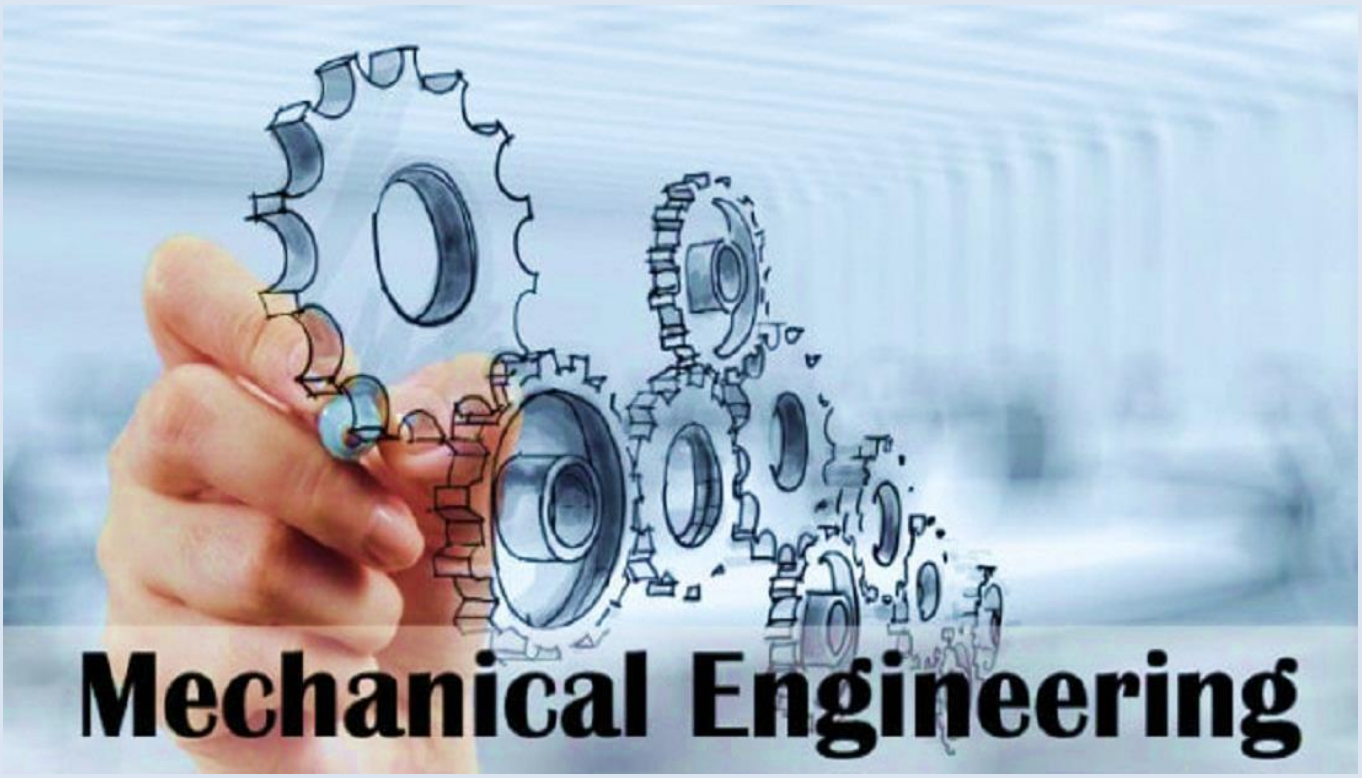
PMC TECH

INSPIRE TO INNOVATE

TECHNICAL MAGAZINE

2023-2024

DEPARTMENT OF MECHANICAL



From Founder's Desk

"Any place that anyone can learn something useful from someone with experience is an Educational Institution"

Time has now come to realize your dream to be in the main stream of your professional career and must be a great feeling to be a part of most prestigious one. PMC TECH has a history of more than 15 years. In recent years degree in the technical education like Engineering, has become the foremost academic qualification for all leading Industries, Government and Non-Government sectors. Academicians and Industrialists alike have recognized the value of the degree in the developing challenges of the rapidly changing technical environment. One of the strength of our campus is the diversity of programs and members background and experience. The range of functional, professional and vocational skills and knowledge that participants bring to the program allow the lecturing faculty to test the validity of theoretical concept against of rich background of personal and organizational outlooks. The Campus environment and work culture will encourage individuals from all walks of life and from all special and economic backgrounds.

From Chairman's Desk

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

True Education indeed paves the path for the children to learn new things in a correct manner. It heals them, broadens their perspectives and enriches their knowledge to face the globally competitive era. PMC TECH- Polytechnic started in 1996 with an objective to provide quality education and excellence in ever changing field of technical education. Technology is moving at a very fast pace. What was breakthrough yesterday is obsolete today. This has made it imperative that future technocrats must be familiar not only with technical skill but also with the technology of tomorrow. The maximum "survival of fittest" is more relevant now than ever before. We believe in value based quality education and faculty Members at PMC TECH – Polytechnic are striving hard for it

From Secretary's Desk

“Education is a progressive discovery of our own ignorance”

At PMC TECH, we value every individual and it is our aim to provide the best possible environment where students can succeed. Our campus has grown from its inception in 2002 to accommodate almost 3000 pupils in first-class teaching facilities which are amidst beautifully kept grounds. We are fortunate to have a talented, highly committed teaching and supporting staff here to ensure the learning environment of our students is the best it can be.

We seek to prepare our young men and women with the very best preparation for life after PMC TECH. Our departing Collegians should be well rounded individuals who are grounded in the Anglican way of faith, hope and love.

From Director's Desk

Er.Peurmal Manimekalai Polytechnic College is an institution that aims at the complete development of the student and our staff are a hand picked and trained to ensure that the students are given every possible support in all their Endeavour's academic or otherwise it is a multi disciplinary institution and this also ensures that the students have ready access to a wide range of academic material.

Our brand of education does not have narrow horizons, we believe in exposure. Our students are encouraged to widen their knowledge base and study beyond the confines of the syllabus.

From Principal's Desk

Er.Perumal Manimekalai Polytechnic College is continuously strive to impart Quality Education along with high ethical and Moral values which enable us, not only to mould our students as successful Diploma Engineers but also as disciplined citizens of our Nation. Also, we continuously upgrade and maintain world class infrastructure keeping in pace with the rapid technological developments.

We are committed to innovation and continuous improvement. We seek to wok closely in partnership with the students and their parents to maximize student performance and success regardless of their ability levels.

ABOUT OUR DEPARTMENT

- Department of Mechanical Engineering was established in the year 1996 to offer a quality education for the students hailing from rural area and meet the industrial demands.
- Mechanical Engineering is the branch of engineering that applies the principles of physics and material science for analysis, design, manufacturing and maintenance of mechanical system.
- The engineering field requires an understanding of core concept including mechanics, thermodynamics, material science, Design, CNC programming.
- Mechanical engineers use these core principles along with the machinery like computer aided manufacturing, computer integrated manufacturing, product life cycle management to design and analyse plants, equipment's and machineries.
- Employment opportunities available for Mechanical engineering diploma holders are found across the entire spectrum of manufacturing industry.
- Different carrier opportunities available for a diploma holder in mechanical engineers, Quality control engineers, Production engineers, Maintenance engineers, and CNC programmer and Design engineers.
- Higher studies opportunities are they can go for Mechanical Engineering, Production engineering, Aeronautical engineering and Post diploma in plastic technology offered by CIPET and Post Diploma Tool Design offered by NTTF.

VISION OF THE DEPARTMENT

- "Achieve excellence in Mechanical Engineering by imparting technical and professional skills along with ethical values".

MISSION OF THE DEPARTMENT

- Educate, prepare and mentor the students for successful careers in their domain of interest.
- Provide infrastructure and conducive environment to get good knowledge and professional skills.
- Motivate the students to follow ethical values and to develop innovative technologies to cater societal needs.

QUALITY POLICY

PMC TECH is committed to create quality professional to meet the emerging industrial and social needs through.

- Innovative teaching
- Industry institute interaction
- Placing faith in human values
- Meeting regularity requirements and aiming continual improvement in all activities.

Program Educational Objectives

- Have strong foundation in the mathematical, scientific and mechanical engineering fundamentals to solve complex engineering problems
- Have successful careers in mechanical industry that meets the need of the society
- Have conducive environment to explore innovation and professional skills
- Become a successful entrepreneur with social responsibilities and ethics to serve the society

Program Specific Outcomes

- Ability to produce mechanical engineering components with the acquired knowledge.

- Ability to design, develop need based products in mechanical engineering.

- Ability to function various domains of mechanical engineering related with Manufacturing Process, Thermal Engineering, Automobile Engineering and Design Engineering.

PROGRAMME OUTCOME

PO1: Basic and Discipline specific knowledge:

Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO2: Problem analysis:

Identify and analyse well-defined engineering problems using codified standard methods.

PO3: Design/ development of solutions:

Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: Engineering practices for society, sustainability and environment:

Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO6: Project Management:

Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: Life-long learning:

Ability to analyse individual needs and engage in updating in the context of technological changes.

Creative Desk

1. Mr D MUTHUKUMAR
   HOD (Admin)
2. Mr A KANAKESWARAN
   HOD (Academic)

Reviewer

1. Mr K JAYANTH
   Lecturer

Editor Incharge

1. Mr M.Manigandasakthivel
   Lecturer
2. Mr G Balasubiramani
   Lecturer
3. Mr.V Arunkumar
   Lecturer
4. Mr N M Boopathi
   Lecturer
5. Mr S Pavendhiran
   Lecturer

Student Member

1. Selvan G Naveen kumar

2. Selvan K Balaji

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3. Selvan K Arunkumar

4. Selvan M Samuel nesaraj

5. Selvi V Janani

6. Selvi S Thanusree

CNC Lathe part programming

- CNC part programming involves a series of coded instructions that are required to produce a part. The program controls the machine tool movements and controls auxiliary functions including spindle, coolant and rotation. The instructions may include numbers, letters, and symbols arranged in functional format blocks.

- CNC part programming uses a program input device such as a keyboard, diskette drivers,pouched tape reader or serial ports among others. The program describes work that should be done on a part in the format required by CNC software. Programming is the point at which all the machining data is compiled and translated so that the control system can understand and implement the instructions.

- Computerized numerical control machining is becoming more popular in computer aided design and computer-aided manufacturing (CAD/CAM) compared to conventional machining processes because of its high level of productivity and precision, coupled with ability to machine complex shapes in 2D and 3D. Computerized numerical control machining with CAD/CAM has evolved over the past three decades and has established itself as the most acceptable and preferable means of manufacturing complex parts because of its flexibility and capacity to replicate parts with high accuracy, especially in high volume manufacturing operation. CNC machining equipment operates on multiple axes, however standard CNC machine has three linear motions along X, Y and Z axes while five axes machine has two additional axes of rotation.

- CNC machining operation has been employed extensively in the automotive industry largely because of the high precision, product consistency and high productivity and efficiency associated with the process. The application of CNC machining in manufacturing has been identified as a feasible solution to problem associated with additive manufacturing The application of CNC machining in manufacturing has been identified as a feasible solution to problem associated with additive manufacturing. Manufacturing method that produces components by adding or laying the material on each other to form a monolithic part. Furthermore, the possibility for automation and flexible manufacturing system has made CNC technology the best option to manufacture complex parts like transmission system and other intricate engineering parts.

PROCESS PLANNING:-

- Generally, the production process begins with conceptualization of the product (shaft) and the

starting point is the selection of the appropriate material and the type of equipment to be used. CNC lathe is the appropriate equipment for the production of the multiple steps shaft.The machining operation was carried out at the CNC laboratory. The major parameters for machining such as cutting speed, feed rate, and the depth of cut were considered. The depth of cut was carefully considered because of the nature of the work-piece while the machining operation was carried out at room temperature of about 280 C, due consideration was given to the measurements to obtain desired result.

Selvan G Naveen kumar
III MECH

GROWTH OF ELECTRIC VEHICLES IN MARKET

- ctor sing this successful trend of minimizing imported petroleum. This supports the U.S. economy and helps diversify the U.S. transportation fleet. Additionally, using an energy source such as electricity for transportation creates a resiliency benefit. The multiple fuel sources used in the generation of electricity results in a more secure and domestically generated energy source for the electrified portion of the transportation sector. All of this adds to our nation's energy security.
- Hybrid electric vehicles (HEVs) typically use less fuel than similar conventional vehicles, because they employ electric-drive technologies to boost vehicle efficiency through regenerative braking—recapturing energy otherwise lost during braking. Plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs), also referred to as battery electric vehicles, are both capable of being powered solely by electricity, which is produced in the United States from natural gas, coal, nuclear energy, wind energy, hydropower, and solar energy.

COST

Although energy costs for hybrid and plug-in electric vehicles are generally lower than for similar conventional vehicles, purchase prices can be significantly higher. Prices are likely to equalize with conventional vehicles, as production volumes increase and battery technologies continue to mature. Also, initial costs can be offset by fuel cost savings, a federal tax credit, and state and utility incentives.

FUEL ECONOMY

HEVs typically achieve better fuel economy and have lower fuel costs than similar conventional vehicles. For example, FuelEconomy.gov lists the 2020 Toyota Corolla Hybrid at an EPA combined city-and-highway fuel economy estimate of 52 miles per gallon (MPG), while the estimate for the conventional 2020 Corolla (four cylinder, automatic) is 34 MPG. Use the Find a Car tool on FuelEconomy.gov to compare fuel economy ratings of individual hybrid and conventional models.

INFRASTRUCTURE AVAILABILITY

Public charging stations, or electric vehicle supply equipment, are not as ubiquitous as gas stations. Charging equipment manufacturers, automakers, utilities, Clean Cities coalitions, municipalities, and government agencies are rapidly establishing a national network of public charging stations. The number of publicly accessible charging stations reached more than 26,000 in 2020, offering more than 80,000 places to charge, according to the Alternative Fueling Station Locator. Search for electric charging stations near you.

EMISSIONS

Hybrid and plug-in electric vehicles can have significant emissions benefits over conventional vehicles. HEV emissions benefits vary by vehicle model and type of hybrid power system. EVs produce zero tailpipe emissions, and PHEVs produce no tailpipe emissions when in allelectric mode.

SELVI S THANUSHREE
III MECH

Cutting Edge Technologies in Mechanical Engineering

of industry. It represents the latest achievements and breakthroughs that push the boundaries of what is currently possible. Cutting-edge technologies often incorporate the latest scientific discoveries, engineering advancements, and creative solutions to address complex problems or enhance existing capabilities.

Additive Manufacturing (3D Printing):

3D printing technology has been revolutionizing the manufacturing industry by enabling the creation of complex geometries, rapid prototyping, and customized products. In mechanical engineering, it's being used to produce lightweight and high-performance components for aerospace, automotive, and medical applications.

Robotics and Automation:

Robotics and automation are being increasingly integrated into various industries, including manufacturing, logistics, and healthcare. Advancements in robotic technology are leading to more sophisticated, agile, and collaborative robots capable of performing complex tasks.

Advanced Materials:

The development of advanced materials with superior properties, such as carbon fiber composites, grapheme, shape memory alloys, and super alloys, is enriching the performance, efficiency, and safety of mechanical systems.

Internet of Things (IoT):

IoT is transforming the way mechanical systems are monitored and controlled. By embedding sensors and connectivity in machines, engineers can collect real-time data, optimize performance, and predict maintenance needs, leading to improved efficiency and reduced downtime.

Computational Fluid Dynamics (CFD):

CFD simulations are becoming more powerful and accessible, enabling engineers to study fluid behavior, heat transfer, and aerodynamics with greater accuracy. This technology finds applications in designing efficient cooling systems, aerodynamic optimizations, and weather simulations.

Nanotechnology:

Nanotechnology is offering opportunities for mechanical engineers to create advanced materials, coatings, and nanoscale devices with unique properties, leading to improve- ments in strength, durability, and functionality.

Energy Harvesting and Storage:

The focus on renewable energy and sustainability has driven research in energy harvesting technologies. Mechanical engineers are exploring innovative ways to capture and store energy from vibrations, heat, and other mechanical sources

Selvan K Balaji
III MECH

MARVELS IN MECHANICAL ENGINEERING

- A Hyperloop is a proposed high-speed transportation system for both passenger and freight transport. The term was coined by Elon Musk to describe the modern open-source project originally conceived in the 1900s. Hyperloop is described as a big vacuum sealed tube or a system of connected vacuum sealed tubes having very low air pressure through which a pod may travel substantially free of air resistance or friction.

- Proposed hyperloop designs employ three essential components: tubes, pods, and terminals. Here, a tube is a large sealed, low-pressure system. A pressurized coach (at atmospheric pressure) runs inside this controlled low-pressure environment (which is usually a long tunnel). A coach is often called a pod. The pod may use aerodynamic or magnetic propulsion to glide along a fixed guideway, with terminals handling pod arrivals and departures.

- The hyperloop has its roots in a concept by George Medhurst in 1799 and subsequently developed under the names pneumatic railway, atmospheric railway or vactrain. Elon Musk renewed interest in hyperloop after mentioning it in a 2012 speaking event. Musk further promoted the concept by publishing a white paper in August 2013, which conceived of a hyperloop route running from the Los Angeles region to the San Francisco Bay Area, roughly following the Interstate 5 corridor. His initial concept incorporated reduced-pressure tubes in which pressurized capsules ride on air bearings driven by linear induction motors and axial compressors. Transportation analysts challenged the cost estimates included in the white paper, with some predictions that a realized hyperloop would be several billion dollars over budget.

- The hyperloop concept has been "open-sourced" by Musk and SpaceX, and other companies or organizations have been encouraged to freely advance the technology, preferably in collaborations. TUM Hyperloop set the hyperloop speed record of 463 km/h (288 mph) in July 2019 at the pod design competition hosted by SpaceX in Hawthorne, California. Virgin Hyperloop conducted the first human trial in November 2020 at its test site in Las Vegas, reaching a top speed of 172 km/h (107 mph). Concept

- The vactrain concept was first invented by Robert H. Goddard as a freshman at Worcester Polytechnic Institute in 1904. Goddard subsequently refined the idea in a 1906 short story called "The High-Speed Bet" which was summarized and published in a Scientific American editorial in 1909 called "The Limit of Rapid Transit". Esther, his wife, was granted a US patent for the vactrain in 1950, five years after his death. Musk first mentioned that he was thinking about a concept for a "fifth mode of transport", calling it the Hyperloop, in July 2012 at a PandoDaily event in Santa Monica, California. This hypothetical high-speed mode of transportation would have the following characteristics: immunity to weather, collision free, twice the speed of a plane, low power consumption, and energy storage for 24-hour operations. The name Hyperloop was chosen

because it would go in a loop. Musk envisions the more advanced versions will be able to go at hypersonic speed. In May 2013, Musk likened the Hyperloop to a "cross between a Concorde and a railgun and an air hockey table".

Human factors

Some critics of Hyperloop focus on the experience—possibly unpleasant and frightening—of riding in a narrow, sealed, windowless capsule inside a sealed steel tunnel, that is subjected to significant acceleration forces; high noise levels due to air being compressed and ducted around the capsule at near-sonic speeds; and the vibration and jostling. Even if the tube is initially smooth, ground may shift with seismic activity. At high speeds, even minor deviations from a straight path may add considerable buffeting.

Selvi V Janani
III MECH

FRICTION WELDING

- Friction stir welding (FSW) is a solid-state joining process that uses a non-consumable tool to join two facing workpieces without melting the workpiece material. Heat is generated by friction between the rotating tool and the workpiece material, which leads to a softened region near the FSW tool. While the tool is traversed along the joint line, it mechanically intermixes the two pieces of metal, and forges the hot and softened metal by the mechanical pressure, which is applied by the tool, much like joining clay, or dough. It is primarily used on wrought
or extruded aluminium and particularly for structures which need very high weld strength.
- FSW is capable of joining aluminium alloys, copper alloys, titanium alloys, mild steel,stainless steel and magnesium alloys. More recently, it was successfully used in welding of polymers. In addition, joining of dissimilar metals, such as aluminium to magnesium alloys, has been recently achieved by FSW. Application of FSW can be found in modern shipbuilding, trains, and aerospace applications.
- It was invented and experimentally proven at The Welding Institute (TWI) in the UK in December 1991. TWI held patents on the process, the first being the most descriptive.

Principle of Operation

- The FSW is performed with a rotating cylindrical tool which has profiled pin (also known a probe) having diameter smaller than the diameter of shoulder. During welding the tool is fed into a butt joint between two clamped workpieces, until the probe pierces into the workpiece and shoulder touches the surface of the workpieces. The probe is slightly shorter than the weld depth required, with the tool shoulder riding atop the work surface. After a short dwell time, the tool is moved forward along the joint line at the pre-set welding speed.
- Frictional heat is generated between the wear-resistant tool and the work pieces. This heat, along with that generated by the mechanical mixing process and the adiabatic heat within the material, cause the stirred materials to soften without melting. As the tool is moved forward, a special profile on the probe forces plasticised material from the leading face to the rear, where the high forces assist in a forged consolidation of the weld. This process of the tool traversing along the weld line in a plasticised tubular shaft of metal results in severe solid-state deformation involving dynamic recrystallization of the base material.

Micro-structural features

- The solid-state nature of the FSW process, combined with its unusual tool shape and asymmetric speed profile, results in a highly characteristic micro-structure. The microstructure can be broken up into the following zones:
    - The stir zone (also known as the dynamically recrystallised zone) is a region of heavily deformed material that roughly corresponds to the location of the pin during welding. The grains within the stir zone are roughly equiaxed and often an order of magnitude smaller than the grains in the parent material. A unique feature of the stir zone is the common occurrence of several concentric rings, which has been referred to as an "onion-ring" structure. The precise origin of these rings has not been firmly established, although variations in particle number density, grain size and texture have all been suggested.
    - The flow arm zone is on the upper surface of the weld and consists of material that is dragged by the shoulder from the retreating side of the weld, around the rear of the tool, and deposited on the advancing side.
    - The thermo-mechanically affected zone (TMAZ) occurs on either side of the stir zone. In this region the strain and temperature are lower and the effect of welding on the micro-structure is correspondingly smaller.

Selvan M Samuel nesaraj
III MECH

GUEST LECTURE

SL	Guest Name with Designation	Topic	Date
1	V. SENTHIL KUMAR M.E	E-Vehicle technology	18/03/2024

- Guest lecture conducted as a seminar session about mechanical system in various applications. The students understood the practical importance of mechanical systems in our day to day life.

- The session mainly focused on automobiles and air conditioning systems. It encouraged the students to learn more about mechanical systems

INDUSTRIAL VISIT

THERMAL POWER PLANT, METTUR, HOSUR (01/08/2023 & 02/08/2023)

- Industry Name : Mettur Thermal Power Plant, Mettur
- Visiting Date : 01.08.2023 & 02.08.2023

Company Profile :

- This is the first inland Thermal Power Station of Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO Ltd.). The plant is located on the left flank of the Ellis surplus course of Mettur Reservoir.

- The boilers of the Mettur thermal Power Station-I, capable of producing 700tonnes of steam per hour at 540 C and 137 kg/cm 2 pressure were supplied by M/s. BHEL, Trichy. The Turbo Generators were supplied by M/s. BHEL, Haridwar

SYMPOSIUM : TECHFEST 2K24

We have conducted national level technical symposium on 08.02.2024

Chief Guest :

Inaugural :

Mr P.P. Govindaraju
Principal
Government Polytechnic College, Kelamangalam

Valedictory :

Mr G.Somasundaram ., MBA ., M-Tech
Sr. manager, HR, Titan Industries, Hosur

SPORTS

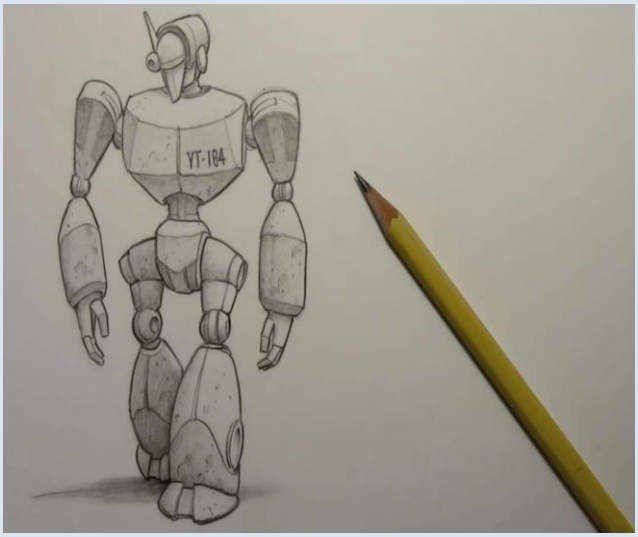
Our Students participated on a regional level inter polytechnic volley ball tournament at KAR Polytechnic College,Vellore on 15.09.2023

Students Achievements :

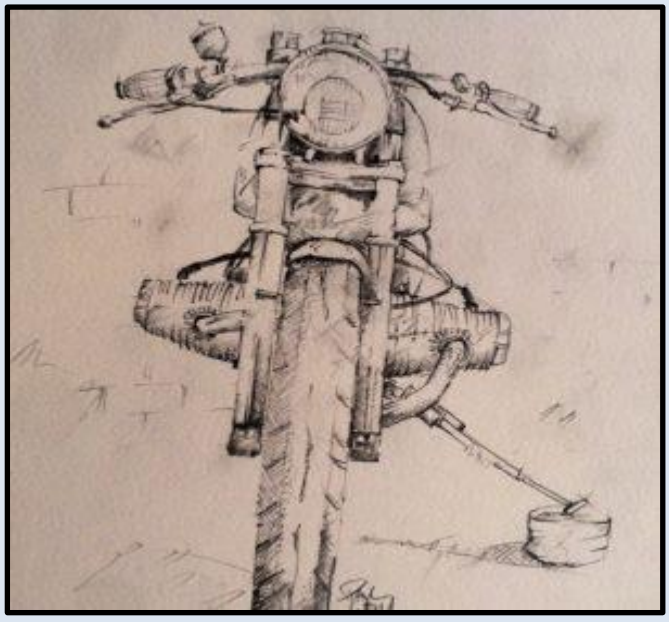
- Our Department students participate in National Level Technical Symposium at various colleges

S.NO	NAME OF COLLEGE	ACHIEVEMENT
1	Kongu polytechnic college, Erode	First Prize
2	Nachimuthu Polytechnic College, Pollachi	Participation
3	Government Polytechnic College, Kelamangalam	Second Prize
4	Shreenivasa Polytechnic College, Dharmapuri	Participation

ART BY STUDENTS

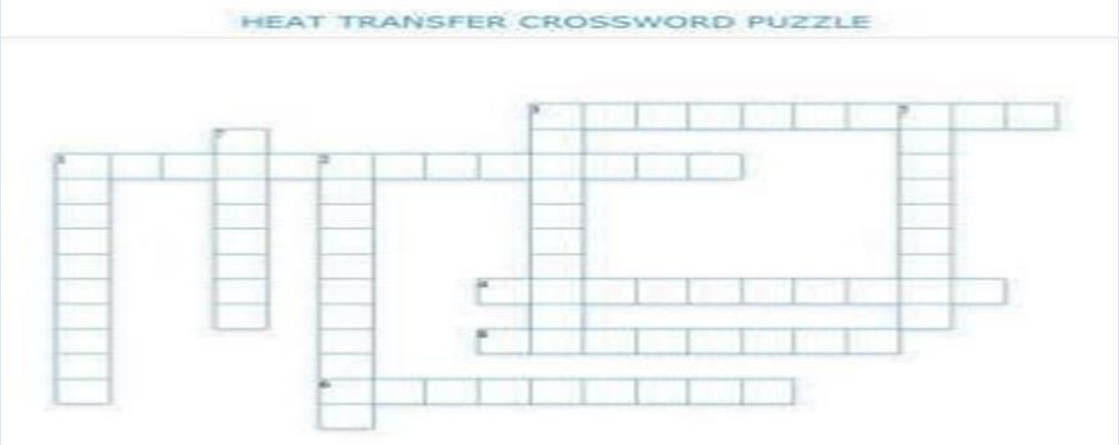


Sanjeev Parthi.V
III MECH



MADESH R
II MECH

CROSS WORD PUZZLE :



ACROSS :

1. The ratio of heat transfer with fin to the heat transfer without fin is called as fin.

3. For solid applications which type of mode heat transfer used

4. On which number lumped parameter analysis depends.

6. For which mode of heat transfer the Stefan's Boltzmann's law is used.

8. The state in which there is a chance in temperature with respective time is called.

DOWN :

1. The ratio of actual heat transfer to maximum possible heat transfer is called as FIN

2. Heat is closely related to

3. Heat transfer in liquid and gases takes place by

5. Thermal conductivity of air with rise in temperature.

7. Thermal insulation is used to prevent the

PHOTO GALLERY

RECRUITERS


SANMAR
₹ 2,57,000 / annum
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AVTEC
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NEEL METAL
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natural
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