ISSUE: 2 | VOLUME: 3 | YEAR: 2022-23

St. XAVIER'S CATHOLIC COLLEGE OF ENGINEERING (Autonomous)

Chunkankadai, Nagercoil - 629003
Kanyakumari District, Tamil Nadu

Approved by AICTE & Affiliated to Anna University, Chennai
Accredited with 'A' Grade by NAAC
UG Programs(ECE, EEE, Mech, Civil, CSE & IT) Accredited by NBA
Anna University Recognized Research Institute
Recognized under section 2(f) & 12(B) of UGC Act, 1956
UG Programs(ECE, EEE, Mech, Civil, CSE & IT),
MBA & MCA Programs Permanently Affiliated

News Letter

Department of Mechanical Engineering

"The object of education is to prepare the young to educate themselves throughout their lives."

Department Vision

Developing technically sound mechanical engineering professionals to serve the global community with academic excellence and innovative research

Department Mission

M 1 To transform the students into mechanical technocrats with clear conceptual understanding and hands-on experience

M 2 To integrate the fundamentals with recent concepts through technical gatherings, research and industry interactions

M 3 To impart managerial quality and develop soft skills through leadership and personality development programs

M 4 To inculcate core human values through ethical practices and inspire them to serve the society

HoD's Message

It gives me immense pleasure to present this edition of our departmental newsletter, showcasing the remarkable research contributions and academic achievements of our faculty and students. The continuous pursuit of knowledge and innovation remains the cornerstone of our department, and this newsletter serves as a testament to our commitment to excellence in research, industry collaboration, and academic growth.

The recent publications by our esteemed faculty members highlight groundbreaking work in diverse fields, including material science, tribology, composite materials, biofuel technology, and sustainable energy solutions. Their contributions to reputed international journals underscore the depth and impact of our research endeavors. Furthermore, the involvement of our faculty in international collaborations, faculty exchange programs, and interdisciplinary research initiatives enhances our global academic footprint.

I encourage our students and young researchers to draw inspiration from these achievements and continue their quest for knowledge and discovery. Let us work together to uphold our tradition of academic excellence and contribute meaningfully to the scientific and technological advancements of society.

Wishing you all continued success in your academic and research endeavors.

ABOUT THE DEPARTMENT

The Department of Mechanical Engineering is dedicated to fostering excellence in education, research, and industry collaboration. Established with a vision to equip students with strong technical knowledge and practical skills, the department offers a comprehensive curriculum that blends theoretical concepts with hands-on experience. With a team of highly qualified faculty members, laboratories, and research facilities, the department actively engages in cutting-edge research areas such as advanced materials, thermal engineering, renewable energy, and automation. The department emphasizes holistic development through industry partnerships, faculty exchange programs, and student-centric activities, ensuring graduates are well-prepared to meet the challenges of the evolving engineering landscape.

Editors

Dr. G. Antony Miraculas
Dr. Y. Balto
Mr. Felix P (III Mech.)
Ms. Joshi Sieana E (IV Mech.)

Faculty Research Excellence: Recent Publications

The Department of Mechanical Engineering at St. Xavier's Catholic College of Engineering continues to set high standards in research and innovation. The faculty members have published numerous high-impact research papers in prestigious journals indexed in Web of Science, Scopus, and SCI, showcasing their expertise in various domains. These publications reflect the department's dedication to advancing knowledge, developing sustainable technologies, and addressing critical challenges in the fields of mechanical engineering, energy management, materials science, and artificial intelligence. Below are the detailed highlights of the faculty's recent publications:

Influence of Heat Treatment on Microstructure and Mechanical Properties

Dr. G. Shanthos Kumar along with his co-authors, conducted an in-depth investigation on the influence of heat treatment on the microstructure and mechanical properties of pulsed Nd: YAG laser welded dissimilar sheets of Hastelloy C-276 and Monel 400. The research, published in Physica Scripta (IOP), highlights how heat treatment impacts the microstructural characteristics and mechanical strength of the welded joints. This study offers valuable insights into improving the performance of dissimilar metal welds, which is essential for industrial applications that require high corrosion resistance and strength.

Effect of Silanized Cassava Periderm Biosilica on Composite Properties

Mr. T. Michel Raj along with his co-authors, explored the enhancement of mechanical, V-notch rail shear, wear, and UL94 flammability properties of spinach stem fiber epoxy composites by incorporating silanized cassava periderm biosilica. Published in Biomass Conversion and Biorefinery (Springer), this study demonstrates how biosilica derived from cassava periderm improves the composite's thermal and mechanical behavior, offering sustainable solutions for developing eco-friendly composite materials.

Optimal Sizing of Solar-Wind Hybrid Energy System Using Modified Dragonfly Algorithm

Mr. D.X. Tittu George, Dr. R. Edwin Raj, and Dr. Ananth Rajkumar proposed an optimized approach for sizing solar-wind-based hybrid energy systems using a modified dragonfly algorithm. Their research, published in Energy Conversion and Management (Elsevier), addresses the challenges of maximizing the efficiency and cost-effectiveness of renewable energy systems for institutions. The proposed algorithm effectively balances power generation and demand, making it a suitable solution for large-scale institutional energy management.

Effect of Heat Treatment on Hardness Behaviour of Aluminium 6061 Alloy

Mr. D.X. Tittu George & Mr. A. Anitto Joe Xavier investigated the impact of heat treatment on the hardness behavior of Aluminium 6061 alloy. The research, published in Materials Today: Proceedings (Elsevier), explores how heat treatment processes such as solutionizing and aging affect the hardness and mechanical strength of the alloy. The findings provide crucial data that can enhance the alloy's performance in structural and automotive applications.

Tribological and Machining Characteristics of AA7075 Hybrid Composites

Mr. M. L. Ajin and Dr. Jebeen Moses conducted a study to optimize the tribological and machining characteristics of AA7075 hybrid composites using a modified PROMETHEE approach. Published in Material Express (IOP), this research emphasizes the significance of improving the tribological properties of hybrid composites to enhance their wear resistance and machining efficiency. The findings offer promising insights for manufacturing industries focusing on lightweight yet durable materials.

Development of Novel Methodology for Gene Identification-Based Classification of Leukemia Disorder

Dr. Ananth Rajkumar & Dr. M. Gerald Arul Selvan developed an innovative methodology for gene identification-based classification of leukemia disorder. Their study, published in Research on Biomedical Engineering (Springer), introduces a classification model that enhances the accuracy of leukemia diagnosis using gene-based data. This contribution holds potential for

revolutionizing biomedical diagnostics and personalized healthcare.

Critical Thinking and Emotional Intelligence in Artificial Intelligence Transition

Dr. M. Felix Xavier Muthu along with his co-authors, explored the critical role of emotional intelligence and critical thinking in the transition from human intelligence to artificial intelligence. Their work, published in REST Journal on Data Analytics and Artificial Intelligence (REST Publisher), examines how these human attributes can complement artificial intelligence systems, ensuring a more balanced and ethical integration of AI into decision-making processes.

Sustainable Biodiesel Synthesis from 2G Feedstocks Using Magnetic Nanocatalyst

Dr. Ajith J. Kings along with his co-authors, conducted a comparative experimental study using response surface methodology (RSM) to optimize biodiesel synthesis from different second-generation (2G) feedstocks using a magnetic nanocatalyst (CaFe2O4). Published in Environment, Development and Sustainability (Springer), this research provides a sustainable and efficient approach to biodiesel production, addressing the global need for renewable energy sources.

Process Optimization of Lipid Extraction from Microalgae

Dr. Ajith J. Kings & Dr. R. Edwin Raj focused on optimizing the process of lipid extraction from microalgae Aphanothece halophytica under wet and dry conditions. Their work, published in Bioenergy Research (Springer), highlights innovative approaches for enhancing lipid yield, which can significantly contribute to the development of bioenergy technologies.

Enhancement of Biodiesel Production Using Magnetic Nanocatalyst

Dr. Ajith J. Kings explored the enhancement of biodiesel production using a magnetic nanocatalyst (CrFe2O4) derived from mixed waste cooking oil. Their study, published in Energy and Environment (Sage), demonstrates the efficacy of using magnetic nanocatalysts in biodiesel production, making the process more sustainable and efficient.

Comprehensive Review of Biodegradable Sensors

Mr. V. T. Vijumon along with his co-authors, conducted a comprehensive review on biodegradable sensors and their applications in biomedical and environmental monitoring. Published in Measurement (Elsevier), this review highlights the advancements in biodegradable sensor technology and its potential to address global environmental challenges.

Corrosion Behaviour of Aluminium 6061 Alloy in Acidic Solution

Dr. M. Gerald Arul Selvan & Mr. P. Jose Aloysius, evaluated the effect of acidic solution and immersion duration on the corrosion behavior of Aluminium 6061 alloy. Their findings, published in Materials Today: Proceedings (Elsevier), contribute to understanding how environmental factors influence the durability and lifespan of aluminium alloys, thereby helping industries enhance the corrosion resistance of materials.

The Department of Mechanical Engineering continues to demonstrate its commitment to excellence in research by contributing to a wide range of scientific fields, including materials science, renewable energy, artificial intelligence, and biomedical engineering. These publications not only reinforce the department’s reputation but also create a strong foundation for future research and industry collaborations. The faculty's innovative work inspires the next generation of engineers to explore new avenues in science and technology.

Faculty Exchange Program: International Research Collaboration

Dr. Ananth Rajkumar, a distinguished faculty member of the Department of Mechanical Engineering, was selected as the First-Level Doctoral Investigator by the Mechanical Department of the University of Aveiro, Portugal, Europe. As part of this prestigious program, he is currently collaborating with the research group at the University of Aveiro and will remain there until June 2023 to contribute to various cutting-edge research projects.

During his tenure in Portugal, Dr. Ananth Rajkumar is actively involved in advancing research in three key areas:

- Development of Plastronics using In-Mould Electronics
- Development of Biodegradable Composites
- Carbon Nanotube-Based Composites

A notable component of this collaboration involves the development of biodegradable composites which is being carried out at St. Xavier's Catholic College of Engineering. This segment of the research is led by Dr. Ajith J. Kings and Dr. Gerald Arul Selvan, who are contributing significantly to the project.

The collaboration between St. Xavier's Catholic College of Engineering and the University of Aveiro has been formalized through the signing of a MoU between the two institutions. As a result of this partnership, a joint conference paper titled "Development of Statistical Model and Experimental Validation of Mechanical Behavior of Fragrant Screwpine Fiber Reinforced Polyester" has been submitted to "TECHMA2023 – 6th International Conference on Technologies for the Wellbeing and Sustainable Manufacturing Solutions." The conference took place on May 25th and 26th, 2023, at the University of Aveiro, Portugal.

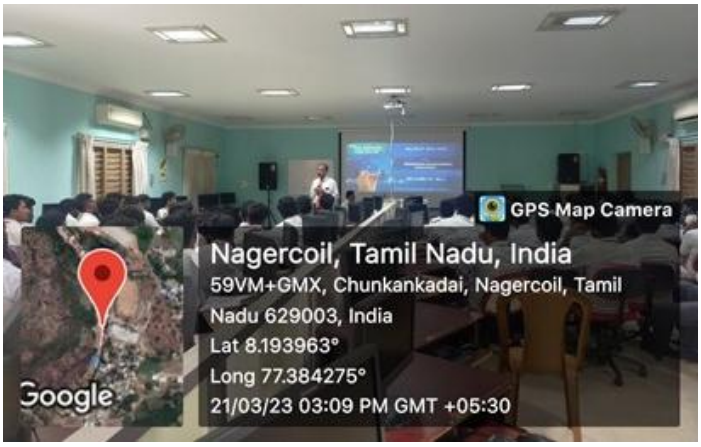
This faculty exchange program highlights the department's commitment to fostering international collaborations, promoting innovative research, and contributing to the global advancement of sustainable technologies.

Association Activity

Seminar on Career Guidance and Placement Training

The Mechanical Engineers' Guild of Xavier's (MEGX), the association of the Department of Mechanical Engineering, successfully organized two insightful seminars focusing on "Career Guidance and Placement Drive Training." These sessions aimed to equip the final-year and third-year students with valuable knowledge about career opportunities and international prospects.

The first seminar was conducted on March 21, 2023 (Wednesday), from 10:00 AM to 12:00 PM. The session was led by Dr. C. Selvamony, MD, ACS International Educational Consultancy, who provided valuable insights and motivated the students by discussing the purpose and procedures involved in emigration to countries like New Zealand and Canada. His presentation encouraged the students to explore global career opportunities and prepare for international placements.



The second seminar took place on March 29, 2023 (Wednesday), from 11:00 AM to 12:00 PM. The session was delivered by Er. B. Beniesh, B.E., Design Engineer, Task and Drafting Company. His session focused on equipping the students with the essential skills and knowledge required for placement drives and industry expectations. The seminar proved to be highly beneficial, helping the students enhance their understanding of career readiness and professional development.

Both sessions provided valuable exposure and practical insights, empowering the students to navigate their career paths effectively and achieve their professional goals.

Workshop on CAD/CAM/CAE Orientation: Enhancing Design and Manufacturing Skills

The Department of Mechanical Engineering organized an orientation workshop on CAD/CAM/CAE for third-year students on March 7, 2023. The session was conducted by Er. M. V. Magesh, Technical Head, CAD POINT, Marthandam, who provided comprehensive training on the fundamental concepts and applications of CAD

(Computer-Aided Design), CAM (Computer-Aided Manufacturing), and CAE (Computer-Aided Engineering).

The workshop introduced students to the core functionalities of industrial design software, which integrates design, analysis, and manufacturing processes. CAD focuses on product design, covering aspects such as appearance, component positioning, and material selection. CAE deals with simulation and analysis to ensure product reliability and performance, while CAM facilitates 3D prototyping and fabrication, bridging the gap between design and production.

The training was conducted in a highly interactive and easy-to-understand manner, enabling students to grasp the basics quickly. Starting with simple concepts, the session gradually progressed to more complex design tasks, allowing students to develop intricate models with confidence. The hands-on practice sessions enabled participants to create and refine multiple designs, enhancing their proficiency in CAD/CAM/CAE applications.

The workshop witnessed enthusiastic participation from 77 students, who actively engaged in the sessions and demonstrated keen interest in mastering the design processes This engaging and informative workshop provided students with a solid foundation in CAD/CAM/CAE, equipping them with essential skills to excel in the evolving landscape of industrial design and manufacturing.

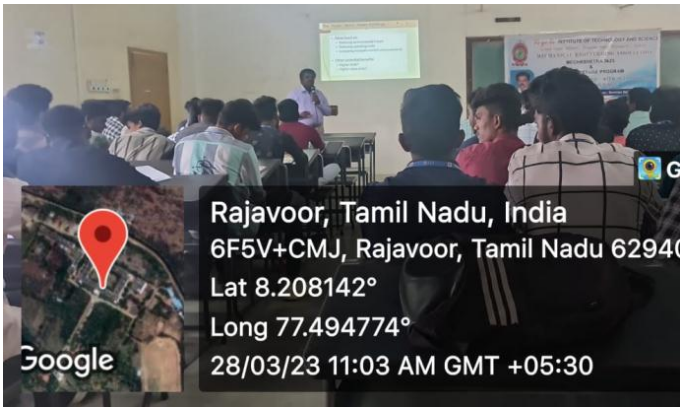
Consultancy Work: Project on Green Building Applications

Four final-year mechanical engineering students from Stella Mary's College of Engineering — V. A. Abilash, V. Nishanth, M. Santhosh, and M. Nikesh — successfully completed their final-year project at the Mechanical Engineering Laboratory of St. Xavier's Catholic College of Engineering (SXCCE). The project, titled "Mechanical Property Evaluation of Modified Bricks for Green Building Application," was conducted under the expert guidance of Dr. Y. Balto, Assistant Professor, Department of Mechanical Engineering.

As part of the consultancy arrangement, the students utilized the institution's laboratory facilities to carry out extensive experimental analysis related to their project.

Guest Lecture on Energy-Efficient Building Design

Dr. Antony Forster Raj, Assistant Professor, Department of Mechanical Engineering, was invited as the Chief Guest and Resource Person for the Mechanical Engineering Department Association Inauguration held at Loyola Institute of Technology and Science on November 28, 2023. During the event, he delivered an insightful technical talk on "Energy-Efficient Building Design," providing valuable knowledge to the mechanical engineering students on sustainable building practices and innovative design concepts.



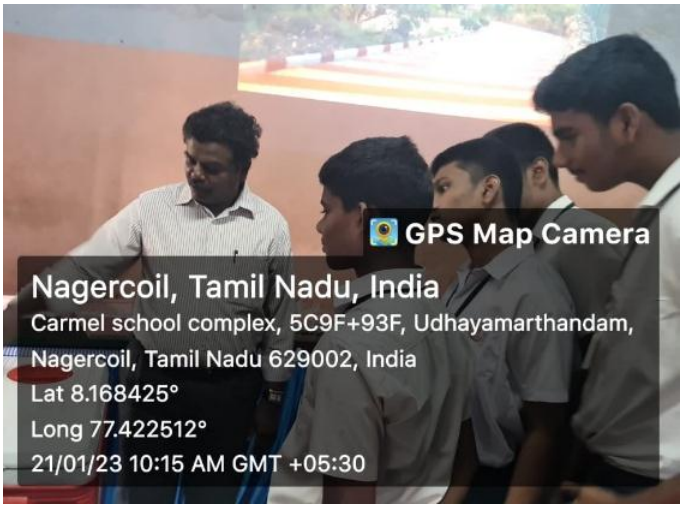
Student Achievements: Recognition at Zonal Quarter Finals

We are delighted to announce that Mr. Allan Gonsalves and Mr. Akash Raj, members of the ISHRAE Student Chapter from our department, emerged as runners-up in the zonal quarter-finals of "A-Quest," a prestigious technical competition conducted by ISHRAE Madurai Chapter. The event took place at Sethu Institute of Technology, Madurai, on February 8, 2023.

Their commendable performance reflects their technical expertise and dedication, bringing pride and recognition to the department and the institution.

Exhibition of Mechanical Projects at Carmel Higher Secondary School's Centenary Celebrations

The Department of Mechanical Engineering actively participated in the Centenary Celebrations of Carmel Higher Secondary School by showcasing five innovative mechanical engineering projects during the event held on January 20th and 21st, 2023. This exhibition provided an excellent platform for demonstrating the creativity, technical knowledge, and problem-solving capabilities of the students to a diverse audience, including school students, teachers, parents, and distinguished guests.



The Department of Mechanical Engineering takes immense pride in contributing to the success of Carmel Higher Secondary School's centenary celebrations and looks forward to continuing its efforts in providing platforms for students to excel and showcase their talents.

Educational Tour for Final-Year Students

The Department of Mechanical Engineering successfully organized an industrial visit cum educational tour for 40 final-year students from Sections A and B, accompanied by three faculty members.

The group embarked on their journey from Nagercoil by train on the evening of February 5, 2023, and reached Hosur, Tamil Nadu, the following day. The first highlight of the tour was a visit to Wonderla, a renowned amusement park where the students enthusiastically participated in various adventure rides and activities, setting an energetic and exciting tone for the journey.

After the thrilling experience at Wonderla, the group proceeded by bus to the picturesque Coorg district of Karnataka. The mesmerizing landscapes of Coorg, with its pristine mountains and lush valleys, left the students captivated. A visit to Abbey Falls offered a breathtaking view of cascading waters amidst aromatic coffee and spice plantations, providing a perfect blend of natural beauty and tranquility.

The exploration continued with a visit to Dubare Elephant Camp, a natural island formed by the Cauvery River. Here, the students trekked through the camp, observing elephants in their natural habitat. This exciting encounter with wildlife sparked enthusiasm and curiosity among the participants, giving them a firsthand experience of ecological diversity.

The journey concluded with a serene visit to the Namdroling Monastery in Bylakuppe, Karnataka. The monastery's calm ambiance, adorned with vibrant murals and intricate architecture, offered the students a moment of reflection and spiritual calm, providing a peaceful end to the tour.

This well-structured educational tour offered the students a unique opportunity to experience a blend of adventure, nature, and culture, enhancing their understanding beyond the confines of the classroom. The successful execution of this tour reflects the department's commitment to providing holistic learning experiences and fostering curiosity, teamwork, and appreciation for diverse environments.

Club/Cell Activities: Outreach Initiatives and SAE Inauguration

Outreach Activities: Spreading Joy and Awareness

The Outreach Team of St. Xavier's Catholic College of Engineering conducted a series of impactful activities aimed at fostering community engagement and promoting education.

Visit to Ambedkar Colony Primary School

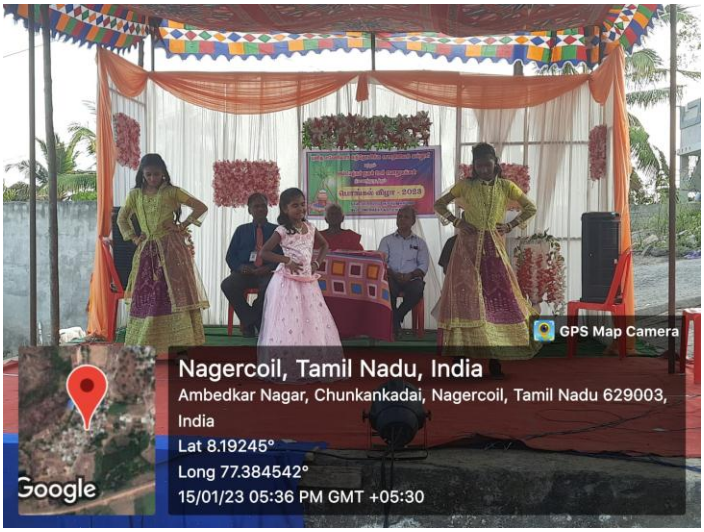
On February 15, 2023, the outreach team visited the primary school in Ambedkar Colony, Chunkankadai, where they conducted various interactive events for the kindergarten students. The objective of this visit was to bring joy to the young minds and encourage them to explore their creativity through engaging activities. The event concluded with the distribution of prizes to the winners, presented by the outreach team members, adding to the excitement and motivation of the children.

Volunteer Service During Pongal and Food Festival

The outreach team actively participated as volunteers during the Pongal Day celebrations at Ambedkar Colony and the Food Festival held at St. Xavier's Catholic College of Engineering. Their involvement ensured the smooth execution of these events and highlighted their commitment to community service.

Educational Awareness in Nearby Villages

As part of their ongoing efforts to promote education, the outreach team visited nearby villages on January 15, 2023, to create awareness about the importance of education. They also motivated the young minds in these villages to pursue higher education, inspiring them to strive for academic excellence and personal growth.



Inauguration of SAE: Fostering Professional Development

The Society of Automotive Engineers (SAE) was formally inaugurated during the All-Professional Cell Meeting held in the seminar hall of the Department of Electrical and Electronics Engineering.

The event commenced with a warm welcome address by Dr. M. Marsaline Beno, Dean of Research. Following this, the faculty advisor introduced the newly appointed office bearers, highlighting their roles and responsibilities for the upcoming academic year.

The inaugural ceremony was graced by Er. Angelin Indria, Founder & CEO of Ed-Zoe, who addressed the gathering with an inspiring talk, emphasizing the significance of professional development and industry readiness among students.

The presidential address was delivered by Rev. Fr. Dr. Maria William, who encouraged the students to actively participate in SAE activities and make the most of the opportunities provided. The event concluded with a heartfelt vote of thanks by Mr. E. Alan Gonsalves, expressing gratitude to all the dignitaries and participants for their presence and support.

These activities reflect the institution's dedication to fostering social responsibility, professional growth, and community engagement among its students.

SAE Professional Workshop: Electric Vehicle Prototyping

The Society of Automotive Engineers (SAE) at St. Xavier's Catholic College of Engineering organized an enriching workshop on Electric Vehicle (EV) Prototyping on April 27, 2023. The objective of this workshop was to inspire and motivate students to explore the rapidly evolving field of electric vehicle design and development. The session was conducted by Mr. A. Amstrong, Director of AA Associate Pvt. Ltd., who shared his extensive knowledge and practical insights on the intricacies of EV prototyping.

Through engaging demonstrations and interactive discussions, Mr. Amstrong highlighted the significance of electric vehicles in the context of sustainable mobility and the growing demand for eco-friendly transportation solutions. The workshop provided the participants with hands-on exposure to the fundamentals of EV design, enhancing their understanding of key concepts and encouraging them to pursue further research and innovation in this domain.

SAE Professional Activity: SAE TREK – Creating a Learning Culture

The Society of Automotive Engineers (SAE) at St. Xavier's Catholic College of Engineering organized a value-added program titled "SAE TREK: Creating a Learning Culture Across Professionals" on May 29, 2023. This insightful and interactive session aimed to instill a culture of continuous learning and professional development among aspiring engineers.

The primary goal of SAE TREK was to cultivate a learning-oriented mindset among students by encouraging them to explore the latest trends, technologies, and innovations in the field of automotive engineering. The program emphasized the importance of staying updated with industry advancements and developing essential technical and leadership skills. The session was led by Mr. S. Shanmugam, Founder and Director of Design Desk (India) Pvt. Ltd., an esteemed industry expert with extensive experience in automotive design and innovation. Through his engaging and thought-provoking talk, Mr. Shanmugam provided valuable insights into the evolving trends in automotive technology, design processes, and the importance of innovation-driven learning in today's competitive landscape.