MEXPRESS

Mechanical Engineering Department's Official Newsletter
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KUMARAGURU college of technology
character is life

Mechanical Engineering Association
DEPARTMENT OF MECHANICAL ENGINEERING

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Ms. Jobisha Celin

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From the Editors…

Dear readers,

As the editor of this newsletter, I am thrilled to share with you our team's accomplishments last month. Our associate editor has contributed as usual with her part 5 on turbulence. Additionally, one of our faculty members has published a book chapter and another faculty completed a Ph.D.

Our faculty has served as resource persons for various events, and we have organized industrial visits for them. Our team has actively participated in various programmes and the Mechanical Engineering Association elected new officer bearers. The MEA celebrated Pongal with enthusiasm.

We are committed to providing our students with the best opportunities to succeed and have provided pre-placement training. In this edition, you will find a student article. Our reviewer's point provides valuable insights on current trends and developments in the field.

As we move forward, our vision, mission, and program outcomes, student outcomes, and educational outcomes will guide us towards continued success.

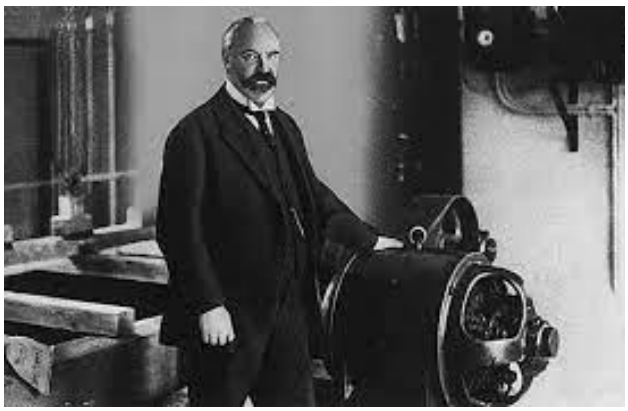
Best regards,

Editors….

STRICTLY TURBULENT – Part 5

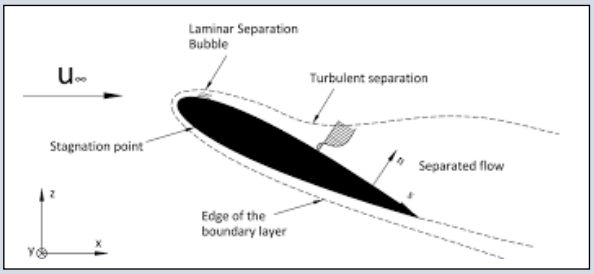
Ms. Jobisha Celin
20BME051
3rd year mechanical - B

Turbulence is a topic of great interest among scientists not only now. Scientist and engineers couldn't give an explanation to this phenomenon even then. This issue will investigate how this phenomenon intrigued a gentleman such that it laid the base for the boundary layer theory. Ludwig Prandtl was a mechanical engineering graduate who was employed in a machine factory where he was given the job of inspecting an exhaust system. He noticed that there was a pressure loss in the diverging sections which he discerned resulted in the loss of power. This separation of air from the walls of the tubes intrigued him. He is best known as the 'Father of modern aerodynamics' and boundary layer theory and in turbulence i.e., Prandtl mixing.



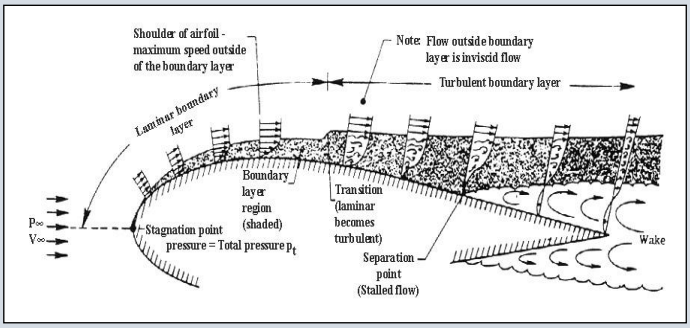
Ludwig Prandtl

This issue will delve into the boundary layer theory, that is the aerofoil theory. Aerofoils are used because their lift to drag ratios are higher, this is in fact a biomimetic design inspired by birds. Lets talk about the boundary layer in the leading edge and the trailing of the wing of an aircraft. As discussed before the flow far away from the surface can be modelled as irrotational stating that if an infinitesimal element is selected it wouldn't undergo rotation that results in the shear. Near leading edge the viscous boundary layers is thin, however as the flow approaches the trailing edge the separation increases and the boundary layer thickens.



Low pressure region in the trailing edge

From this one can understand that lift and drag computations become difficult to do, this is where Prandtl enters the chat. Prandtl simplified the Navier stokes equation for this viscous layer, a closely accurate equation that describes lift and drag. Prandtl boundary layer theory helped in understanding skin friction drag. He stated that no matter how small the viscosity of a fluid is, at high velocities of the flow past an object, the effects of shear viscous forces become very high at the region of the flow next to the surface and that the effects can be proportioned to the inertial effects. We know that by no slip boundary condition, the fluid flow on the surface has zero tangential velocity, as the inertial effects increase, the velocity gradient increases thereby according to newton's law of viscosity our rate of shear strain increases.

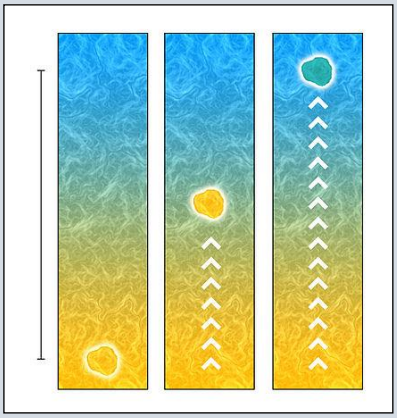


Boundary layer over the surface of an aerofoil

As these shear effects slow down the flow, the boundary layer increases in thickness and after some point the flow becomes turbulent, in this region the pressure drops and one can imagine that if a body is moving and that on its front end pressure is maximum and in its rear end the pressure drops, suction effect occurs and it becomes hard for the body to move forward or requires more energy to do so. Therefore, in the aerofoil theory it is assumed that the shedding of vortex is in the form of sheet rather as a single whole vortex from the wingtips. Prandtl also did the mathematical modelling for the lift that is produced by the wings in a 3d perspective that is called as the lifting line theory, making the mathematics easier.

PRANDTL MIXING:

There is a mathematical modelling technique called the mixing length model, it is a method to find the momentum diffusion by the viscous shear stress tensors in the boundary layer. This model was developed by Ludwig Prandtl himself but however he had some doubts and reservations about the accuracy of the model but it has been in applicability since then.



Mixing length

This modelling technique provides with the mixing length that is the maximum distance up to to which a flow will retain its characteristics, this is analogous to the characteristic length we've learnt in thermodynamics. Prandtl is the founder of Aerodynamische Versuchsanstalt (AVA) with its new name as Aerodynamic Research Institute in the Max Planck Society and Kaiser Wilhelm Institute which are worldwide renowned for their research.

PAPERS PUBLISHED

Dr. R. Manivel, Professor, published a paper entitled "Multi-parametric investigations on gravitational vortex hydropower system (GVHPS) using computational hydrodynamic analysis: A verified computational procedure based investigation, A Web of Science indexed International Journal of Low Carbon Technology , DOI: 10.1093/ijlct/ctac124.

MANUSCRIPTS REVIEWED

Dr. S. Sivakumar, Assistant Professor – III, reviewed a paper titled "Design and CFD Simulation of Guide Vane for Multistage Savonius Wind for the International Journal of Engineering and Technological Sciences.

Mr. B. Jeeva, Assistant Professor – II, reviewed the following manuscripts.

1. "Evaluation of the Performance of Alternative Refrigerants with Low Global Warming Potential" for the International Journal of Engineering Research and Reports".
2. "Development and Evaluation of Palmyrah (Borassus Flabellifer L.) Fruit Pulp Extractor Current" for the International Journal of Applied Science and Technology.
3. "Design and Optimisation of Horizontal Axis Wind Turbine Blades using Biomimicry of Whale Tubercles", International Journal of Engineering Research and Reports".

BOOK CHAPTER PUBLICATIONS

Mr. B. Jeeva, Assistant Professor – II, published a book chapter titled "Numerical Analysis: Cross-Section Optimization of Printed Circuit Heat Exchanger using Supercritical CO2 for Low Temperature Regenerator of Brayton Cycle in the Lecture Notes in Mechanical Engineering, Springer, Singapore, pp 45 – 61, ISBN 978-981-19-6944-7, ISBN 978-981-19-6945-4 (eBook)".

Ph. D. Completed

Mr. S. Ramanathan, Assistant Professor – III completed his doctoral research in "Mechanical Engineering on 20-01-2023 under the guidance of Dr. M. R. Thansekhar, Professor, Department of Mechanical Engineering, KLN College of Engineering, Madurai.

FACULTY AS RESOURCE PERSONS

Dr. V. R. Muruganantham, Associate Professor, acted as External Examiner at Government College of Technology on 8th and 9th of January 2023.

Dr. B. N. Sreeharan, Assistant Professor – II, acted as Judgefor an event titled "Technovations- The Project Expo" organized by the Department of Computer Science and Engineering, Kumaraguru College of Technology, on 31-01-2023.

FACULTY INDUSTRIAL VISIT

Dr. V. R. Muruganantham, Associate Professor, and Mr. K. Murugesan, Assistant Professor – II, Mechatronics Engineering Department – MCE were had a discussion with Mrs Bhavani – Coimbatore Productivity Council - head at their office on 24th Jan 2023.

Dr. K. M. Senthilkumar, Associate Professor and **Mr. P. D. Devan,** Assistant Professor – II, visited IMTEX, Bangalore on 20-01-2023 to 21-01-2023.

Dr. A. P. Arun, Assistant Professor – III, **Dr. K. Krishnamoorthi,** Assistant Professor – III, **Mr. K. Manikanda Prasath,** Assistant Professor - II and **Mr. R. S. Mohankumar,** Assistant Professor – II visited International Exhibition Centre, IMTEX , Bangalore dated from 23rd Jan 2023 to 24th Jan 2023.

A four-member team comprising Dr. Poongodi, Dr. Mohanamani, Assistant Professors, Mr. Venkatesharan S (I MBA) of KCT Business School and Dr. M. Balaji, Associate Professor, Department of Mechanical Engineering, KCT visited KKP Spinning Mills, Namakkal, on 06 January 2023. The team was well received by the general manager and factory head, who also initially gave a briefing on the firm's inception, growth, product line, competition, and future space in the industry. Subsequently, the team was taken to the factory by the factory head and unit heads, who explained in real time the entire process at the facility. Starting with the receipt of inventory as bales of cotton at Quality Check and progressing through conventional spinning or AirJet spinning, carding, and weaving until it reaches the packaging stage in 4 hours, the team gained an in-depth knowledge of the spinning industry and its current trends. The team finally thanked the hosts for their interests and deliverables in the closure meeting, and propositions of future connections surfaced in terms of student internships or projects.

PROGRAMMES ATTENDED

Mr. B. Jeeva, Assistant Professor – II, attended a one-day online workshop in Intellectual property commercialization on Jan 21st, 2023, organized by TurnIp Innovations Pvt. Ltd, Kolkata.

Dr. S. Balasubramanian, Associate Professor, attended Workshop on CII's Accelerating Cleantech Enterprise on 25th Jan 2023, organized by the Confederation of Indian Industry, Coimbatore. He also attended MSME South Zone Conclave - Laghu Udyog Bharathi (LUB), Coimbatore.

"True leader always practice the 3 R's: Respect for self, Respect for Others, Responsibility for all their actions."

Introducing the new set of Office Bearers of MEA_KCT for the Academic Year 2022- 2023.

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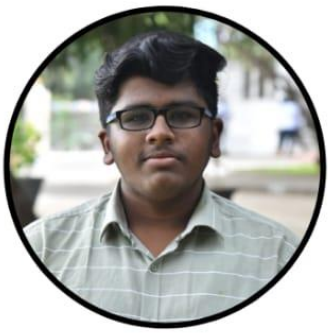

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2022 - 2023**

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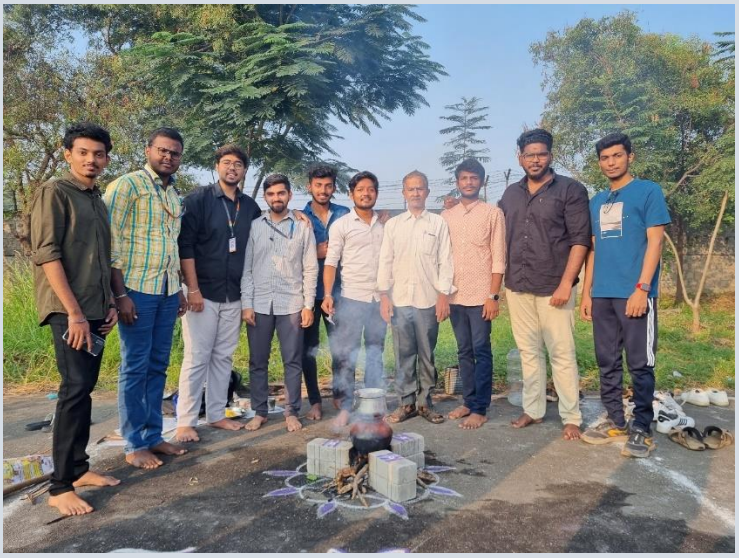
MEA Pongal

Pongalo Pongal! Allow the warmth and joy of the harvest festival to spread throughout your life for everlasting happiness and prosperity. "Pongal 2023" of KCT was organised by Kumaraguru Tamil Mandram, known as Pongal Vizha. Various Tamil cultural games are held on the day before Pongal as part of the Pongal celebration.



To actively initiate our Pongal celebration, Tamil Mandram has created a cultural competition of making Pongal. As a result, every department in our college competed in that competition, and we at MEA enthusiastically participated with a group of 10 boys in making Pongal with reference to YouTube videos and preparation techniques from mom's ideas, and our boys successfully made the Pongal with good taste and received a positive result from the judges.

And our 1st year Mechanical Engineering students separately take part in that competition, and they also successfully finish the competition by making Pongal with good taste and get good result from the judge.

Pre-placement Training

Pre-placement training for our 3rd year Mechanical Engineering students was conducted by the MySlate team, where their vision is to develop quality and innovative learning material while clarifying the concepts relating to real world phenomena and solving a variety of problems. My Slate material makes the subject easy to understand.

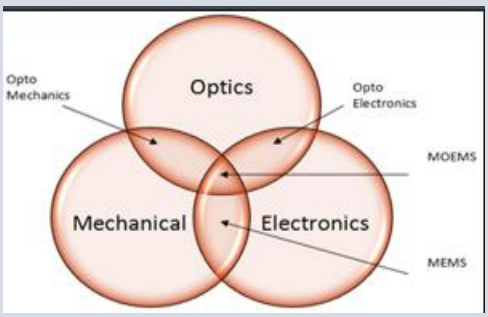
For our students, they provide enough knowledge about C programming languages for the period of 10 days. The first five days were theoretical sessions to help students understand concepts and clear their doubts, and the next five days were practical sessions in which students were asked to work on systems to run and work on various types of codes, which will be very useful in their placements.

It was the first time My Slate provided this type of opportunity for KCT students, where our students benefited from their work and expressed a strong desire to continue their work in the coming years.

MEMs An Overview

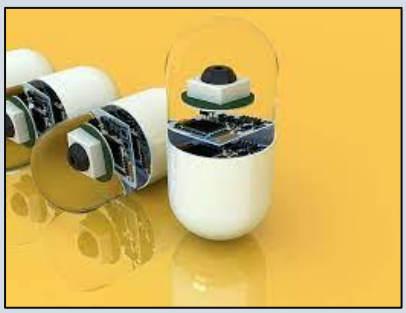
Yuhendran R. J.
21BME103
2nd year Mechanical

Micro-Electro-Mechanical Systems (MEMS) are a group of technologies that involve the integration of mechanical elements, such as gears, levers, and springs, with electronic components, such as sensors, transistors, and actuators, at a micro scale. It can be simplified as micromachines and also Micro System Technologies – (MST).



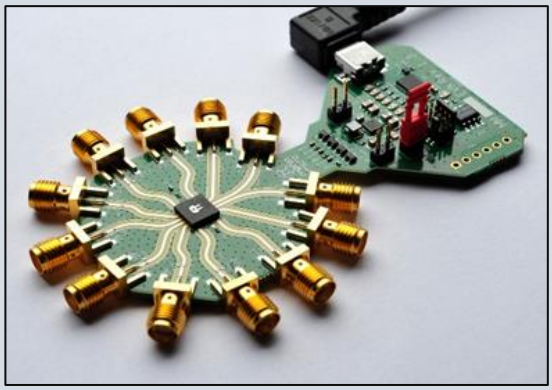
The history of MEMS can be traced back to the 1960s, when scientists first began experimenting with the integration of mechanical and electronic components at a micro scale. Then it was in the 1980s that the technology began to get a gain widespread recognition. This was due to advances in microfabrication techniques which made it possible to create complex and precise micro-mechanical structures.

One of the most well-known applications of MEMS technology is in sensors. MEMS sensors are used in a wide range of applications, including automotive, consumer electronics, and industrial automation. These sensors are designed to be small, lightweight, and energy-efficient, making them ideal for use in portable devices and other applications where size and power consumption are critical factors. Some of the most common types of MEMS sensors include accelerometers, gyroscopes, and pressure sensor.



Another important application of MEMS technology is in actuators. MEMS actuators are used to convert electrical energy into mechanical motion. They are used in a wide range of applications, including micro-robots, optical switches, and micro-pumps. These actuators are designed to be small, lightweight, and energy-efficient, making them ideal for use in portable devices.

MEMS technology is considered a key technology for the development of the Internet of Things (IoT) as it allows to create small, low-power, and low-cost sensors, which can be integrated in various devices to connect them to the internet. The technology has a wide range of applications in various fields including healthcare, automotive, aerospace, and consumer electronics.



Though it has a wide range of applications it doesn't mean that it does not have any drawbacks. The process of creating MEMS devices is requires specialized equipment and facilities. So, the production of MEMS devices quite expensive, which can limit their uses. The size of MEMS devices though being advantageous also limits the technology due to the production techniques used to create them. This makes it difficult to create large or complex devices with the same principles. MEMS devices are very small and delicate making it easier to damage. This is a problem in applications like aerospace or automotive technology where devices may be subjected to high levels of stress or vibration. MEMS devices often require less power. In some cases, the power requirements be too high for the application in which it is used. MEMS devices may be more prone to failure than traditional devices due to their small complex structure. This can be a problem in healthcare solutions. These devices are sensitive to environment this can makes them difficult to use in harsh environments. MEMS devices can be vulnerable to cyber-attacks if not properly secured.

In conclusion, MEMS technology is a rapidly growing field that has the potential to revolutionize a wide range of industries. With advances in microfabrication techniques and the continued miniaturization of electronic components, it is likely that we hope to see even more innovative and exciting applications of this technology in the future.

TVS APACHE RTR 180

Yuhendran R. J.
21BME103
2nd year Mechanical

INTRODUCTION: TVS motor company is an Indian multinational company which manufactures motorcycles headquartered at Chennai, Tamil Nadu, India. It is third largest company in generating revenue of about Rs. 20,000 crore per year. The APACHE RTR 180 a sporty and powerful motorcycle that is designed to provide a thrilling riding experience. The RTR 180 is an upgraded version of the RTR 160.

APACHE RTR 180: The design of the RTR 180 is sporty and aggressive, it features a muscular fuel tank, sharp headlamp, and a sleek tail section. The motorcycle is built using high-quality materials that are designed to withstand the rigors of everyday use.

The engine of the RTR 180 is a 177.4 cc, single-cylinder, 4-stroke, air-cooled engine that delivers 17 PS of power at 8,500 RPM and 15.5 Nm of torque at 6,500 RPM. This engine is paired with a 5-speed transmission that provides smooth and precise shifting. The engine is also equipped with a number of advanced technologies, such as the TVS patented Duralife Engine, which provides longer engine life and improved performance. The motorcycle is equipped with telescopic forks at the front and a mono shock at the rear, which provide a smooth and stable ride. The suspension system is fully adjustable, which allows the rider to fine-tune the suspension to their liking.

The braking system of the RTR 180 is designed to deliver strong and consistent braking performance. The motorcycle is equipped with a pedal disc brake at the front and a drum brake at the rear, which provide an amazing braking performance. The braking system is equipped a single-channel ABS system that helps to prevent wheel lockup during hard braking.

The Apache RTR 180 is also available in a race-spec variant called the Apache RTR 180 ABS Race Edition which comes with advanced features such as dual-channel ABS, Pirelli tires, and a digital-analog instrument cluster. The bike comes under colours Pearl white, Gloss Black, Matte Black, and T-Grey.

Overall, the TVS Apache RTR 180 is a sporty and powerful motorcycle that is designed to provide a thrilling riding experience. Its sporty and aggressive design, powerful engine, and advanced suspension and braking systems all work together to provide a smooth and stable ride. The motorcycle is designed to be easy to handle, and it is built to last.

Industrial Automations & Robotics by Axis Global Automation's (AGIIT): Training cum Internship

Category: Internship/Training
Event Type: Virtual/Hybrid Mode
Start Date: 19th February 2023
Last Date to Register: 15th February 2023
Location: Chennai and Coimbatore.
Organizer: Axis Global Institute of Industrial Training.
Registration Fees: INR 1500/-

Internship Details:

- Internship Duration: 45 days
- Live session: 4 hrs./week-Sunday- 7 Sessions
- Sunday-10.00 am to 3.00 pm.
- Recorded Videos will be provided for Limited time access.

Requirements:

1. A desktop or laptop computer is required. Windows 10 is recommended.
2. Stable internet connection
3. A microphone is strongly recommended for trainer communication.

Benefits:

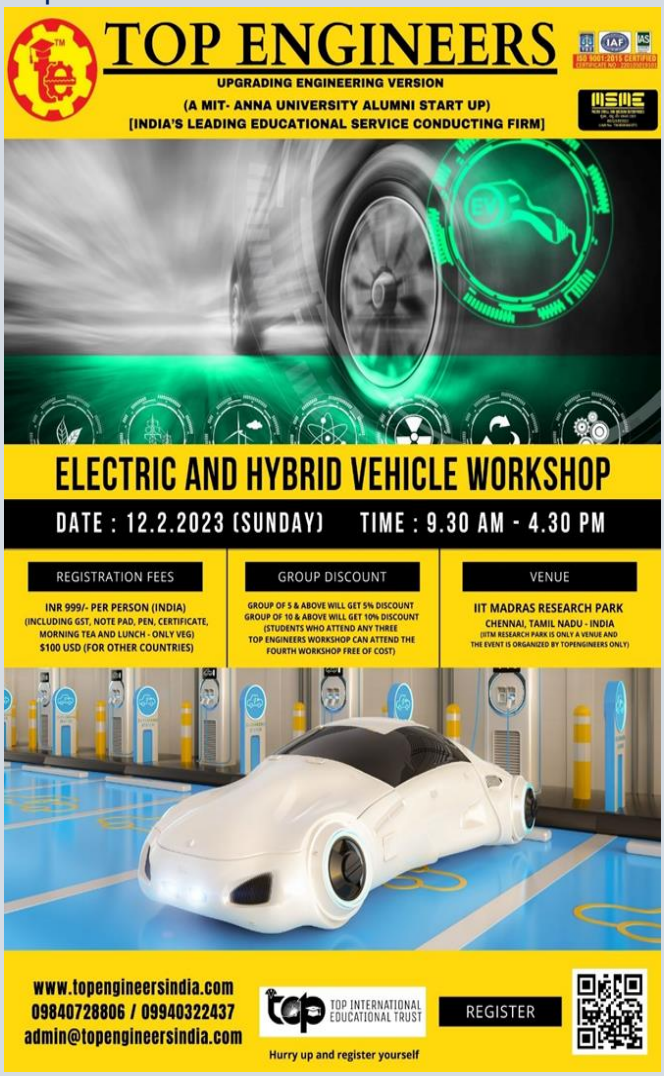
1) Active students will be given Best Intern Award-Decided by the Industrial trainer.
2) Faculty Mentor will be given Internship Mentor certificate if students enrolling as team & successfully complete the Training cum Internship
3) Internship Certificate (6 Weeks) and Course Completion Certificate (32 hrs) are issued as per the norms specified in NAAC & NBA Accreditation process.

Registration Link:

https://docs.google.com/forms/d/e/1FAIpQLSfNHhfDjcftwmld7cgJdGegZDanIlz1dDuqH9PqN6-kVO0UXg/viewform

Electric and Hybrid Vehicle Workshop 2023, Top Engineers, Chennai, Tamil Nadu, 12th February 2023.

Category: Electric and Hybrid Vehicle Workshop
Event Type: Venue/Offline Mode
Start Date: 12th February 2023
End Date: 12th February 2023
Location: Chennai, Tamil Nadu
Organizer: Top Engineers
Last Dates for Registration: 10.02.20223



Only limited seats per batch and the seats are filled on "first come & first serve.

Registration fees: Certificate from top engineers with iso certified number and hologram sticker will be provided by the end of the workshop which will add value during placements.

INR 999/- PER PERSON (INDIA) (Including GST, NOTE PAD, PEN, CERTIFICATE, MORNING TEA AND LUNCH - ONLY VEG)

GROUP DISCOUNT OFFER
Group of 5 & above will get 5% Discount
Group of 10 & above will get 10% Discount

Contact Details:

CONTACT: 9840728806 / 09940322437
MAIL: admin@topengineersindia.com
WEBSITE: www.topengineersindia.com
ENROL LINK: https://pages.razorpay.com/pl_KuGeqz6QWg0LIO/view

KUMARAGURU college of technology
COIMBATORE – 641 049

Department of Mechanical 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 emerge as a centre, that imparts quality higher education through the programme in the field of Mechanical Engineering and to meet the changing needs of the society.

DEPARTMENT MISSION:

The department involves in sustained curricular and co-curricular activities with competent faculty through teaching and research that generates technically capable Mechanical Engineering professionals to serve the society with delight and gratification.

B. E. MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OUTCOMES (PEO's):

PEO 1 : Graduates will take up career in manufacturing and design related disciplines.
PEO 2 : Graduates will be involved in the execution of Mechanical Engineering projects.
PEO 3 : Graduates will take up educational programme in mastering Mechanical sciences and management studies.

PROGRAM OUTCOMES (PO's):

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

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

7. **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.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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.

11. **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.

12. **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 (PSO's):

1. Apply the fundamentals of science and mathematics to solve complex problems in the field of design and thermal sciences.

2. Apply the concepts of production planning and industrial engineering techniques in the field of manufacturing engineering.

M. E. INDUSTRIAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEO's):

PEO 1 : Graduates will be mid to higher level management / engineering professionals with responsibilities in engineering management, data analysis and business operations.

PEO 2 : Graduates will be engineering professionals, and technology leaders who would manage such functions as plant engineering, production, supply chain and quality management.

PEO3 : Graduates would function as educators or researchers in academic institutions.

PROGRAM OUTCOMES (PO's):

PO1 : An ability to independently carry out research /investigation and development work to solve practical problems.

PO2 : An ability to write and present a substantial technical report/document.

PO3 : Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PO4 : Apply knowledge and competencies in manufacturing, analytics, supply chain, quality and engineering management.

PO5 : Apply principles of industrial engineering to solve problems in industry.

PO6 : An ability to work as part of interdisciplinary teams, communicate effectively, model and design engineering systems optimally.