KUMARAGURU
COLLEGE OF TECHNOLOGY

Department of Mechanical Engineering

Newsletter MExpress

Vol. 03 Issue No. 02

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Editors:
Dr. C. Velmurugan
Mr. B. N. Sreeharan

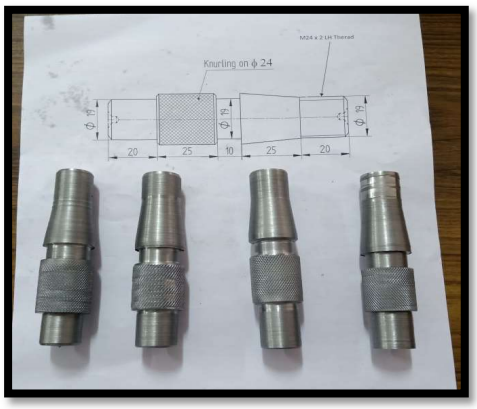
Associate Editors:
Mr. S. Dharun Kumar
Mr. P. Kapil Anandh
Mr. B. Praveen

EVENTS CONDUCTED BY MEA

Mr. MECHANIST

MEA has organized an event named Mr. Mechanist to test their skills and knowledge in Technical aspects and ability to convert the theoretical knowledge into practical one. The event consists of three rounds.

1. Auditing Fundamentals in general Mechanics
2. JAM on Mechanical Component
3. Carving Metal to Material



The event was conducted on 18th October and the result was posed in Instagram page.

MECHBEE INSTA QUIZ CONTEST

MEA has organized an event named MECHBEE INSTA QUIZ CONTEST to check the knowledge level of students. Two questions have been posted daily on MEA official Instagram page around 6:30 to 7 daily.

1) Participants should attend both the question
2) Participants should answer the questions regularly. If a participant is skipping a day then he is disqualified from the contest.

Participants have been shortlisted based on the following criteria,

1) Answering for both questions posted on the same day
2) Answering Questions regularly
3) Number of correct answers at the end of 5th day.

Winner: the_engine_hacker (INSTA ID)
Runner: whitebeast10 (INSTA ID)

MECONNECT

MEA has launched MECONNECT as a tool to increase placements. Students were being trained in various field, thus strengthening their basics.

STUDENTS ACHIEVEMENTS

WORKSHOP PARTICIPATION

- Students of 2nd year Mechanical Engineering are interested towards gaining Knowledge by attending workshops. Mr. Prasanth - 18BME100, Mr. Adithya - 18BME078, Mr. Nithish Kumaran - 18BME062, Mr. Ibrahim Basha - 18BME095, Mr. Vasanth Kumar - 18BME101, Mr. Roshan Ashraf - 18BME114, Mr. Praveen Kumar - 18BME112, Mr. Saran - 18BME113, Mr. Anuj - 18BME113 have Attended a one day workshop on the topic UNVEILING THE REALMS OF 3D PRINTING at SRI RAMAKRISHNA INSTITUTE OF TECHNOLOGY, COIMBATORE which is conducted on 21st September, 2019.

- Ms. Pavithra - 18BME106, Ms. Nandhini - 18BME068, Ms. Madhumitta - 18BME064, Mr. Karuthu Vinayaga Iyyapan - 18BME201, Mr. Arun - 18BME205 had attended a one day workshop on the topic HYBRID VEHICLES at Organized by TOYOTO in GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE on 7th September, 2019

- Mr. Nishank - 18BME060 and Mr. Ilavarasan N.P -18BME141 attended RDC Camp held at Sree Narayana Guru College, Coimbatore from 07.09.2019 to 16.09.2019.

- Mr. V. Raaghul and Mr. Karan Ram have participated in AUTODESK FUSION 360 MODELLING Competition held at SNS College of Technology from 31st September to 1st October 2019.

- Mr. Sri Charan – 18BME020, Mr. Avinash Roshan - 18BME045, Mr. Boopathy Karthik - 18BME202, Mr. Karutthu Vinaayaga Iyyapan - 18BME201, Mr. Karthick - 18BME210, Mr. Alaguraj - 18BME229 have participated in AUTODESK FUSION 360 MODELLING Competition held at SNS College of Technology from 31st September to 1st October 2019.

RC EVENTS

- Mr. Charan, Mr. Vinoj, Mr. Krishna Kanth, Mr. Naveen Krishna, Mr. Kavin Prasanth had participated in AARUUSH'19 Death Drift RC CAR CHAMPIONSHIP Conducted by SRM UNIVERSITY, Chennai on 28th September 2019.

- Mr. Charan, Mr. Vinoj, Mr. Krishna Kanth, Mr. Naveen Krishna, Mr. Kavin Prasanth had participated in a national level technical Symposium KRATORQ'19 Conducted by SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Vadapalani on 20th September 2019.

- Our students participated in the PFA-Adithya Birla Group Case Study competition "Reinventing the future", at Chennai organised by Adithya birla group. and won the Certificate of Honour shield for KCT on 10.09.2019.

PLACEMENTS

Editors, faculty and students of the department put their hands together to congratulate the following students to get placed in the respective companies.

TATA CONSULTANCY SERVICES

1. Mr. DINESH KUMAR N - 16BME038
2. Mr. HARSHATH C-16BME104
3. Mr. KAVIN P-16BME115
4. Mr. BARATH IRAIYARUL P-16BME121
5. Mr. VIGNESH K - 16BME005
6. Mr. INDIRANANDAN V-16BME071
7. Mr. SANTOSH R M - 16BME083
8. Mr. SURESH N - 16BME076
9. Mr. DINESH KUMAR P - 16BME069
10. Mr. NARESH D - 16BME068

Cognizant

20. Mr. VIGNESH K-16BME005
21. Mr. YOGESH S - 16BME012
22. Mr. ARAVIND R - 16BME013
23. Mr. VAISHAK P NAIR-16BME016
24. Mr. RISHIVIGNESH SRISABARI R - 16BME025
25. Mr. RAGHUL P-16BME036
26. Mr. R BALA VIKNESH - 16BME054
27. Mr. NARESH DHANABAL - 16BME068
28. Mr. RANJITH - 16BME078
29. Mr. SANTOSH RM - 16BME083

1. Mr. NIKHIL SS - 16BME086
2. Mr. SASIDHARAN P - 16BME087
3. Mr. SUSANTH B - 16BME100
4. Mr. LAXMANAPANDI B - 16BME103
5. Mr. NAVEEN N - 16BME106
6. Mr. RAMKUMAR - 16BME108
7. Mr. APARAJITH- 16BME127
8. Mr. ROBIN Y - 16BME109
9. Mr. RAGHUL R 16BME110
10. Mr. LOKESH KUMAR - 16BME112
11. Mr. BALAVIGNESH S - 16BME119
12. Mr. BARATH IRAIYARUL - 16BME121
13. Mr. ANISH ANBARSINGH - 16BME129
14. Mr. MADHU PRANESHM - 16BME130
15. Mr. B.MURALIDHARAN - 16BME132
16. Mr. KARTHI ES - 16BME137
17. Mr. MANOJ N - 16BME159
18. Mr. AGNEESH S - 16BME231
19. Mr. M GOWTHAM-16BME070

PLACEMENTS

TISMO

1. Mr. RAGHUL – 16BME022

Infosys

1. Mr. KARTHI ES-16BME137
2. Mr. VYASS YADEVAN A R-16BME138
3. Mr. DINESH M-16BME145
4. Mr. RAKESH S-16BME128
5. Mr. MADHU PRANESH M-16BME130
6. Mr. BARATH IRAIYARUL-16BME121
7. Mr. RAGHUL R-16BME110
8. Mr. LOKESH KUMAR C T-16BME112
9. Mr. KAVIN P-16BME115
10. Mr. C RAMKUMAR-16BME108
11. Mr. LAXMANAPANDI B-16BME103
12. Mr. RAGUPATHY M-16BME096
13. Mr. SANTOSH RM-16BME083
14. Mr. BHARATHRAJ NATARAJAN-16BME060
15. Mr. RAJESH KUMAR-16BME065
16. Mr. VAISHAK P NAIR-16BME016

Whirldata

1. Mr. Durai Raja – 16BME074

accenture

1. Mr. DINESH KUMAR N - 16BME038
2. Mr. SUGANTH.S -16BME219
3. Mr. B. LAXMANAPANDI - 16BME103
4. Mr. L. RAJAGURU-16BME243
5. Mr. PRASANNA R-16BME043
6. Mr. R. GOKULA KRISHNAN-16BME033
7. Mr. A. ANISH-16BME129
8. Mr. E. S. KARTHI-16BME137
9. Mr. SUSANTH B-16BME100
10. Mr. MADHU PRANESH M-16BME130
11. Mr. M. AMUTHAN-16BME124
12. Mr. HARSHATH C-16BME104
13. Mr. KAVIN P-16BME115
14. Mr. BARATH IRAIYARUL P-16BME121
15. Mr. RAMKUMAR C -16BME108
16. Mr. VIGNESH K-16BME005
17. Mr. NIKHIL S-16BME086
18. Mr. SANKAR KRISHNAN B - 16BME095
19. Mr. PRAVEEN M- 16BME098
20. Mr. SURESH N - 16BME076
21. Mr. DARANEESH B - 16BME237
22. Mr. SANGEETHAPRIYAN R-16BME146
23. Mr. MOHAN A- 16BME170
24. Mr. NIKIL KUMAAR N-16BME056
25. Mr. NIZAANTH R - 16BME157
26. Mr. R. BALAVIKNESH - 16BME054
27. Mr. R. RATEESH KUMAR –16BME153

STUDENT ARTICLE

MECHANICAL ENGINEER – JUSTIFICATION

NANDHINI V - 18BME068

A scientist can discover a new star but he cannot make one. He would have to ask an engineer to do it for him. There isn't a country in the world that doesn't need its engineers because engineers only build the society and specifically mechanical engineers, apply fundamental math and physics laws to create and build mechanical devices we use every day. Mechanical engineering is a professional programme which helps to understand the working mechanisms of heavy tools on machineries. Mechanical engineering is the most diverse and versatile of the engineering disciplines. Mechanical engineering touches virtually every aspect of modern life, from mobile phones and biomedical devices to aircrafts and power plants. Not only engineering, mechanical engineers deal with economic issues to the economic impact of a manufacturing plant.

This course covers technical areas like distribution of electricity through generators, transformers, transmission lines, lightning etc. Mechanical Engineering is the study of objects and systems in motion. Anything that needs to be manufactured, anything with moving parts, needs the expertise of a mechanical engineer. The foremost qualities for mechanical engineers are Creativity, Listening skills, Math skills, Mechanical skills and Problem solving skills. Mechanical engineers may design a component, a machine, a system or a process. This ranges from the largest systems like cars, satellite, airplanes etc. to the smallest components like sensors, switches etc. It is one of the oldest and broadest of the engineering disciplines.

This field is now emerging as a evergreen field as it's the only branch of engineering which is immune to the impact of recession. Mechanical engineering emerged as a field during the Industrial Revolution in Europe in the 18th century. However, this field has been developed several thousands of years ago .The application of mechanical engineering can be seen in ancient and medieval societies. This is ranging from steam engine which was created by Ancient Greece to gears by China. Mechanical engineering is the application of the principles and problem solving techniques of engineering from design to manufacturing to the market place for any object. Mechanical engineers analyze their work using the principles of motion, energy and force-ensuring that designs function safely efficiently and reliably, all at a competitive cost. This ranges from the largest systems like cars, satellite, airplanes etc. to the smallest components like sensors, switches etc. It is one of the oldest and broadest of the engineering disciplines.

Many Mechanical engineering companies have begun to incorporate Computer Aided Engineering (CAE) programs into their existing design and analysis processes, including 2D and 3D solid modeling Computer Aided Design. These methods has many benefits including easier visualization of products to virtual assemblies of parts and in designing mating interfaces and tolerances Mechanical engineers play a key roles in a wide range of industries including automotive, aerospace, biotechnology, computers, electronics, microelectromechanical systems, energy conversion, robotics and automation and manufacturing. A Mechanical engineering education empowers students with creative thinking skills to design an exciting product or system.

CASTING THE UNIVERSE; SHAPING THE WORLD; FORGING THE SOCIETY; WELDING THE REST OF ALL OTHER BRANCHES… Because WE ARE THE MACHINES and WE ARE MECHANICAL ENGINEERS!

STUDENT ARTICLE

3D PRINTING

MADHUMITTA P - 18BME064

When we shine we Lighten the world, when we think we Turn the world, When we stand we rule the world, We are Kings of all…Mechanical Engineers!

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object. 3D printing is the opposite of subtractive manufacturing which is cutting out / hollowing out a piece of metal or plastic with for instance a milling machine. 3D printing enables you to produce complex shapes using less material than traditional manufacturing methods.

It all starts with a 3D model. You create one yourself or download it from a 3D repository. When creating it yourself you can choose to use a 3D scanner, app, haptic device, code or 3D modeling software that are available. Industrial grade software can easily cost thousands a year per license, but there's also open source software you can get for free. We often recommend beginners to start Tinkercad. Tinkercad is free and works in your browser, you don't have to install it on your computer. Tinkercad offers beginner lessons and has a built-in feature to get your 3D model printed via 3D print service. Now that you have a 3D model, the next step is to prepare the file for your 3D printer. This is called slicing.

Slicing is dividing a 3D model into hundreds or thousands of horizontal layers and is done slicing software. Some 3D printers have a built-in slicer and let you feed the raw .stl, .obj or even CAD file. When your file is sliced, it's ready to be fed to your 3D printer. This can be done via USB, SD or internet. Your sliced 3D model is now ready to be 3D printed layer by layer.

Adoption of 3D printing has reached critical mass as those who have yet to integrate additive manufacturing somewhere in their supply chain are now part of an ever-shrinking minority. Where 3D printing was only suitable for prototyping and one-off manufacturing in the early stages, it is now rapidly transforming into production technology. Most of the current demand for 3D printing is industrial in nature.

Examples of 3D Printing

3D printing encompasses many forms of technologies and materials as 3D printing is being used in almost all industries you could think of. It's important to see it as a cluster of diverse industries with a myriad of different applications.

A few examples:

- Dental Products
- Eyewear
- Architectural scale models & Marquette's
- Prosthetics
- Movie Props
- Design (lamps, furniture etc)
- Reconstructing fossils in Paleontology
- Replicating ancient artefacts in archaeology
- Reconstructing bones and body parts in forensic pathology
- Reconstructing heavily damaged evidence retrieved from a crime scene

As it evolves, 3D printing technology is destined to transform almost every major industry and change the way we live, work, and play in the future.

DEPARTMENTAL ACTIVITIES

PROGRAMMES ORGANIZED

- The department organized an awareness program titled "Higher Education & Competitive Exams" on 05.09.2019. The awareness was given by M/s. BYJU's Learning Centre, Coimbatore. Dr. N. Sangeetha, Sr. ASP/ME and Mr. S. Suresh, AP/ME coordinated the event.

- Another awareness program on "Higher Education in Abroad" was given by Ms/. Career Zone, Coimbatore on 19.09.2019. Dr. N. Sangeetha, Sr. ASP/ME and Mr. S. Suresh, AP/ME coordinated the event.

- A Guest Lecture on "Advanced Industrial Automation and Robotics" was organized by the department on 16.09.2019. Mr. Rudhrakumar delivered the guest lecture. Mr. V. Manivel Muralidaran, AP (II)/ME and Dr. A. P. Arun AP (II)/ME coordinated the guest lecture.

- Mechanical Engineering Association Installation for 2019-2020 was conducted on 13.09.2019. Mr. Basavaraj, Division head, M/s. KSB Pumps limited Coimbatore" inaugurated and delivered a guest lecture.

- Department organized another Guest Lecture on "AutoDesk Fusion 360" on 19.09.2019. Mr. S. Sivakumar AP (II)/ME and Dr. A. P. Arun, AP (II)/ME coordinated the guest lecture.

FACULTY ACHIEVEMENTS

Following are the details of the recognition of faculty in the Teacher's day celebration on 05.09.2019 at our institution.

- Dr. V. R. Muruganantham, ASP/ME - "Award for Merit - Industry Education relationship".
- Mr. B. Jeeva, AP/ME - "Award for Merit in Teaching".
- Dr. P. S. Samuel Ratna Kumar, AP/ME – "Best Young faculty".
- Dr. C. Velmurugan, HoD/ME – "Punctuality and Attendance".
- Mr. B. N. Sreeharan, AP (II)/ME – "Innovation and Knowledge Transfer".
- Mr. S. Subbiah, AP/ME – "Engal Aasan".

JOURNALS REVIEWED

Dr. C. Velmurugan, HoD/ME reviewed the following papers on 14th September 2019. (i) "Homogenious hybrid aluminium metal matrix composite by stir casting for defence application" for the Journal of Defence Technology, Elsevier Publications (ii) "Investigations on varying compositions of Nylon 6 Polymer matrix composites for wear reduction in application to gears", reviewed for the journal Engineered fibers and Fabrics, SAGE publications.

ONLINE COURSE COMPLETIONS

- Dr. V. R. Muruganantham, ASP/ME, Mr. M. Thirumalai muthukumaran, AP (II)/ME, Mr. T. Karuppusamy, AP (II)/ME and Mr. P. D. Devan, AP/ME completed a course titled "Tale 2: Course Design and Instruction of Engineering Course" through NPTEL.
- Mr. M. Thirumalai muthukumaran, AP (II)/ME completed a course titled "Fundamentals of Manuscript preparation" through Elsevier Researcher Academy.

DEPARTMENTAL ACTIVITIES

PROGRAMMES PARTICIPATED

- Dr. S. Balaji, AP/ME and Mr. S. Subbiah, AP/ME accompanied the TEAM LEGION which won First place in Kill the Hill competition in Quad Torc 2019 conducted by ISNEE from 6th to 10th September 2019 at Bijnor, UP.

- Dr. C. Velmurugan, HoD/ME had attended DC Meeting at Kongu Engineering College on 13.09.2019 for Provisional Confirmation of the Ph. D. Candidate Mr. M. Arul (1814269122) doing research under the guidance of Dr. K. S. K. Sasikumar, Associate Professor, Department of Mechanical Engineering, Kongu Engineering College, Perundurai.

- Dr. K. M. Senthilkumar, ASP/ME and Mr. P. D. Devan, AP/ME participated in the IBM's Conference on Artificial Intelligence on 16th September 2019 at SVPITM, Coimbatore.

- Dr. V. R. Muruganantham, ASP/ME, Dr. S. Balasubramanian, ASP/ME, Mr. M. Thirumalai muthukumaran, AP/ME and Mr. B. N. Sreeharan, AP/ME participated 52nd Engineers' Day 2019 Celebrations on 16th September 2019 at PSG College of Technology, Coimbatore organized by The Institution of Engineers (India), Coimbatore.

- Dr. M. Balaji, ASP/ME, participated in the AICTE sponsored FDP on "Lean six sigma and its applications" at Government College of Technology, Coimbatore from 23.09.2019 to 27.09.2019.

- Dr. S. Sivakumar, AP (III)/ ME and Mr. B. N. Sreeharan, AP (II)/ME participated in a All India Seminar on "Challenges and Research Opportunity for Electric Mobility in India" during 26.09.2019 and 27.09.2019 at KPR Institute of Engineering and Technology Coimbatore.

- Dr. S. Balasubramanian, ASP/ME and Mr. B. N. Sreeharan, AP/ME and Mr. B. Praveen, II Mech. B participated in the Monthly Lecture Meeting on "Relevance of Nuclear Power and Structural Materials for Prototype Fast Breeder Reactor" held on 25th September 2019 (Wednesday) PSG College of Technology, Coimbatore organized by The Institution of Engineers (India), Coimbatore Local Centre in association with The Indian Institute of Metals (IIM), Coimbatore Chapter

- Dr. V. R. Muruganantham, ASP/ME and Mr. P. D. Devan, AP/ME attended TEQIP-III sponsored Training Programme on "Six Sigma Green Belt" jointly conducted by the Department of Mechanical Engineering, Government College of Technology, Coimbatore and Government Engineering College, Jagalpur during 23rd – 27th September 2019.

JOURNAL PUBLICATIONS

- Mr. T. Karuppusamy, AP (II)/ME published a paper entitled "Experimental Study on the Mechanical Properties Heat Treated Aluminium Composites in the International Journal 'Materials Research Express', Vol. 6, No. 6, pp 1-1, http://doi.org/10.1088/2053-1591.

Following are the details of the papers published by our faculty members in the International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-8.

- Mr. P. D. Devan, AP/ME and Dr. V. R. Muruganantham, ASP/ME - "Determination of Natural Frequencies of Spur Gear in Portal Axle Gearbox".
- Mr. P. D. Devan, AP/ME and Dr. K. K. Arun, AP(SRG)/ME - "Design and Research of Heat Recovery Shield at Hot Rolling Mill in Steel Industry".
- Mr. B. N. Sreeharan, AP (II)/ME et al., - "Productivity Improvement using Lean Concept in Automotive Welding Fixture Manufacturing Industry".
- Dr. S. Balasubramanain, ASP/ME, et al., - "Research and Finding Technical Enablers using Ism for Industry 4.0 in Indian Agricultural Industries".
- Dr. S. Bhaskar, ASP/ME, et al., - "A Research on Failure Mode and Effect Inquiry on Tea Leaves Processing - Leaf Shredder Machine.
- Mr. S. Ramanathan, AP(II)/ME, Mr. S. Prabhu, AP/ME, Mr. R. S. Mohankumar, AP/ME "Study of Effects of Obstacles on Heat Transfer and Fluid Flow in Backward Facing Step Flow".
- Dr. Siddhan Sivakumar, AP(III)/ME, "CFD Analysis For Optimal Designing Of Radiator Axial Fan".
- Dr. Sangeetha N, Sr. ASP/ME, et al., "Review on Design and Method to Predict Fatigue Life of an Anti-Vibration Mount".
- Mr. Mohan Kumar R S, AP/ME and Mr. Vinayagamoorthi M A, AP(II)/ME, "Design and Fabrication of Automated Inbuilt Hydraulic Jack for Light Motor Vehicle".
- Dr. P. Sathyabalan, Prof./ME, et al., "Electrodeposition of Transition Metal Composites on Mild steel: Structural and Wear Behaviour".
- Dr. S. Bhaskar, ASP/ME "A Study on Causes of Underemployment of Engineering Graduates Through Quality Control (QC) Tool - Affinity Diagram (KJ Method)" .
- Dr. Muthukumaran. V, Prof./ME et al., "A Review of Implementation of Lean tools across verticals in Manufacturing".
- Mr. S. Prabhu, AP/ME et al., "Investigation of Performance and Emission of IC Engine using Porous medium Cylinder head".
- Dr. Manivel. R, Prof/ME, Dr. MUTHUKUMARAN. V, Prof./ME et al., "Design of Thermal Storage Using Phase Change Material (PCM) For Agro Products Preservation".
- Dr. Thirumurugaveerakumar. S, AP(III)/ME, "Temperature Variation Study on Industrial Bus Duct System by MATLAB and FEA".
- Dr. Siddhan Sivakumar, AP(III)/ME and Dr. Sathyabalan P, Prof./ME, "FEA Assisted Design and Structural Analysis of Vertical axis wind turbine rotor".
- Dr. Manivel. R, Prof./ME, Dr. Siddhan Sivakumar, AP(III)/ME, et al., "Effect of Dynamic Stress on Heavy Duty Centrifugal Pump Assembly Through Fluid Structure Interaction".
- Mr. S. Suresh, AP/ME, Mr. R. S. Mohan Kumar, AP/ME, et al., "A Comparative study on Tribological behaviour of Pongamia biodiesel blended lubricant with Cardanol biodiesel blended lubricant at different loads".

  Dr. Sathyabalan P, Prof./ME, et al., "A Neural Network Model for the Compressive Strength of a Hybrid LM6 Aluminium Alloy Composite".

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 VISION:

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.

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

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7. **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.

8. **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.

9. **Individual and team work:** 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 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 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.