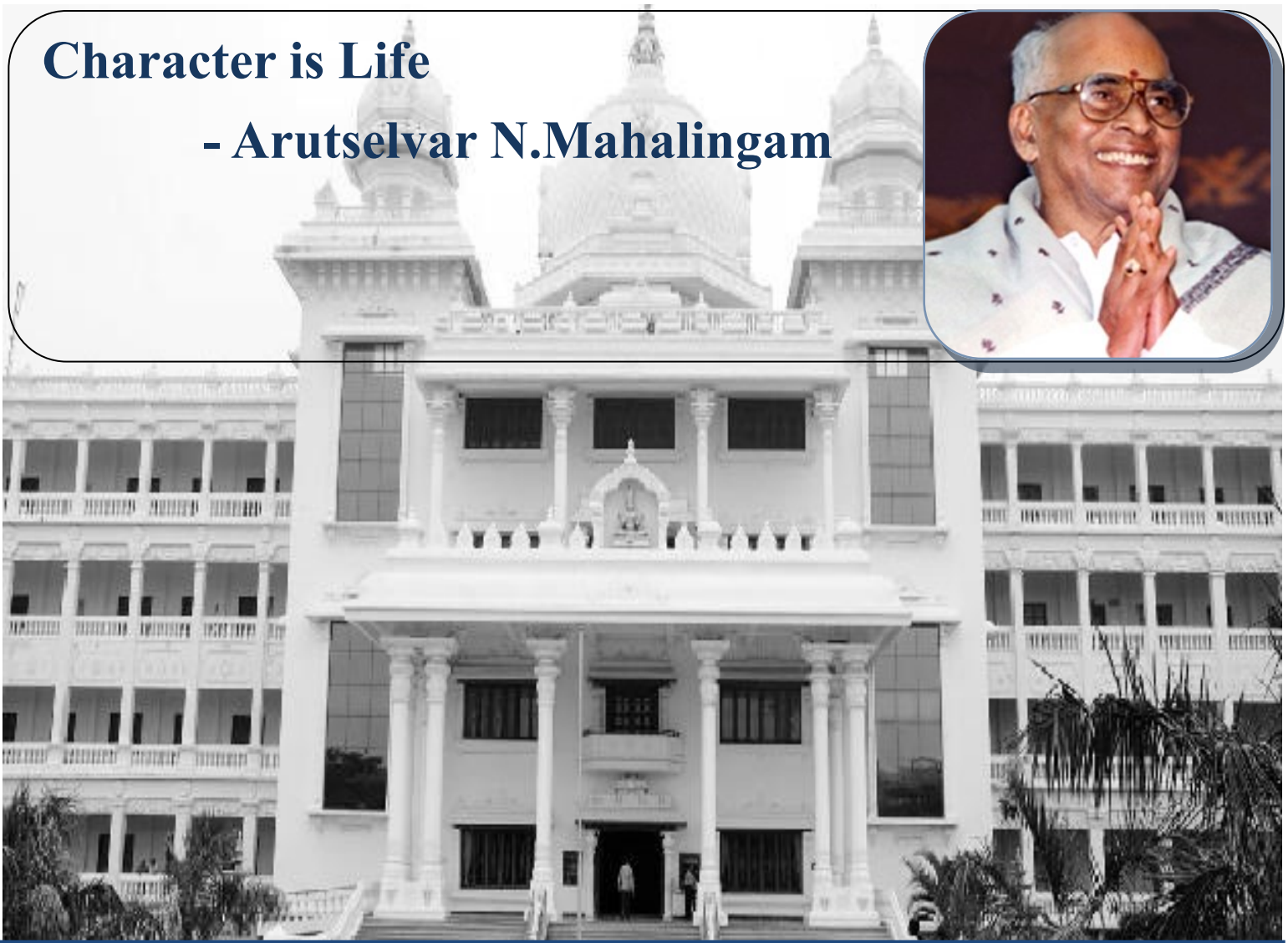
The Arrow

Department of Aeronautical Engineering Newsletter

KUMARAGURU
college of technology
character is life

Character is Life

- Arutselvar N.Mahalingam



HoD's Message:

This academic year has been a remarkable journey for our Aeronautical Department, marked by milestones like the inauguration of the Micro Gas Turbine Facility, success in the SAE Drone Challenge, impactful seminars, workshops, and value-added courses. These achievements, coupled with notable journal publications and inspiring lectures by eminent scientists, reflect our unwavering commitment to excellence in aerospace education and research. Let us continue to innovate, inspire, and soar to new heights together.

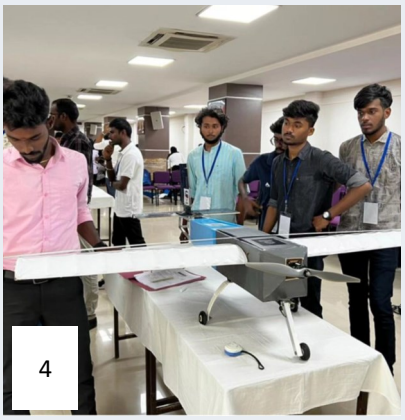
Warm regards,

Dr. M. Senthilkumar

Head of Department, Aeronautical Engineering

In this issue

3



4

5

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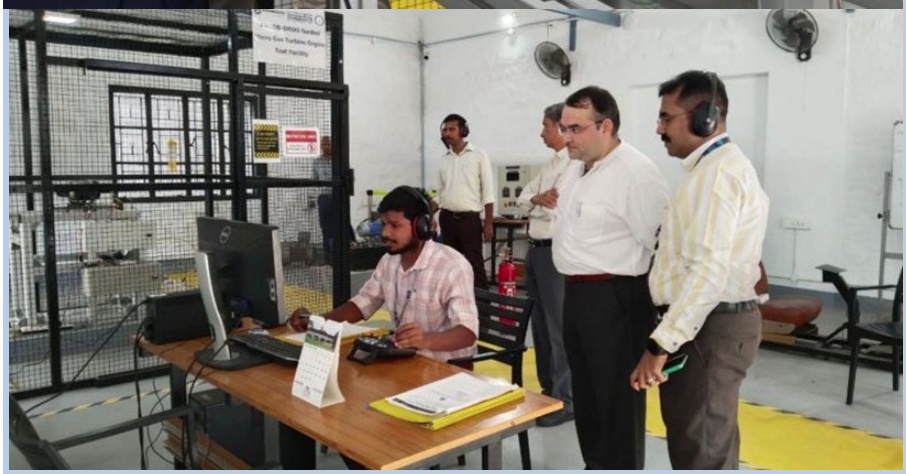
6

7

8

Inauguration of State-of-the-Art Micro Gas Turbine Facility	**3**
SAE Drone Development Challenge 2023	**4**
Webinar on Advances in Wind Turbine Design and Industry Trends	**5**
Seminar on Academia Collaboration in Aeronautical Research & Development	**6**
Workshop on CFD for NCC Air Wing Cadets	**7**
Value Added Course on Non-Destructive Techniques for Metal and Composite Materials	**8**



Inauguration of State-of-the-Art Micro Gas Turbine Facility

We are proud to announce that our Associate Professor, **Dr. Premkumar P.S.**, has secured a significant **AR&DB fund of ₹50 lakhs** to establish a state-of-the-art **micro gas turbine facility** on our campus. This facility, aimed at enhancing research and innovation in the field of aerospace engineering, was officially inaugurated by **Mr. P. Krishnan, Former Director, ADE, DRDO.**

Micro gas turbine engines, which are widely used in Unmanned Aerial Vehicles (UAVs) for multi-purpose applications, are at the forefront of modern aerospace technology. This facility will enable students and researchers to explore and develop miniature gas turbine engines, contributing to advancements in UAV systems and related fields.

With the support of the AR&DB fund, this cutting-edge facility will play a vital role in fostering research and innovation, offering hands-on experience and learning opportunities for students and faculty. The inauguration marks a significant milestone in our department's commitment to advancing aerospace technology and strengthening ties with defense research organizations.

Sabarish Shines in SAE Drone Development Challenge 2023

The Aeronautical Department congratulates **Sabarish**, a proud alumnus from the **2019 batch**, for his remarkable participation in the **SAE Drone Development Challenge 2023**. Competing as part of **Team Unicraft**, the team secured an impressive **8th place** in this prestigious competition held at **Rajalakshmi Engineering College, Chennai**, from **21st to 23rd July 2023**.

This achievement highlights Sabarish's dedication and technical expertise in UAV development. The department commends his efforts and wishes him continued success .

Dr. J. Darshan Kumar Completes Drone Remote Pilot Training

The Aeronautical Department proudly congratulates **Dr. J. Darshan Kumar** on successfully completing the **DGCA-approved Remote Pilot Training Course** on **21st August 2023**. The training, conducted by **Garuda Aerospace Private Limited**, a recognized Remote Pilot Training Organization, equips participants with advanced skills in UAV operation.

Aeronautical Department Visits CODISSIA Startup Thiruvizha 2023

Faculty members **Mr. Rajkumar** and **Mr. Naveen Kumar** accompanied a group of **10 students** from the Aeronautical Department to the **CODISSIA Startup Thiruvizha 2023**, held at **CODISSIA Trade Fair Complex, Coimbatore**, from **18th to 20th August 2023**.

This event, organized by **Startup TN** under the **Micro, Small, and Medium Enterprises Department, Government of Tamil Nadu**, aimed to position Tamil Nadu as a global hub for innovation and entrepreneurship. The students explored various startup initiatives, gaining valuable insights into business development and technological advancements in the aerospace sector and beyond.

The two-day program provided an excellent platform for students to understand the functioning of startups, network with innovators, and draw inspiration.

Webinar on Advances in Wind Turbine Design and Industry Trends

The Aeronautical Department hosted an insightful webinar on **"Advances in Wind Turbine Design and Latest Industry Trends"** on **Friday, 29th September 2023**. The session was conducted by **Mr. Jaikumar Loganathan**, Engineering Manager at **GE Vernova, Bengaluru**.

Mr. Jaikumar shared valuable knowledge on the latest advancements in wind turbine technology and the evolving trends in the renewable energy sector.

Seminar on Academia Collaboration in Aeronautical Research & Development

The Aeronautical Department, in collaboration with the **Kumaraguru Centre for Industrial Research & Innovation (KCIRI)**, organized a seminar on **"Academia Collaboration in Aeronautical Research & Development"** on **September 2, 2023**, at **Swami Vivekananda Hall, KCT**.

The event was held in association with the **Aeronautical Research and Development Board (DRDO)** and the **Aeronautical Society of India, Chennai Branch**.

The seminar was graced by **Dr. K. Rajalakshmi Menon**, Director of **CABS, DRDO**, as the Chief Guest. The session focused on strengthening collaborations between academia and industry to foster innovation in aeronautical engineering and defense technologies.

The event provided valuable insights into ongoing research initiatives and opportunities for future advancements.

Workshop on CFD for NCC Air Wing Cadets

The Aeronautical Department conducted a **Workshop on Computational Fluid Dynamics (CFD)** for **NCC Air Wing Cadets** on **October 3, 2023**. The workshop saw enthusiastic participation from around **50 cadets** from the **Air Wing Salem**. The session, led by **Mr. Vijayanandh**, introduced the cadets to the fundamentals and applications of CFD in aerospace engineering.

This initiative provided a unique opportunity for cadets to gain technical insights, enhancing their understanding of aerodynamics and computational tools. The department appreciates the cadets' active involvement and looks forward to more such interactive programs.

Second-Year Students Visit Airforce Station Sulur

On October 21, 2023, second-year students visited the Airforce Station at Sulur to witness an exciting airshow and explore the aircraft exhibits.

The visit provided students with valuable insights into the utility and applications of various aircraft and weapons used by the Indian Air Force. It also served as a motivational experience, inspiring many students to consider a career in the Air Force and contributing to a greater understanding of the nation's defense capabilities.

Seminar on Job Opportunities in DRDO and Advanced Technologies

The Aeronautical Department organized an enlightening seminar for students on **"Job Opportunities in DRDO and Applications of Advanced Technologies"**, delivered by **Dr. V. Natarajan**, Former Scientist 'G' and Director, Research & Innovation Centre, **DRDO**, at IIT Madras Research Park, Chennai.

Dr. Natarajan shared valuable insights into career prospects at DRDO and highlighted the role of cutting-edge technologies in aeronautics and defense research. His expertise inspired students, offering them a clearer understanding of opportunities in the field.

Value Added Course on Non-Destructive Techniques for Metal and Composite Materials

The Aeronautical Department conducted **Value Added Course** on **Advancements in Non-Destructive Techniques for Metal and Composite Materials"** from **6th to 9th October 2023** for third-year students. The course was led by **Mr. V. Krishnamoorthi**, Senior Inspection Engineer at **Engineers EDGE Institute of NDT, Coimbatore**.

The course focused on the latest advancements in **non-destructive testing (NDT)** methods, crucial for assessing the integrity of metal and composite materials used in aerospace and other industries. Students gained practical knowledge of various NDT techniques, such as ultrasonic testing, radiography, and eddy current.

Dr. Premkumar Invited as Guest of Honour for National Seminar

Dr. Premkumar P.S. was honored to serve as the **Guest of Honour** for the **Inauguration of the Aeronautical Engineering Association** and the **National Seminar on "Recent Developments in Air Traffic Management"**, held at **Hindusthan Institute of Technology, Coimbatore**, on **23rd August 2023**.

The seminar was organized in association with **The Aeronautical Society of India – Chennai Branch** and aimed to discuss advancements in air traffic management, a critical area in modern aviation. Dr. Premkumar's presence and insights added significant value to the event, inspiring students and faculty alike with his expertise in the field. The department congratulates Dr. Premkumar for representing our institution and contributing to the academic community.

Seminar on Electronic Warfare Strategies

The Aeronautical Department hosted an engaging seminar on **"Exploring Electronic Warfare: Strategies and Insights"** on **October 10, 2023**. The session was delivered by **Mr. P. Raghavendra Rao**, Former Scientist G and Associate Director, **Center of High Energy Systems and Sciences (CHESS), DRDO**.

Mr. Rao provided in-depth knowledge on the strategies, advancements, and real-world applications of electronic warfare, offering valuable insights into its critical role in modern defense systems. The department extends its gratitude to Mr. Rao for inspiring students with his expertise.

Webinar on Lightweight Metallic Materials for Automotive and Aerospace Applications

On **31st August 2023**, the Aeronautical Department hosted a **webinar** on **"Lightweight Metallic Materials for Automotive and Aerospace Applications"**, presented by **Dr. T.P.D. Rajan**, Senior Principal Scientist at the **Materials Science and Technology Division** of **CSIR-National Institute for Interdisciplinary Science and Technology (NIIST)**, Ministry of Science and Technology, Govt. of India, Trivandrum. Dr. Rajan discussed the importance of lightweight materials in improving performance and energy efficiency in both the **automotive** and **aerospace** sectors. He shared insights into the **development and application** of advanced metallic materials, highlighting their crucial role in meeting industry demands for sustainability and reduced emissions.

Chandrayaan: Unraveling Lunar Mysteries – A Journey of India's Success

On August 11, 2023, Dr. S.M. Ahmed, Payload Scientist at XDLINX Labs and former Scientist at VSSC, ISRO, delivered an insightful webinar titled "*Chandrayaan: Unraveling Lunar Mysteries – A Journey of India's Success.*"

Dr. Ahmed shared his extensive knowledge of India's Chandrayaan missions, emphasizing their groundbreaking contributions to lunar exploration, such as the discovery of water molecules on the Moon. He discussed the scientific achievements and technological advancements behind the missions, which have positioned India as a global leader in space research. Drawing from his experience at ISRO, Dr. Ahmed highlighted the challenges and milestones of the Chandrayaan missions, illustrating the teamwork and dedication that have driven India's space program to success. He also inspired young scientists to pursue careers in space exploration, stressing the importance of innovation and collaboration in advancing India's presence in space.

Lecture on Aircraft as a Dynamical System by Mr. Ramkumar, DRDO

On October 7, 2023, Mr. Ramkumar, Scientist from CABS, DRDO Bangalore, delivered an insightful lecture on "*Aircraft as a Dynamical System*" to third-year students.

He explained the dynamics of aircraft systems, focusing on stability, control, and aerodynamics, while showcasing their real-world applications in aviation and defense. The session provided students with valuable insights into aerospace technology, inspiring them to explore opportunities in this field.

Talk on the Importance of Higher Studies by Alumni Abinash Natrajan

On November 2, 2023, our esteemed alumni, Abinash Natrajan, delivered an inspiring talk on the *importance of higher studies* and the vast opportunities it offers.

Abinash shared his personal experiences and insights, encouraging students to consider further education as a pathway to greater career prospects. He highlighted various academic and professional opportunities available globally, motivating students to pursue their aspirations and enhance their skills through higher studies. The session provided valuable guidance, helping students understand the benefits of continuing their education beyond undergraduate studies.

List of Faculty activities during the 2023-24 Odd Semester

FDP Attended

1. Mr. G Raj Kumar attended FDP on Role of 3D Printing in Digital Manufacturing from 03-07-2023 to 07-07-2023, 5days Online by Anurag University
2. Dr PS Premkumar attended Refresher course on “Refresher Course Advanced Research Methodology” from 21-06-2023 05-07-2023 14 days Online conducted by "Teaching Learning Centre Ramanujan College, New Delhi"
3. Mr. Muthukumar S attended FDP on Computational Thinking and Problem Solving from 24-07-2023 to 28-07-2023, 5days at Amrita university, Computer Science department.
4. Dr. Senthil kumar S attended FDP on Computational Thinking and Problem Solving from 24-07-2023 to 28-07-2023, 5days at Amrita university, Computer Science department.

Papers reviewed

1. Dr P S Premkumar reviewed the paper titled “Study of wedge-shaped Jet tabs for effective Thrust vector control in Supersonic vehicles” from Springer Aerospace systems journal.
2. Mr. Arul Prakash R reviewed the paper titled “Lift augmentation on a tiltrotor wing using the combination of vortex generators and Gurney flap” from the International Journal of Aerospace Engineering Published by Hindawi journal.
3. Dr M Senthil Kumar reviewed the paper titled “A New big-and-small bi-wing Layout to Achieve Self-Adjusting Angle-of-Attack” from International Journal of Aerospace Engineering - Published by Hindawi an International journal.
4. Dr M Senthil Kumar reviewed the paper titled “A Comprehensive Review of Innovative Blade Design Strategies for Enhancing Wind Power Generation Efficiency towards Sustainable Energy” from Sustainable Energy Technologies and Assessments journal

List of Faculty activities during the 2023-24 Odd Semester

5. Dr M Senthil Kumar reviewed the paper titled "Modelling and Energy Optimisation of a Combined Gas Plant and Combined Cycle Plant using a Multi-Layer Perception Regression Method" from International Journal of Aerospace Engineering - Publisher: Hindawi an international journal.
6. Dr M Senthil Kumar reviewed the paper titled "Effect of Bogie Cavity End Wall Inclination on Flow Field and Aerodynamic Noise in the Bogie Region of High-Speed Trains" from CMES-Computer Modeling in Engineering & Sciences journal.
7. Dr M Senthil Kumar reviewed the paper titled "Lift augmentation on a tiltrotor wing using the combination of vortex generators and Gurney flap" from International Journal of Aerospace Engineering Published by Hindawi an international journal.
8. Dr M Senthil Kumar reviewed the paper titled "YOLO-based Detection of Halyomorpha halys in Orchards Using RGB Cameras and Drones" from Computers and Electronics in Agriculture journal.
9. Dr Premkumar PS reviewed "Effect of Localized Pressure Depression and Rain on Aerodynamic Characteristics of MALE UAV" in Defence science Journal
10. Dr M Senthil Kumar reviewed "Vibration Damper Design and Additive Manufacturing for Unmanned Aerial Vehicles Simulation modelling Practice and Theory International Scopus / WoS
11. Mr. Rajkumar G reviewed "Vibration Damper Design and Additive Manufacturing for Unmanned Aerial Vehicles" in Simulation Modelling Practice and Theory International Journal, SCI
12. Dr Senthilkumar M reviewed "Flexible heat integration system in first-/second-generation ethanol production via screening pinch-based method and multiperiod model" in Energy Journal International, SCI
13. Dr M Senthil Kumar reviewed the paper titled "A nylon-based 3D printed solid propellant microthruster" from International Journal of Aerospace Engineering - Published by Hindawi an International journal

List of Faculty activities during the 2023-24 Odd Semester

Papers Published

1. C. Y. Foo, P. Rajendran, N. Aswini, V. Raja, E. Natarajan and C. K. Ang, "A Fast-Compressive Tracking Integrated with Differential Evolution to Optimize Object Tracking Performance," 2023 IEEE 19th International Conference on Automation Science and Engineering (CASE), Auckland, New Zealand, 2023, pp. 1-6, doi: 10.1109/CASE56687.2023.10260655.
2. C. H. Tan, P. Rajendran, V. Raja and E. Natarajan, "Hybrid Fuzzy C-Means Using Particle Swarm Optimization (PSO) and Differential Evolution (DE) for Image Segmentation," 2023 IEEE 19th International Conference on Automation Science and Engineering (CASE), Auckland, New Zealand, 2023, pp. 1-6, doi: 10.1109/CASE56687.2023.10260372.
3. R. Vijayanandh, R. Manivel, R. Arul Prakash, G. Raj Kumar, R. Raffik, Parvathy Rajendran, Harinadh Vemanaboina; Comparative computational analyses on various aerospace materials under lower thermal loads by using advanced coupled engineering approach. AIP Conf. Proc. 27 October 2023; 2869 (1): 040029. https://doi.org/10.1063/5.0168307
4. Raja, V, Jayakumar, SS, Saravana Mohan, H, Rajendran, P, Stanislaus Arputharaj, B, & Madasamy, SK. "Design and Multi-Perspective Investigations on Aeroacoustic Noise Reduction Technologies for Anti-Drone Propeller." Proceedings of the ASME 2023 Gas Turbine India Conference. ASME 2023 Gas Turbine India Conference. Bangalore, India. December 7–8, 2023. V001T07A002. ASME. https://doi.org/10.1115/GTINDIA2023-117639
5. Muniswaran, S, Raja, V, Rajapandi, R, Rajendran, P, Mageswaran, R, Madasamy, SK, & Stanislaus Arputharaj, B. "An Innovative Approach for the Validation of Computational Structural Outcomes of Octocopter's Connection Arms Through Advanced Finite Element Methods." Proceedings of the ASME 2023 Gas Turbine India Conference. ASME 2023 Gas Turbine India Conference. Bangalore, India. December 7–8, 2023. V001T07A001. ASME. https://doi.org/10.1115/GTINDIA2023-115175

List of Faculty activities during the 2023-24 Odd Semester

Papers Published

6. R. Vijayanandh, R. Manivel, R. Arul Prakash, R. Raffik, G. Raj Kumar, J. Darshan Kumar, Harinadh Vemanaboina; Comprehensive thermal characteristic investigations on various lightweight materials under higher thermal load through fluid-thermal interaction analysis. AIP Conf. Proc. 27 October 2023; 2869 (1): 040030. https://doi.org/10.1063/5.0168308

7. R. Vijayanandh, R. Manivel, G. Raj Kumar, R. Arul Prakash, R. Raffik, Parvathy Rajendran, A. R. Babu; Structural characteristic investigations on propeller of UAVs under different aerodynamic loading conditions: A comprehensive computational approach. AIP Conf. Proc. 27 October 2023; 2869 (1): 040031. https://doi.org/10.1063/5.0168309

8. R. Manivel, M. Naveenkumar, D. R. Sharan, R. Saravanan, R. Vijayanandh, C. Vijaya Bhaskar Reddy; Design and simulation of cooling and heating system for buildings using solar thermal systems. AIP Conf. Proc. 27 October 2023; 2869 (1): 040034. https://doi.org/10.1063/5.0168266

9. Sabari Thangavel, Mohamed Aashik Jaffar Ali, Raj Kumar Gnanasekaran, Beena Stanislaus Arputharaj, Arunkumar Karuppasamy, Hussein A. Z. AL-Bonsrulah, Parvathy Rajendran, Vijayanandh Raja, Devendhiran Soundararajan, Krishnakumar Kalaivani Muthuramalingam, "Comprehensive Thermal Characteristic Investigations on Hemp - and Jute-Based Nature Fibre-Reinforced Composites for Engineering Applications through Coupled and Verified Engineering Approaches", Journal of Engineering, vol. 2023, Article ID 4031238, 18 pages, 2023.

10. Ajith Pisharam, A, Raja, V, Raji, AP, & Madasamy, SK. "Improving the Stage Efficiency of Axial Compressors by Vane Rotation." Proceedings of the ASME 2023 Gas Turbine India Conference. ASME 2023 Gas Turbine India Conference. Bangalore, India. December 7–8, 2023. V001T01A004. ASME. https://doi.org/10.1115/GTINDIA2023-118396

List of Faculty activities during the 2023-24 Odd Semester

Papers Published

11. Musavir Bashir, Parvathy Rajendran, Ambareen Khan, Vijayanandh Raja and Sher Afghan Khan, Numerical investigation of turbulence models with emphasis on turbulent intensity at low Reynolds number flows, Advances in Aircraft and Spacecraft Science, Vol. 10, No. 4 (2023) 303-315.

12. Vijayalakshmi, Selvaramanan, Sekar, Aravindha Vasan, Hassan, Ahmed Mohamed, Arputharaj, Beena Stanislaus, Jayakumar, Shyam Sundar, AL-bonsrulah, Hussein A. Z., Rajendran, Parvathy, Madasamy, Senthil Kumar, Karuppasamy, Arunkumar and Raja, Vijayanandh. "Multi-perspective structural integrity-based computational investigations on airframe of Gyrodyne-configured multi-rotor UAV through coupled CFD and FEA approaches for various lightweight sandwich composites and alloys" REVIEWS ON ADVANCED MATERIALS SCIENCE, vol. 62, no. 1, 2023, pp. 20230147.

13. R. Vijayanandh, G. Raj Kumar, R. Rajkumar, R. Raffik, J. Darshan Kumar, R. Arul Prakash, Harinadh Vemanaboina; Computational structural investigations on the various aerospace materials based conventional and hybrid composites: Comprehensive analyses. AIP Conf. Proc. 27 October 2023; 2869 (1): 040028. https://doi.org/10.1063/5.0168265

KUMARAGURU
college of technology
COIMBATORE – 641 049

Department of Aeronautical Engineering

INSTITUTE VISION

The vision of the college is to become a technical university of International Standards through continuous improvement.

INSTITUTE MISSION

Kumaraguru College of Technology (KCT) is committed to providing quality Education and Training in Engineering and Technology to prepare students for life and work equipping them to contribute to the technological, economic and social development of India. The College pursues excellence in providing training to develop a sense of professional responsibility, social and cultural awareness and set students on the path to leadership.

DEPARTMENT VISION

To attain excellence and global reputation in Aeronautical Engineering Education and Research.

DEPARTMENT MISSION

M1: The department is committed to provide quality education in Aeronautical Engineering to students to build their career and do quality research and thus contribute to the field of Aviation and Aerospace.

M2: The department aims to prepare students for their higher studies and research to contribute to the advanced technological needs of Aeronautical engineering.

M3: To encourage faculty to update their knowledge and teaching-learning process through continuous learning.

M4: To undertake inter-disciplinary research to contribute and support the industry.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

The Program Educational Objectives (PEOs) of Aeronautical Engineering Undergraduate Program are to prepare the students:

I. To pursue a successful profession in leading organizations.

II. To pursue postgraduate degrees and conduct research at leading technological universities to contribute to the advancement in the field of Aviation and Aerospace industries.

III. Continue their professional development by utilizing educational and career building opportunities through their employer, educational institutions, or professional bodies.

PROGRAM OUTCOMES (POS)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

and systems.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commitment to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life -long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOS):

PSO1: Apply fundamental principles of Aerodynamics, Structures, Propulsion, Materials, and Avionics to provide solutions to aerospace and non-aerospace industrial problems.

PSO2: Use the software packages in the design, manufacturing, testing and maintenance of aeronautical and aerospace based components