

MEXPRESS

NOVEMBER 2023

Mechanical Engineering Department's Official Newsletter
Volume No. 07 Issue No. 03
For Internal Circulation Only



REACH US AT



Mechanical Engineering Association
Department of Mechanical Engineering
KUMARAGURU COLLEGE OF TECHNOLOGY



EDITORS



Dr. C. Velmurugan
Professor & Head



Dr. B. N. Sreeharan
Assistant Professor - II

ASSOCIATE EDITORS



Mr. S. V. Nithesh



Ms. P. Kirubashini



Mr. K. V. Vijay Adithya



Ms. S. Santhiya

CONTENTS

Details	Page No.
Editors' Portfolio	4
Programmes Organized	5
Faculty as Resource Persons	6
Paper Publications - Faculty	7
Manuscripts Reviewed	9
Books Published	9
Ph. D. Student – Viva Completion	10
Faculty Recognition	10
Seed Money	10
Research funds applied	10
Industry Linkages	11
Consultancy	12
Programmes Participated	12
MoU	14
Snap Shots	14
Internships	22
Paper Publications – Students	23
Participations – Students	23
Vision, Mission, POs, PSOs and PEOs	25

From the Editors...

Dear Readers,

It is with great pleasure that we extend a warm welcome to the latest edition of our newsletter, a platform dedicated to showcasing the remarkable achievements and contributions of our esteemed faculty and students. As we delve into the pages of this newsletter, we are reminded of the unwavering dedication and passion that fuel our academic endeavors.

Our department has a rich history of organizing thought-provoking seminars, workshops, and conferences, providing a vibrant platform for intellectual exchange and fostering a culture of continuous learning. Our faculty members are recognized experts in their respective fields, and their willingness to share their knowledge and expertise has enriched the academic experience of countless students. Our faculty's commitment to research is reflected in their impressive publication record, contributing significantly to the advancement of knowledge in various disciplines. Their dedication to peer review ensures the high quality and credibility of academic publications worldwide. Our faculty's authorship of books has further enhanced the department's reputation for academic excellence and thought leadership.

The recognition of our faculty members for their outstanding achievements is a testament to their unwavering commitment to excellence. The institution's commitment to providing seed money to faculty members has fostered a culture of innovation and research excellence. The forging of strong industry linkages has facilitated collaborative research projects and provided students with valuable exposure to real-world applications. Our faculty members' expertise has been sought after by various industries, contributing to the transfer of knowledge and the advancement of technology.

Our faculty and students have actively participated in various national and international programmes, expanding their horizons and enriching their academic experience. We invite you to capture the essence of our vibrant academic life through a collection of captivating snapshots. Our students have actively pursued internships at renowned organizations, gaining valuable hands-on experience and preparing them for successful careers. Our students' research contributions are evident in their impressive publication record, demonstrating their budding talent and potential for future success.

As we conclude this newsletter, we express our deepest gratitude to our faculty, students, and staff for their unwavering commitment to the pursuit of knowledge and the advancement of our academic endeavors. We look forward to continuing our journey of excellence, together, in the years to come.

Best regards,

Editors....



PROGRAMMES ORGANIZED



An Insta Quiz Smart skill Quest was organized in the department from 01-09-2023 to 15-09-2023. **Dr. M. A. Vinayaga Moorthi**, Assistant Professor – III, coordinated the event.



A Career Guidance & Awareness “ELEVATE - Paving the way towards Jobs and Entrepreneurs” was coordinated by the department on 02-09-2023 at CODISSIA. **Dr. V. R. Muruganantham**, Associate Professor and **Dr. M. A. Vinayaga Moorthi**, Assistant Professor – II, coordinated the event.





Teacher's Day Ceremony "Light of learning" was organized in the department on 08-09-2023.

FACULTY AS RESOURCE PERSONS:



Dr. R. Manivel, Professor, was the other resource persons in KLDA Workshop on "Writing Proposals for funding and Journal paper writing" on 11-10-2023 and on 12-10-2023.

Dr. V. R. Muruganantham, Associate Professor, acted as External Examiner as an Examiner for the Question Paper Scrutiny at Government College of Technology, Coimbatore on 27-10-2023.



Dr. B. N. Sreeharan, Assistant Professor – II, was the resource person for a session on "Advanced Excel" conducted for MBA Students of KCT - Business School on 03-10-2023. The session was organized by Sakthi Excellence Academy, Coimbatore. He also acted resource person in the capacity development program on "Data Analytics using Microsoft Excel" organized by the Department of Aeronautical Engineering, Hindusthan College of Engineering and Technology, Coimbatore on 27-10-2023. Further, he acted as one of the panellists in the recruitment process for the Team SEA Sakthi on 20-10-2023 and he reviewed the SIH 2023 Intra Hackathon Waiting List Teams on 26-10-2023 and on 27-10-2023.



Mr. V. R. Navaneeth, Assistant Professor – II, acted as External Examiner for end semester question paper scrutiny board at Hindusthan Institute of Technology, Coimbatore on 19-10-2023.

Dr. P. S. Samuel Ratna Kumar, Assistant Professor, was one of the resource persons in KLDA Workshop on “Writing Proposals for funding and Journal paper writing” on 11-10-2023 and on 12-10-2023. He also acted as one of the jury members in the programme “Innovate for impact design ideathon organized by KCT- Aeronautical Engineering and Aeromodelling club of KI on 18-10-2023. Further, he delivered a talk on “Impact of Article writing in research & development” to the second year Mechatronics Engineering department students in a programme organized by the Department of Mechatronics Engineering on 19-10-2023.



PAPER PUBLICATIONS:

Following faculty members published their papers as detailed below in the Scopus indexed AIP Conference Proceedings.

	Dr. K. K. Arun , Assistant Professor – III	Design of Shaftless Spiral Conveyor for Transportation of Bulk Materials
		A Study on design of propeller blades for shaftless thruster
	Dr. V. R. Muruganantham Associate Professor	Optimization of hammer mill pulverize
	Dr. V. Manivel Muralidaran , Assistant Professor – III	Analysis of barriers in lean implementation strategy for manufacturing sectors
	Dr. M. Thirumalai Muthukumaran , Assistant Professor – III	Design and analysis of front bumper for the comfort and safety of passengers
		Design and analysis of ventilated disc brake.

	Dr. V. Muthukumaran, Professor	Design and development of agricultural multipurpose cutting machine
		Optimising tolerance of non-precious alloy crowns in dentistry
	Dr. B. N. Sreeharan, Assistant Professor - II	A novel approach in riveting process using semi mechanized pneumatic drilling cum riveting machine
		Application of lean thinking for enhancing productivity in an automotive industry
		A novel way of using DEAR algorithm for selecting suspension coil spring material
		Smart spark plug cleaning system
	Mr. K. Manikanda Prasath, Assistant Professor – II	Process parameter optimization of 3D printed ABS using RSM by fused filament fabrication process
	Dr. M. Balaji, Associate Professor	Modeling critical success factors for agility in textile sector
		Analysis of barriers in lean implementation strategy for manufacturing sectors
		Process parameter optimization of 3D printed ABS using RSM by fused filament fabrication process
	Dr. S. Sivakumar, Assistant Professor - III	An investigation of fatigue analysis of power take-off shaft used in agricultural tractor
		Design and comparative analysis of cardiovascular self-expanding stent for different shape memory alloy (SMA) materials using finite element analysis
		Design and fabrication of hexapod based multifunctional agricultural vehicle
	Dr. C. Velmurugan, Professor & HoD	Analysis of heat storage capacity of metal roof tops in order to use them as a solar collector



Dr. M. A. Vinayaga Moorthi, Assistant Professor – II and **Dr. N. Sangeetha**, Sr. Associate Professor, published their paper entitled "Structural Design and Analysis on Various Profile" in the International Journal of Research and Analytical Reviews (IJRAR) Volume 10, Issue 4, E-ISSN 2348-1269, P- ISSN 2349-5138.



MANUSCRIPTS REVIEWED:

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



1. Research on ORC-based industrial circulating water cogeneration system for the WoS indexed Current Journal of Applied Science and Technology, an International Journal.
2. Investigation of the control characteristics of mineral processing technology indicators for the WoS indexed Advances and Challenges in Science and Technology, an International Journal.
3. Exploring Effective Weed Management through UAV Application for the WoS indexed International Journal of Plant & Soil Science.

Dr. P. S. Samuel Ratna Kumar, Assistant Professor, reviewed the following manuscripts:

1. Atomic-scale study of linear reciprocating friction of TCP/ γ phase in nickel-based single crystal alloy for the SCI indexed International Journal: Physica Scripta.
2. Assessment on Weldability and Corrosion behaviour of boiler Material for the SCI indexed International Journal: High Temperature Corrosion of Materials



Dr. V. Manivel Muralidaran, Assistant Professor – III, reviewed a manuscript titled "Effect of Adding Urtica Dioica Chopped Fiber on Load Bearing, Fatigue and Water Absorption Behaviour of Rock Dust Dispersed Vinyl Ester Composite" for the Scopus indexed International Journal: Biomass Conversion and Biorefinery

BOOKS PUBLISHED:

Dr. K. K. Arun, Assistant Professor – III published a book on "Production Planning and control", published by Jayalakshmi publications bearing ISBN: 978-93-90203-42-0.



Ph. D. COMPLETED:

Mr. S. Srinivasan (18142691115), Research Scholar of **Dr. S. Thirumurugaveerakumar**, Associate Professor have successfully defended his research work on 16-10-2023 and awarded the doctoral degree by Anna University, Chennai



FACULTY RECOGNITION:



Dr. B. N. Sreeharan, Assistant Professor – II, have been recognized by Microsoft as Microsoft Office Specialist Associate in Excel 2019.

SEED MONEY:

Dr. P. S. Samuel Ratna Kumar, Assistant Professor received a seed money of Rs. 2,06,292 for the Development of UHTC material to increase the ablation and oxidation resistance with the outcome of the of the research project such as SDGs, SCI and Scopus publications and for Industry / societal partnership.



RESEARCH FUNDS APPLIED:



Dr. V. Muthukumaran, Professor, **Dr. S. Balaji**, Assistant Professor – II, applied for a research proposal for funding on “Design of Variable Mach number nozzle system for Trisomic Wind tunnel” to Aeronautics R & D Board (AR & DB), DRDO, Ministry of Defence, Delhi for Rs. 67.36 Lakhs.



Dr. S. Sivakumar, Assistant Professor – III, applied for student project proposals on “Design and Control of a Lightweight and Ergonomic Wearable Powered Exoskeleton for Walking Assistance in Mobility-Impaired Individuals” and on “Solar Powered Auto Rickshaws: Integrating Optimal Mechanical and Electrical Design for Enhanced Efficiency and Sustainability” to Tamilnadu State Council for Science and Technology.

INDUSTRY LINKAGES:

As a part of Student project and Consultancy works, **Dr. M. Balaji**, Associate Professor, visited Solid and Liquid Resource Management Plant at Kurudampalayam Village, Perianaickenpalayam Block on 19-10-2023. He interacted with a few employees of the center and understood the processes involved in the facility in lines with helping the team to work more effectively. Future visits were planned to the other facilities too.



Dr. S. Ramanathan, Assistant Professor – III, visited ISRO, Bangalore for satellite integration and test establishment (SITE) for research interaction with Thermal Systems Group (TSG) on 09-10-2023.

Dr. C. Velmurugan, Professor, **Dr. M A. Vinayaga Moorthi**, Assistant Professor – II, and **Dr. R. S. Mohankumar**, Assistant Professor – II visited Capgemini Engineering and SiTarc on 05-10-2023 for the purpose of students' internship, project, and placements.



Dr. T. Karuppusamy, Assistant Professor – II, underwent an Internship at Barani Hydraulics, Coimbatore from 26-09-2023 to 06-10-2023.

Dr. C. Velmurugan, Professor, **Dr. V. Muruganantham**, Associate Professor and **Mr. P. D. Devan**, Assistant Professor – II had Industry Interaction with Texmo Industries, Coimbatore on 03-10-2023 and interacted with the concerned regarding student internships.



CONSULTANCY:



Mr. V. R. Navaneeth, Assistant Professor - II, provided consultancy on IP enclosure mounting column box and Report generation for Zeekers Tech, Coimbatore

PROGRAMMES PARTICIPATED

Mr. P. Pradeep, Assistant Professor II, participated in an FDP on "Inculcating Universal Human Values in Technical Education" from 05-10-2023 to 07-10-2023, organized by All India Council for Technical Education (AICTE) at Kumaraguru College of Technology, Coimbatore.



Mr. R. S. Mohankumar, Assistant Professor II, participated in a Seminar on "Business Process Analysis: Role of Process Modelling, Simulation and Optimisation" on 27-09-2023 organized by NIVID Informatics Private Limited and IIT Roorkee.

Mr. K. Manikanda Prasath, Assistant Professor II, participated in a Seminar on "Business Process Analysis: Role of Process Modelling, Simulation and Optimisation" from 27-09-2023 to 27-09-2023, organized by NIVID Informatics Private Limited and IIT Roorkee.



Dr. V. R. Muruganantham, Associate Professor, completed an online course on "Teaching and Learning in General Programs" from 24-07-2023 to 31-08-2023, organized by NPTEL. He also participated in an FDP on "Advanced Manufacturing & Materials processing" on 25-09-2023 organized by Annant Gyan Knowledge and Skills Private Limited.

Dr. S. Sivakumar, Assistant Professor III, participated in an STTP on "Durability and Repairs of RC Structures" from 16-10-2023 to 20-10-2023, organized by CBRI IIT ROORKEE.



Dr. S. Rajesh, Assistant Professor II, participated in an STTP on "Durability and Repairs of RC Structures" from 16-10-2023 to 20-10-2023, organized by CBRI IIT ROORKEE. He further participated in an FDP on "Inculcating Universal Human Values in Technical Education" from 05-10-2023 to 07-10-2023, organized by All India Council for Technical Education (AICTE) at Kumaraguru College of Technology, Coimbatore.



Dr. R. Manivel, Professor, participated in a Seminar on “European Research Day (ERD) Conference” on 27-09-2023 organized by European Research Centre at Renaissance Hotel, Racecourse, Bangaluru.

Dr. P. S. Samuel Ratna Kumar, Assistant Professor, participated in a Seminar on “Indo - Australian Webinar on Composite Materials for Ballistic Protection” on 20-09-2023, organized by PSG College of Technology, India and University of New South Wales, Canberra, Australia through Cisco WebEx platform.



Dr. M. Thirumalai Muthukumaran, Assistant Professor III, participated in a Seminar on “Indo - Australian Webinar on Composite Materials for Ballistic Protection” from 20-09-2023 to 20-09-2023, organized by PSG College of Technology, India and University of New South Wales, Canberra, Australia through Cisco WebEx platform. He also participated in another Seminar on “Finite Element Analysis Convergence and Mesh Independence” on 30-09-2023 organized by Coursera Project Network. Further, he participated in one more Seminar on “FEM - Linear, Nonlinear Analysis & Post- Processing” from 29-09-2023 to 05-10-2023, organized by Coursera Project Network. In addition to above, he completed an online course on “Teaching and Learning in General Programs” from 24-07-2023 to 31-08-2023, organized by NPTEL. Dr. Thirumalai Muthukumaran, Assistant Professor III, participated in an FDP on “Advanced Manufacturing & Materials processing” from 25-09-2023 to 29-09-2023, organized by Annant Gyan Knowledge and Skills Private Limited.

Dr. M. Balaji, Associate Professor, participated in a Seminar on “Business Process Analysis: Role of Process Modelling, Simulation and Optimisation” from 27-09-2023 to 27-09-2023, organized by NIVID Informatics Private Limited and IIT Roorkee.



Dr. B. N. Sreeharan, Assistant Professor II, completed following online courses: Top Excel tips to (Impress Everyone) in your Office, Mastering the Art of Designing Business Presentations, International Teaching Olympiad, 50 Excel Formulas to get smarter than your colleagues, 10 Excel Skills for job Interview organized by Excel Champs. He further participated in an FDP on “Inculcating Universal Human Values in Technical Education” from 05-10-2023 to 07-10-2023, organized by All India Council for Technical Education (AICTE) at Kumaraguru College of Technology, Coimbatore.

Department Activities

MoU:



An MoU was signed between the department and Tamil Nadu Centre of Excellence for Advanced Manufacturing (TANCAM) on 07-08-2023. MoU was initiated by **Dr. C. Velmurugan**, Professor and Head and **Mr. R. S. Mohankumar**, Assistant Professor – II.



As a part of MoU initiatives following faculty members visited Ashok Leyland, Hosur for the interaction with forge team, MTM program students on 17-10-2023 and 18-10-2023.

1. **Dr. C. Velmurugan**, Professor & Head
2. **Prof. T. R. Sukumar**, Associate Professor
3. **Dr. V. R. Muruganantham**, Associate Professor
4. **Dr. M. Thirumalaimuthukumar**, Assistant Professor - III
5. **Mr. P. D. Devan**, Assistant Professor - II

SNAPSHOTS



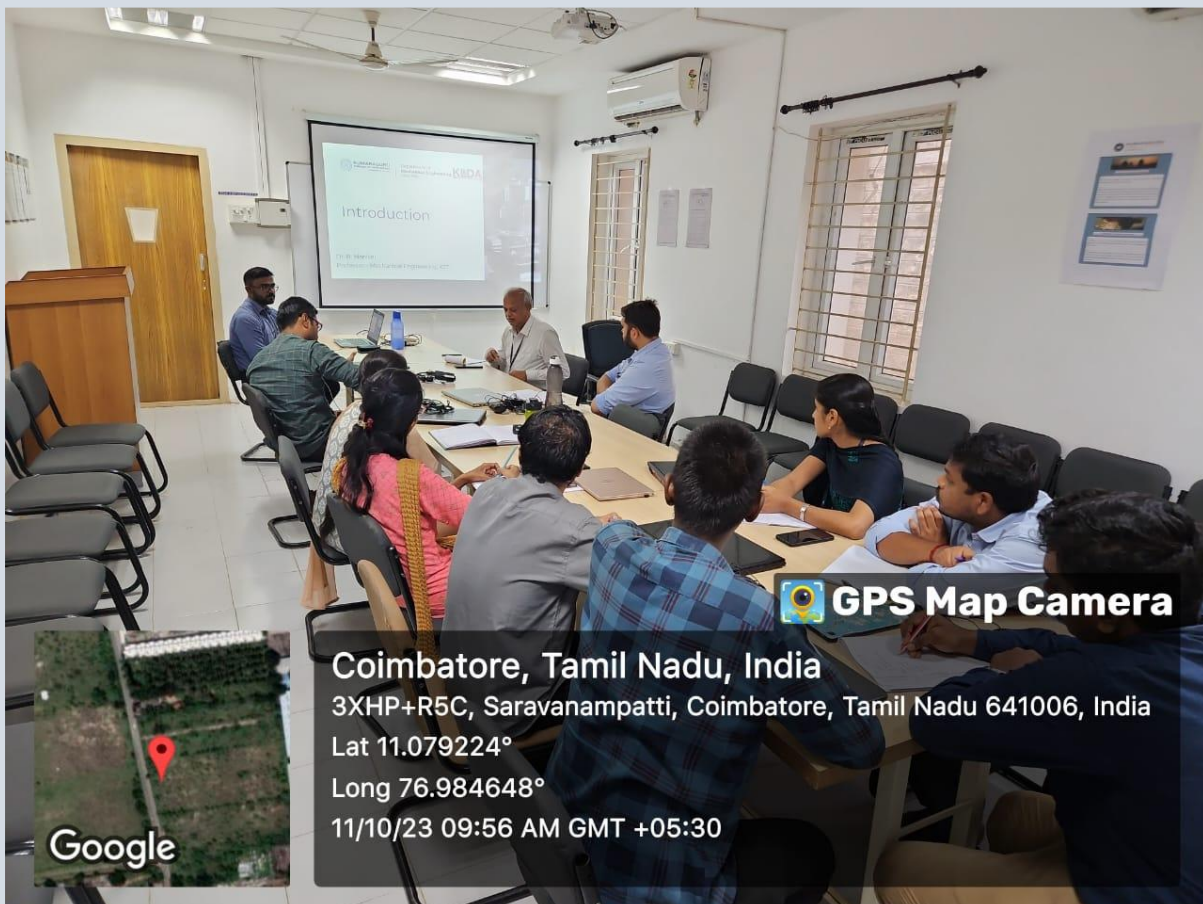
Faculty members at Teacher's Day Ceremony Events



Dr. Samuel Ratna Kumar delivering the guest lecture on Impact of Article writing in research & development.



Mr. Joel David, final year student at CODISSIA Elevate Event



Dr. R. Manivel and **Dr. Samuel Ratna Kumar** as Resource Persons at Writing Proposals for funding and Journal paper writing Workshop



Dr. C. Velmurugan, Dr. V. R. Muruganantham, and Mr. P. D. Devan
@ Texmo Industries, Coimbatore



Dr. B. N. Sreeharan providing Microsoft Excel Training @ HiCET, Coimbatore

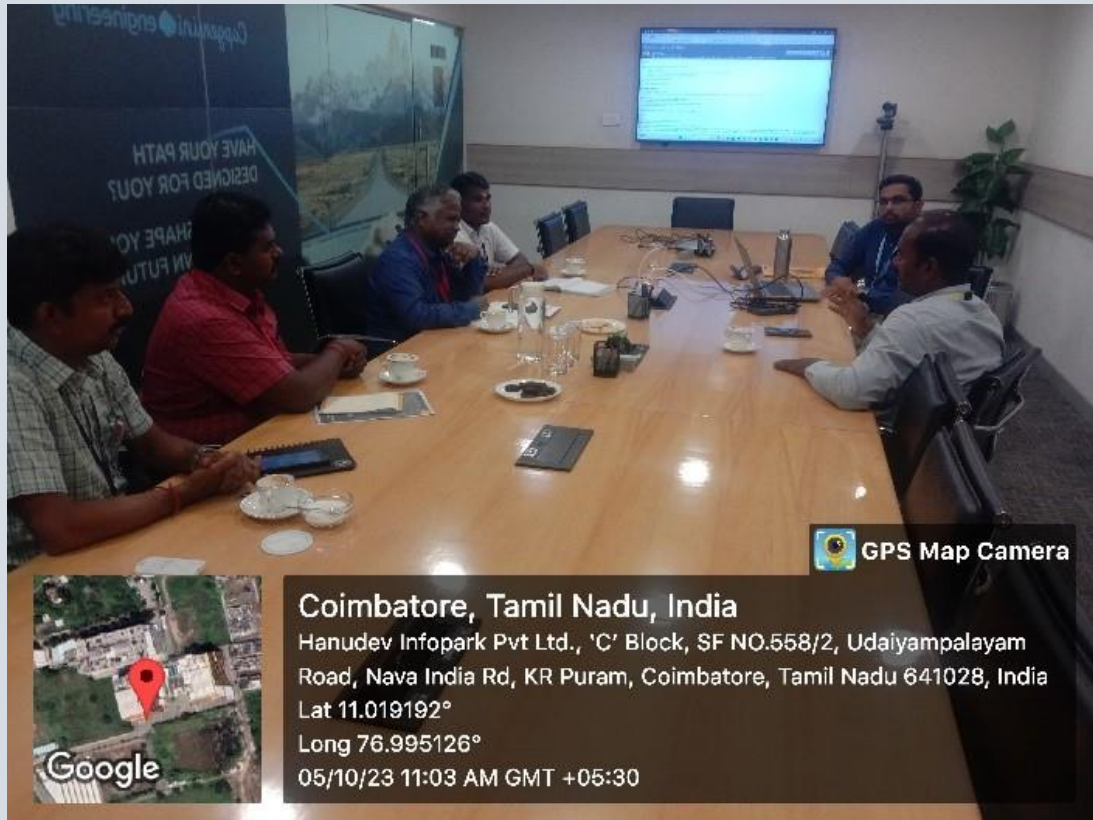


Dr. B. N. Sreeharan delivering the guest lecture on Advanced Excel Training @ KCT Business School, Coimbatore



Dr. S. Ramanathan and final year students **Mr. Balavignesh P**, **Ms. Jobisha Celin A**, **Ms. Muruga Shri V** and **Mr. Prabhakar T R** @ ISRO satellite integration and test establishment (ISITE)

Department Activities



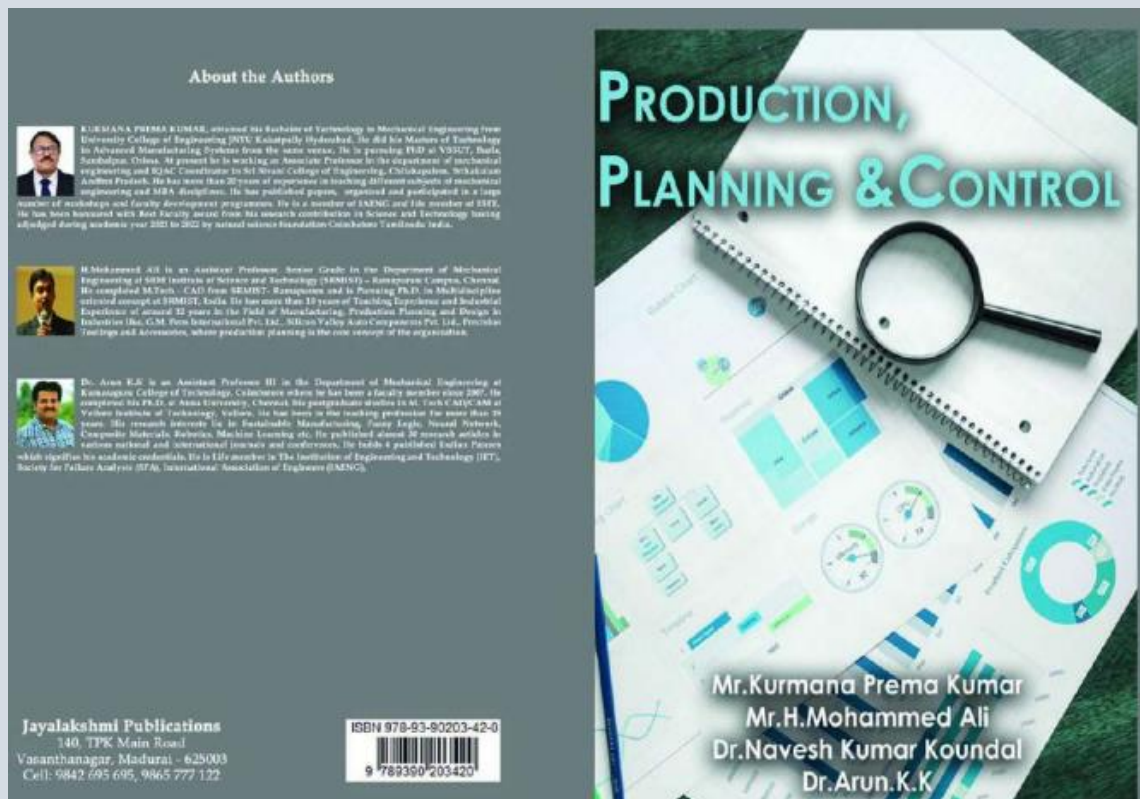
Dr. D. Saravanan, Principal, Mr. Rangaraj Saravanakumar, Senior Director, Dr. C. Velmurugan, Dr. M. A. Vinayagamoorthis and Mr. R. S. Mohan Kumar @ Capgemini Engineering, Coimbatore



Dr. C. Velmurugan, Dr. M. A. Vinayagamoorthis and Mr. R. S. Mohan Kumar @ SiTarc, Coimbatore



Dr. Samuel Ratna Kumar as Jury member in Innovate for impact design ideathon
@ KCT- Aeronautical Engineering and Aeromodelling club



Book by **Dr. K. K. Arun**



Dr. M. Balaji @ Solid and Liquid Resource Management Plant, Periyanaickenpalayam



Our faculty members @ Ashok Leyland, Hosur

INTERNSHIPS:

- Following students underwent internship at Barani Hydraulics India Private Limited, Coimbatore from 26-09-2023 to 06-10-2023.

Ms. Kamalika M 22BME043
Ms. Kirubashini P 22BME050
Ms. Thiruvazhagi E 22BME120

Mr. Harshit S 22BME037
Mr. Aruthra S 22BME013

Dr. T. Karuppusamy, Assistant Professor – II, coordinated the internship.

- Mr. Smith S, 22BME103** underwent internship at Rehovot Engineering Products, Coimbatore from 18-09-2023 to 03-10-2023 and at Sabhari Electroplaters, Coimbatore from 09-10-2023 to 14-10-2023.
- Following students underwent internship at Texmo Industries, Coimbatore from 26-09-2023 to 25-10-2023 with Rs. 10,000/- as stipend.

Reg No	Name	Reg No	Name
20BME002	Aakash kumar V	20BME068	Mahesh Kumar. N
20BME004	Aakash v	20BME080	Nithesh
20BME007	Ahamed Sharieff	20BME081	Nithin Karthik S
20BME010	S Ananda Kishore	20BME086	Prasath D M
20BME015	Arunvasan S D	20BME090	Rahul V
20BME016	Ashwin k	20BME093	Ramanan B
20BME023	Bravin S D	20BME099	Sangeeth R
20BME033	Gopinathan M	20BME102	Santhosh kumar S
20BME039	Guru G	20BME106	V.Shriyaas
20BME042	Harirajulu S	20bme111	Subramanian M
20BME046	Jagdish Castro	20BME119	Thilak T G
20BME050	K.P.JeyaSuriyaa	20BME124	Vijay v
20BME052	V Jodirr Ramana	20BME233	NIKIL.R



The above internship was initiated by **Dr. C. Velmurugan**, Professor and Head of the Department and coordinated by **Mr. P. D. Devan**, Assistant Professor – II.



PAPER PUBLICATIONS:

Mr. Abdul Khadar Hussain S, Mr. Kavin Kumar S, final year students under the guidance of **Dr. M. A. Vinayagamoorthi**, Assistant Professor - II and **Dr. Sangeetha N**, Senior Associate Professor published their paper in the International Journal of Research and Analytical Reviews (IJRAR) with the title of "Structural Design and Analysis on Various Profile" Volume 10, Issue 4, E-ISSN 2348-1269, P- ISSN 2349-5138

PARTICIPATIONS:

- Following final year students visited ISRO satellite integration and test establishment (ISITE) for research interaction with Thermal Systems Group (TSG) on 09-10-2023.

Mr. Balavignesh P
Ms. Jobisha Celin A
Ms. Muruga Shri V
Mr. Prabhakar T R

- Mr. Melavasal Pandian D**, 2nd year student volunteered Kumaraguru Livestock Hackathon'23 from 28-09-2023 to 01-10-2023.



Mr. Nithesh S V, final year student participated in V - Guard Big Idea Design and Tech Challenge from 21-09-2023 to 23-09-2023.

Student Activities

- **Mr. Krishnan K**, 3rd year student participated in Grand Challenge during Himalayan Startup Trek from 29-09-2023 to 01-10-2023 at IIT Mandi Catalyst.



Mr. Gokulakrishnan M 21BME024 participated in Intra college Drahaa'23 KALAKKAL GALATTA Conducted by Kumaraguru Haasya and Kumaraguru Dramatroupe, where it is the benchmark event of the both the clubs. And also, he is the Winner of Asatha Povathu Yaaru in NIT Festembe'23 held on October 6th 2023.

Following NSS Students volunteered in the "Vanam Kappom (Madhukari Cleaning) Camp on 27-10-2023.

20BME224	Mr. Kathiravan S V
20BME259	Mr. Vaanmugilan M
22BME027	Mr. Giriprasath R
22BME105	Mr. Sree Ram G

Student Activities

Following students participated in FMAE Moto Student event from 26-10-2023 to 02-11-2023 as a part of TEAM Moto KCT and Team Zeall, KCT.

22BME043	Ms. Kamalika M
22BME088	Mr. Sanjaykumar S
22BME102	Mr. Sivathiruthani S
22BME117	Ms. Swetha S
22BME120	Ms. Thiruvazhagi E
22BME126	Mr. Yogesh S
21BME095	Mr. Varun M P



Mr. Kamalesh Ganesan 21BME038 of Our Department participated in Zone 11 Kho Kho Match which was conducted by Sri Raganathar Institute of Engineering & Technology held on 10th & 11th October. Our college team were the Zone 11 Winners.





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):

- P01 :** An ability to independently carry out research /investigation and development work to solve practical problems.
- P02 :** An ability to write and present a substantial technical report/document.
- P03 :** 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.
- P04 :** Apply knowledge and competencies in manufacturing, analytics, supply chain, quality and engineering management.
- P05 :** Apply principles of industrial engineering to solve problems in industry.
- P06 :** An ability to work as part of interdisciplinary teams, communicate effectively, model and design engineering systems optimally.