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Knowledge, skills and values

MECHAZINE

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Department of Mechanical Engineering
Annual Magazine
2019-20

Letter from the Editors

Dear Readers,

As Editorial Board Members of Mechanical Engineering Departmental Magazine, it is our immense pleasure to welcome you to the latest edition of magazine ***Mechazine***. The objective of magazine is to update and showcase the latest development of Mechanical engineering and application of Mechanical technology. ***Mechazine*** includes articles from Mechanical Engineering Department. Let us join hands and explore the boundless universe in quest of the never-ending truth of Mechanical Engineering and build a new world of sustainable development. We would like to thank the management of Institute of Engineering & Science, IPS Academy, all the reviewers and authors.

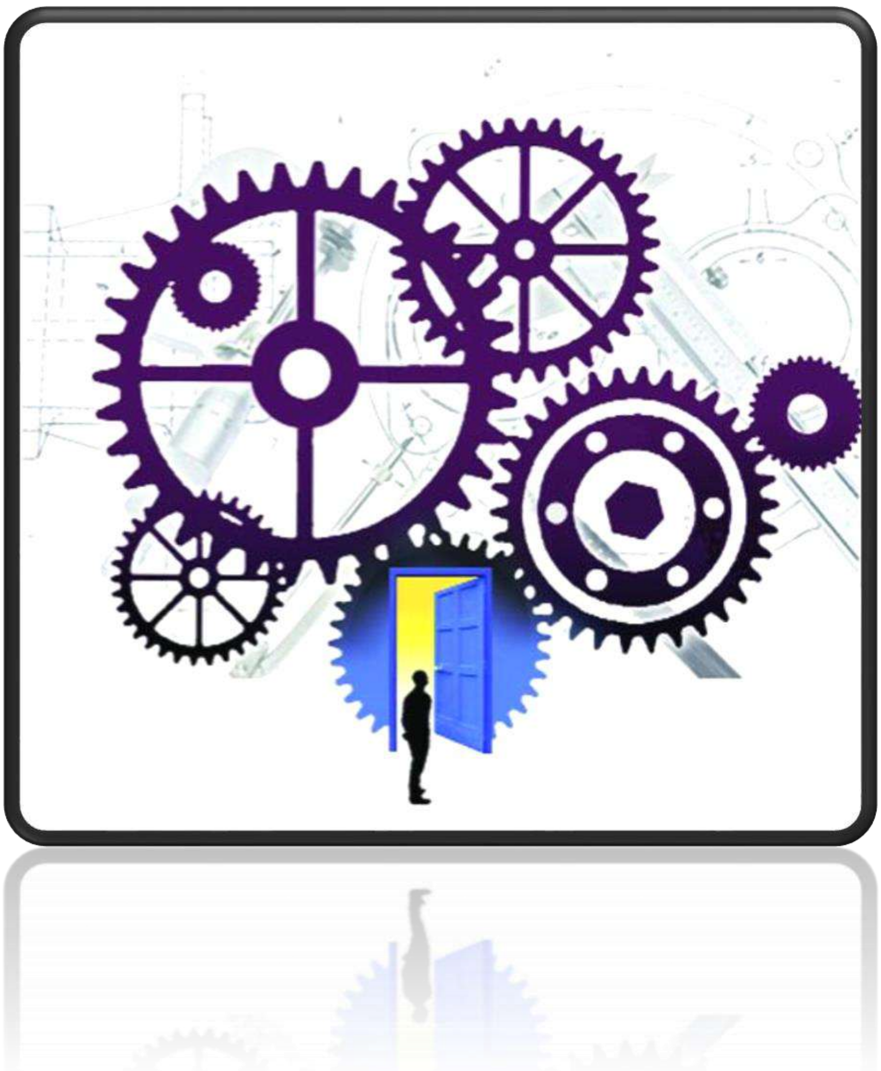
We take this opportunity to thank our respected Principal **Dr. Archana Keerti Chowdhary,** HOD **Dr. Sanjay Jain** and all the faculty members for their incessant inspiration and kind support.

We hope that this edition would be enjoyable as well as informative.

Editors…

Content

STUDENT ARTICLES



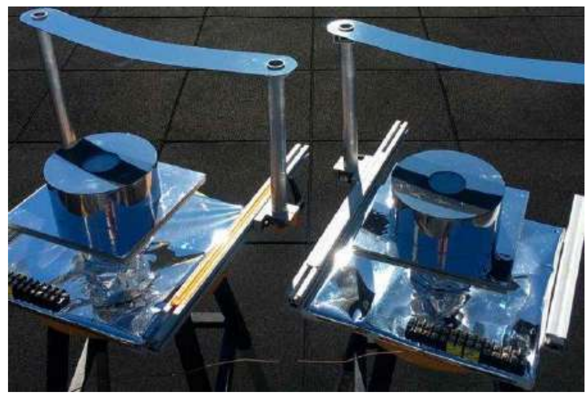
New Way to Provide Cooling Without Power

MIT researchers have devised a new way of providing cooling on a hot sunny day, using inexpensive materials and requiring no fossil fuel-generated power. The passive system, which could be used to supplement other cooling systems to preserve food and medications in hot, off-grid locations, is essentially a high-tech version of a parasol.

The system allows emission of heat at mid-infrared range of light that can pass straight out through the atmosphere and radiate into the cold of outer space, punching right through the gases that act like a greenhouse. To prevent heating in the direct sunlight, a small strip of metal suspended above the device blocks the sun's direct rays.

The new system is described this week in the journal *Nature Communications* in a paper by research scientist Bikram Bhatia, graduate student Arny Leroy, professor of mechanical engineering and department head Evelyn Wang, professor of physics Marin Soljacic, and six others at MIT.

In theory, the system they designed could provide cooling of as much as 20 degrees Celsius (36 degrees Fahrenheit) below the ambient temperature in a location like Boston, the researchers say. So far, in their initial proof-of-concept testing, they have achieved a cooling of 6 C (about 11 F). For applications that require even more cooling, the remainder could be achieved through conventional refrigeration systems or thermoelectric cooling.



Other groups have attempted to design passive cooling systems that radiate heat in the form of mid-infrared wavelengths of light, but these systems have been based on complex engineered photonic devices that can be expensive to make and not readily available for widespread use, the researchers say. The devices are complex because they are designed to reflect all wavelengths of sunlight almost perfectly, and only to emit radiation in the mid-infrared range, for the most part. That combination of selective reflectivity and emissivity requires a multilayer material where the thicknesses of the layers are controlled to nanometer precision.

But it turns out that similar selectivity can be achieved by simply blocking the direct sunlight with a narrow strip placed at just the right angle to cover the sun's path across the sky, requiring no active tracking by the device. Then, a simple device built from a combination of inexpensive plastic film, polished aluminum, white paint, and insulation can allow for the necessary emission of heat through mid-infrared radiation, which is how most natural objects cool off, while preventing the device from being heated by the direct sunlight. In fact, simple radiative cooling systems have been used since ancient times to achieve nighttime cooling; the problem was that such systems didn't work in the daytime because the heating effect of the sunlight was at least 10 times stronger than the maximum achievable cooling effect.

But the sun's heating rays travel in straight lines and are easily blocked -- as we experience, for example, by stepping into the shadow of a tree on a hot day. By shading the device by essentially putting an umbrella over it, and supplementing that with insulation around the device to protect it from the ambient air temperature, the researchers made passive cooling more viable.

"We built the setup and did outdoors experiments on an MIT rooftop," Bhatia says. "It was done using very simple materials" and clearly showed the effectiveness of the system.

"It's kind of deceptively simple," Wang says. "By having a separate shade and an emitter to the atmosphere -- two separate components that can be relatively low-cost -- the system doesn't require a special ability to emit and absorb selectively. We're using angular selectivity to allow blocking the direct sun, as we continue to emit the heat-carrying wavelengths to the sky."

This project "inspired us to rethink about the usage of 'shade,'" says Yichen Shen, a research affiliate and co-author of the paper. "In the past, people have only been thinking about using it to reduce heating. But now, we know if the shade is used smartly together with some supportive light filtering, it can actually be used to cool the object down," he says.

One limiting factor for the system is humidity in the atmosphere, Leroy says, which can block some of the infrared emission through the air. In a place like Boston, close to the ocean and relatively humid, this constrains the total amount of cooling that can be achieved, limiting it to about 20 degrees Celsius. But in drier environments, such as the southwestern U.S. or many desert or arid environments around the world, the maximum achievable cooling could actually be much greater, he points out, potentially as much as 40 C (72 F).

While most research on radiative cooling has focused on larger systems that might be applied to cooling entire rooms or buildings, this approach is more localized, Wang says: "This would be useful for refrigeration applications, such as food storage or vaccines." Indeed, protecting vaccines and other medicines from spoilage in hot, tropical conditions has been a major ongoing challenge that this technology could be well-positioned to address.

Even if the system wasn't sufficient to bring down the temperature all the way to needed levels, "it could at least reduce the loads" on the electrical refrigeration systems, to provide just the final bit of cooling, Wang says.

The system might also be useful for some kinds of concentrated photovoltaic systems, where mirrors are used to focus sunlight on a solar cell to increase its efficiency. But such systems can easily overheat and generally require active thermal management with fluids and pumps. Instead, the backside of such concentrating systems could be fitted with the mid-infrared emissive surfaces used in the passive cooling system, and could control the heating without any active intervention.

As they continue to work on improving the system, the biggest challenge is finding ways to improve the insulation of the device, to prevent it from heating up too much from the surrounding air, while not blocking its ability to radiate heat. "The main challenge is finding insulating material that would be infrared-transparent," Leroy says.

The team has applied for patents on the invention and hope that it can begin to find real-world applications quite rapidly.

Arun Rawal (3rd Year)

Water Purification machine (What Future really needs not just e-vehicles?)

Abstract: This is a “Unique independent, integrated Water purification system” and it caters to remote communities, villages at crises. The main goal of the machine is to deliver “Potable drinking water- from any

source, anytime, anywhere. The jeep is mobile, self-contained, independent and automatic and this machine produces Drinking Water according to (World Health Organisation) WHO Water standards. The technique not only desalinates the seawater, it's capable of removing sewage and dirt from it too. The researchers combined expertise in oceanography, chemical engineering, agricultural engineering and biosystems engineering to come up with the solution.

Introduction: India faces quite a bad water situation, as a large part of the population does not have access to proper drinking water. Most of the Indian water bodies get polluted with organic and hazardous pollutants. Moreover, there are interstate disputes over river waters. With a steadily increasing population that will reach an estimated 1.7 billion by 2050, there is a dire need to find ways to provide clean drinking water. Groundwater is not considered a sustainable source, as it may end one day due to over extraction. This leads to a need to improve our wastewater treatment as well as desalination. This GalMobile-like technology can be a huge help to India, especially since the country has a large part of its borders, linked to seas an oceans.

The jeep is a patented project developed by GAL Water Technologies. In February 2015, the company launched a unique Water Purification System, GALMOBILE, the first of its kind in the world. The mobile plant can purify up to 20,000 litres of sea water a day and 80,000 litres of brackish, muddy or contaminated river water and bring it to WHO standards. It is a “Unique independent, integrated Water purification system” and it caters to remote communities, villages at crises, and emergency situations in Israel. The main goal of the machine is to deliver “Potable drinking water- from any source, anytime, anywhere.” Israel’s technology is a source of envy for many world nations.

Saline water can be made into freshwater, which is the purpose of this portable, inflatable solar still (it even wraps up into a tiny package). The process is called desalination, and it is being used more and more around the world to provide people with needed freshwater. Most of the United States has, or can gain access to, ample supplies of freshwater for drinking purposes. But, freshwater can be in short supply in many parts of the Nation and world. And, as the population continues to grow, shortages of freshwater will occur more often, if only in certain locations. In some areas, salt water (from the ocean, for instance) is being turned into freshwater for drinking.

The "simple" hurdle that must be overcome to turn seawater into freshwater is to remove the dissolved salt in seawater. That may seem as easy as just boiling some seawater in a pan, capturing the steam and condensing it back into water (distillation). Other methods are available but these current technological processes must be done on a large scale to be useful to large populations, and the current processes are expensive, energy-intensive, and involve large-scale facilities.

Need of this machine: The scarcity of freshwater resources and the need for additional water supplies is already critical in many arid regions of the world and will be increasingly important in the future. Many arid areas simply do not have freshwater resources in the form of surface water such as rivers and lakes. They may have only limited underground water resources, some that are becoming more brackish as extraction of water from the aquifers continues. Solar desalination evaporation is used by nature to produce rain, which is the main source of freshwater on earth.

Another way saline water is desalinized is by the "reverse osmosis" procedure. In most simplistic terms, water, containing dissolved salt molecules, is forced through a semipermiable membrane (essentially a filter), in which the larger salt molecules do not get through the membrane holes but the smaller water molecules do. Reverse osmosis is an effective means to desalinate saline water, but it is more expensive than other methods. As prices come down in the future the use of reverse osmosis plants to desalinate large amounts of saline water should become more common.

Characteristics of this machine:

1. The jeep is mobile, self-contained, independent and automatic.
2. It is quite lightweight, as it weighs just 1540 Kgs.
3. It can connect to any possible Water source (rivers, lakes, oceans, brackish water, wells, and more.
4. The machine produces Drinking Water according to (World Health Organisation) WHO Water standards.
5. The jeep can control and analyse stable supply of drinking water.
6. It features an advanced control system, which reduces the need for operator

attendance and works on ‘Plug and Play’ configuration

7. The GalMobile can resist to all weather conditions.

8. The speed of the jeep is 90 kilometres per hour.

9. It is an Independent energy source.

10. In order to deploy the GalMobile, one needs less than 30 minutes, by just 2 people.

11. It contains an integrated water storage tank with a capacity of 265 Gallons to 2650 Gallons.

12. The jeep runs on a mere 12V low voltage system.

13. The GalMobile has small dimensions, which makes it easy to store, carry and ship.

Story Source:

1.http://gal-water.com/solutions/drinking-water-2/project-5-2/mobile-systems-accessories/

2. https://www.usgs.gov/special-topic/water-scienceschool/science/desalination?qt-science_center_objects=0#qtscience_center_objects

3.https://www.financialexpress.com/industry/technology/what-is-galmobile-how-israelitechnology-netanyahus-fascinating-jeep-can-solve-water-woes-in-modis-

Harsh Baria (3rd Year)

Underwater Welding

Introduction: Welding processes have become increasingly important in almost all manufacturing industries and for structural application]. Although, a large number of techniques are available for welding in atmosphere, many of them cannot be applied in offshore and marine application where presence of water is of major concern. In this regard, it is relevant to note that, a great majority of offshore repairing and surfacing work is carried out at a relatively shallow depth, in the region intermittently covered by the water known as the splash zone. This is predominantly because of the fact that the probability of failure is maximum at a shallow depth of water because of maximum collision probability between the ship and platform. Though, numerically most ship repair and welding jobs are carried out at a shallow depth, most technologically challenging task lies in the repairing at a deeper water level, especially, in pipelines and occurrence/creation of sudden defects leading to a catastrophic accidental failure. The advantages of underwater welding are of economical nature, because underwater-welding for marine maintenance and repair jobs bypasses the need to pull the structure out of the sea and saves much valuable time. The main difficulties in underwater welding are the presence of a higher pressure due to the water head under which welding takes place, chilling action of the water on the weld metal (which might change the metallurgical structures and properties), the possibility of producing the arc mixtures of hydrogen and oxygen in pockets, which might set up an explosion, and the common danger sustained by divers, of having nitrogen diffused in the blood in dangerous proportions. Furthermore, complete insulation of the welding circuit is an essential requirement of underwater welding. In practice, the use of underwater wet welding for offshore repairs has been limited mainly because of porosity and low toughness in the resulting welds. With appropriate consumable design, however, it is possible to reduce porosity and to enhance weld metal toughness through microstructural refinement. Hence, welding in offshore and marine application is an important area of research and needs considerable attention and understanding where, many problems are still unsolved. In the present review, a brief understanding of the problems in underwater welding will be discussed in context to the existing welding techniques. Detailed description of a few advanced welding techniques has also been made. Finally, the scope of further research would be recommended.

Classification of Underwater Welding: Underwater welding may be divided into two main types, wet and dry welding.

(a) Wet welding: It is carried out directly at ambient water pressure with the welder/diver in the water using water-proof stick electrode and without any physical barrier between water and welding arc.Special precaution should be taken to produce underwater arc to protect it from surrounding water. Wet welding does not need any complicated experiment set up, it’s economical and can be immediately applied in case of emergency and accident as it does not need water to be evacuated. However, difficulties in welding operation due to lack of visibility in water, presence of sea current, ground swells in shallow water and inferior weld qualities (increased porosities, reduced ductility, greater hardness in the heat affected zone, hydrogen pick up from the environment) are the notable disadvantages of wet welding technique.

(b) Dry welding: Dry welding in underwater may be achieved by several ways:

- Dry habitat welding Welding at ambient water pressure in a large chamber from which water has been displaced, in an atmosphere such that the welder/diver does not work in diving gear. This technique may be addressed as dry habitat welding.
- Dry chamber welding Welding at ambient water pressure in a simple open-bottom dry chamber that accommodates the head and shoulders of the welder/diver in full diving gear.
- Dry spot welding Welding at ambient water pressure in a small transparent, gas filled enclosure with the welder/diver in the water and no more than the welder/diver's arm in the enclosure.
- Dry welding at one atmosphere Welding at a pressure vessel in which the pressure is maintained at approximately one atmosphere regardless of outside ambient water pressure.
- Cofferdam welding Welding inside of a closed bottom, open top enclosure at one atmosphere.

Underwater welding in a dry environment is made possible by encompassing the area to be welded with a physical barrier (weld chamber) that excludes water. The weld chamber is designed and custom built to accommodate braces and other structural members whose centerlines may intersect at or near the area that is to be welded. The chamber is usually built of steel, but plywood, rubberized canvas, or any other suitable material can be used. Size and configuration of the chamber are determined by dimensions and geometry of the area that must be encompassed and the number of welders that will be working in the chamber at the same time. Water is displaced from within the chamber by air or a suitable gas mixture, depending upon water depth and pressure at the work site. Buoyancy of the chamber is offset by ballast, by mechanical connections and chamber to the structure, or by a combination of both.

Dry welding requires a pressurized enclosure having controlled atmosphere. Weld metal is not in direct contact with water. Advantages of dry welding are improvement in stability of welding operation, reduced hydrogen problem, lower quench rate of the weld and base metal and restoration of weld strength and ductility. Dry welding may be carried out under high pressure, which consists of preparing an enclosure to be filled with gas (helium) under high pressure (hyperbaric) to push water back, and have the welder, fitted with breathing mask and other protective equipment. Limitations of hyperbaric welding are the practical difficulties in sealing the chamber and increase in pressure as weld depth increases leading to problem which affects both the weld chemistry and microstructures.

Risks: Associated with Underwater Welding There is a risk to the welder/diver of electric shock. Precautions include achieving adequate electrical insulation of the welding equipment, shutting off the electricity supply immediately the arc is extinguished, and limiting the open-circuit voltage of MMA (SMA) welding sets. Secondly, hydrogen and oxygen are produced by the arc in wet welding.

Precautions must be taken to avoid the build-up of pockets of gas, which are potentially explosive. The other main area of risk is to the life or health of the welder/diver from nitrogen introduced into the blood steam during exposure to air at increased pressure. Precautions include the provision of an emergency air or gas supply, standby divers, and decompression chambers to avoid nitrogen narcosis following rapid surfacing after saturation diving.

For the structures being welded by wet underwater welding, inspection following welding may be more difficult than for welds deposited in air. Assuring the integrity of such underwater welds may be more difficult, and there is a risk that defects may remain undetected.

Characteristics of a Good Underwater Welding: The characteristics of a good underwater welding process are:

(a) Requirement of inexpensive welding equipment, low welding cost, easy to operate and flexibility of operation in all positions.

(b) Minimum electrical hazards, a minimum of 20 cm/min welding speed at least.

(c) Permit good visibility.

(d) Produce good quality and reliable welds.

(e) Operator should be capable in supporting himself.

(f) Easily automated.

Application of Underwater Welding: The important applications of underwater welding are:

(a) Offshore construction for tapping sea resources,
(b) Temporary repair work caused by ship's collisions or unexpected accidents.

(c) Salvaging vessels sunk in the sea

(d) Repair and maintenance of ships

(e) Construction of large ships beyond the capacity of existing docks.

Alex Louis (2nd Year)

Cryogenic Engines

What is Cryogenics? While refrigeration deals with the achievement of low temperatures, cryogenics takes it a step further dealing with extremely low temperatures, going below -1500C. Basically these involve temperatures at which otherwise normally gaseous substances like Nitrogen, Oxygen, Hydrogen, Helium, etc. are turned into liquids. It is derived from the Greek words "Kryos" meaning frost and "Genic" meaning to produce. A commonly used cryogen like LOX (Liquid Oxygen) requires a temperature of -1830C to change into the liquid phase and Helium at -2690C. According to the second law of thermodynamics, there is a barrier towards to the lower end of the temperature scale below which a temperature cannot be attained. This is known as the "absolute zero" and is equal to a value of -273.150C or in the Kelvin scale, 0 K. This is impossible to attain since it would require infinite amount of energy to attain this state. At such low temperatures, atoms and molecules behave differently than at normal due to quantum mechanical effects. For example, liquid helium at a temperature of about 2K has zero viscosity and can creep up the walls of a container, this is called a superfluid. Certain materials when treated with cryogens exhibit special properties, like when metals are cooled at those temperatures they behave as super conductors. Cryogenic Liquids are used extensively in the aerospace, food, medicine, electronics and energy industries.

Such low temperatures cannot be measured using the conventional mercury and alcohol thermometers since they freeze much before that. Special temperature sensing devices using special materials like platinum (up to 20K temperature) and doped germanium (up to 1K Temperature). These materials are used resistance temperature sensing devices and need the appropriate calibration. These are generally used in combinations as primary and secondary sensing devices.

Generation of the cryogenic temperatures involves the process of liquefaction of gases. There are many different methods of liquefying gases but they work on the same principle. Air is extracted and compressed to great extent causing it to heat up. It is then allowed to come down to room temperature keeping the pressure constant. It is then further cooled through a heat exchanger to a lower temperature. This is now expanded (pressure lowered) back to atmospheric pressure. This expansion causes rapid cooling and some portion of the air is liquefied. The cool gases are sent to the beginning of the heat exchanger to cool the incoming compressed gas from the first stage. The liquefied air is distilled to separate the components like Oxygen, Nitrogen, Argon, etc. Lighter gases like helium can also be achieved but adding stages of expansion, i.e. the cold gases from the first stage is further depressurized in steps to produce a lower temperature.

The Cryogenic Rocket Engine

Why does the need to liquefy gases arise? Rocket engines work something like this: A primary fuel is combusted using an oxidizer (in a combustion chamber) which generates a lot of energy causing rapid expansion of the gases resulting in a high pressure, this high pressure energy is converted into kinetic energy by passing it through a nozzle. To generate higher thrust at a greater efficiency, a higher mass flow rate of both oxidizer and fuel are required. This is where the difference between gases and liquids becomes significant. They are differentiated by their intermolecular separation. So, in a given volume of both phases, liquid state contains more mass than the gaseous state. So if the oxidizer and fuel are in their liquid state, it will consume lower energy to pump them at a higher mass flow rate and at the same time, consuming lower storage space. Oxygen and some low weight hydrocarbons started out as the best options as oxidizer and fuel in the early rocket development stages. But these elements, at normal atmospheric conditions are gases and their storage would require special pressurized containers. Therefore liquefying these gases improves the propulsion system in many ways.

Coming to the construction of a cryogenic engine, it in volves the following subsystems:

- LOX (Liquid Oxygen) and LH2 (Liquid Hydrogen) storage tanks
- Turbo/Cryo Pumps
- Gas Generator
- Combustion Chamber
- Nozzle with a cooling jacket

The cryo-pumps are special turbo pumps which rotate at a high velocity to feed the fuel and oxidizer from the storage tanks to the combustion chamber. It operates at speeds of more than 15,000 RPM generating mass flows in the values of tons to produce the highest thrust levels possible using optimum mixtures of fuel and oxidizer.

The cryo-pumps require certain amount of energy to operate and this energy is generated from the gas generators. Some amount of the liquid fuel is pre burnt to run turbines which will provide the rotary force to rotate the turbo pumps. These cryo-pumps aligned with the turbo pumps produce higher efficiency and produce greater thrust.

When the mixture is fed into the combustion chamber as fine droplets they form a colloid together and produce an immense pressure going up to 250 bars equivalent to 15,000 lbs. of force on the walls of the chamber. This pressure heats up the mixture making them to combust and form the reaction force. This high pressure 'controlled explosion' is manipulated through a narrow opening into the nozzle. Here, the pressure energy is converted to kinetic energy and is exited at very high velocities creating the required thrust to achieve the escape velocity. The nozzle is made cone shape to manipulate the conversion of pressure energy into a supersonic outflow of exhaust gases.

The temperature in the combustion chamber can reach extremely high values of up to 6,0000C and therefore require a cooling jacket system. The cooling system is not that complicated and utilizes the already available supercool cryogens which are passed through the hot regions on their way to the inlet into the combustion chamber.

All these separate components and their control systems need to work in precise harmony in order to bring theory into practical application for a successful space program.

The Indian Cryogenic Engine Development (CUS & CE20)

India's space organization ISRO (Indian Space Research Organization) has developed the Cryogenic Upper Stage (CUS) designed and developed in India under the Cryogenic Upper Stage Project (CUSP) to replace the use of older stage which was previously procured from Russia. The CUS uses LOX (which liquefies at -1830C) and LH2 (which liquefies at -2530C) which are fed by turbo pumps running at a speed of 40,000 RPM. To further increase the volumetric efficiency, the liquid hydrogen and liquid oxygen tanks consist of separate booster pumps which push them in at a greater pressure to the main turbo-pump. It consists of highly complex propulsion control systems for filling and storing the propellants and various other ground support controls. The CUS consists of one main engine and two smaller maneuvering engines which when combined produce a nominal thrust of 73,550 N of Thrust. Since it is an upper stage engine it normally fires once the main boosters have burned out and fires for a duration of 720 seconds. The CUS was successfully used by ISRO to launch the GSLV – D5 space mission in 2013.

ISRO's CUSP For its future mission ISRO is developing a high thrust cryogenic engine which will produce two times more power than the CUS, called the High Thrust Cryogenic Engine (CE20). This engine will be used as an upper stage booster for a heavy lift launch vehicle, the GSLV – Mk-III. It runs on a “gas generator cycle” improving the thrust outputs as well as making it easier to develop each of the subsystems separately. This engine has the capability of producing 196,500 N of Thrust and generates 2MW of power at a specific impulse of 434sec. Systems tests have been conducted at various test sites and have proven to be satisfactory producing a firing duration of 635 seconds. When completed the CE20 will be one of the most powerful cryogenic engines in the world.

Pranshu Parouha (4th Year)

ISHRAE CHAPTER

CHAPTER INSTALLATION SESSION2019 – 20 @ 06/09/2019

Introduction: Student Chapter Installation process of **ISHRAE** was completed at IPS Academy, Institute of Engineering & Science, and Department of Mechanical Engineering on 6-9-2019. For the program we invited Mr. Sandeep Belsare President ISHRAE Indore Chapter, Dr. Sharad Choudhary Associate professor IET DAVV, National Student vice Chair ISHRAE, and Mr. J. Vyas Past President ISHRAE Indore Chapter, Mr. Kapil Jain Secretary ISHRAE Indore chapter, Mr. Nilesh Patil Area manager Hitachi Air Conditioners.

The program was started by lightening the lamp and worship of goddess Saraswati Maa. Then Welcome of honorable dignitaries was done by Dr. Sanjay Jain Professor and Head Mechanical Engineering department. After welcome speech, Dr. Sharad Choudhary has delivered short description about ISHRAE Society and their benefits.

After that an expert lecture on career in HVAC & R industry was given by Mr. Sandeep Belsare. He told about the current energy scenario of India and the need of HVAC products.

A product presentation was delivered by Mr. Nilesh Patil about Hitachi products and services. He cleared the doubts of students about the HVAC product design.

After all the session Oath ceremony for chapter installation were fulfilled by Mr. Kapil Jain.

The list of CWC officers of IPS Indore chapter:

1) Mr. Aayam Rai – President

2) Mr. Nishant Soni-Secretary

3) Mr. Tanmay Sharma- Treasurer

i) Mr. Varun Shivpuria- CWC member

ii) Mr. Alex Louis- CWC member

iii) Mr. Rahul Kumar Lashkar- CWC member

Program Memories

Lamp Lighting

Floral Welcome of Guest

Speech by Dr. Sharad Chaudhary

Presentation by Mr. Nilesh Patil

Oath Ceremony

Group Photo

❖ Industrial Visit at Maa Annapurna Ice & Cold Storage Private Limited Indore@ August 7, 2019

Introduction: - Maa Annapurna Ice & Cold Storage Private Limited is a Private incorporated on 15 March 1996. It is classified as Non-govt Company and is registered at Registrar of Companies, Gwalior.

Company's authorized capital stands at Rs 100.0 lakhs and has 87.6% paid-up capital which is Rs 87.6 lakhs. MAA Annapurna ICE & Cold Storage Private Limited last annual general meet (AGM) happened on 30 Sep, 2017. The company last updated its financials on 31 Mar, 2017 as per Ministry of Corporate Affairs (MCA).

Maa Annapurna Ice & Cold Storage Private Limited's Annual General Meeting (AGM) was last held on 29 September 2018 and as per records from Ministry of Corporate Affairs (MCA), its balance sheet was last filed on 31 March 2018.

MAA Annapurna ICE & Cold Storage Private Limited is in the business from last 23 years and currently, company operations are active. Current board members & directors are OM PRAKASH MANGAL, KAPIL MANGAL, SANTOSH CHOUDHARY, PRAMOD HARDIA and ANKIT MANGAL.

Maa Annapurna Ice & Cold Storage Private Limited's Corporate Identification Number is (CIN) U06302MP1996PTC010605 and its registration number is 10605.

Its Email address is ampl_india@yahoo.co.in and its registered address is Rao Mundi Road, Behind Sharmic Colony, Rao Indore MP 453331.

About Visit:-

ISHRAE Indore Chapter, IPS Academy, Institute of Engineering & Science, Mechanical Engineering Department, organized an Industrial visit to “Cold Storage”, Silicon City, Indore on August 7, 2019.

Fifty one mechanical engineering students from II, III and IV year and four faculty members visited to Cold Storage to interact with the professionals working there along with having an interactive informative session with Mr. S.K.Vardhe, who has more than twenty years of experience working in the field of HVAC specially in the installation and maintenance of the cold storage sector.

In the morning at 10:00 am, we visited the Cold Storage and were warmly welcomed by the on-duty staff. First, there was an introductory session by Mr. Sandeep Belsare, President, ISHRAE Indore Chapter followed by an interactive informative session with Mr. S.K.Vardhe. In addition, he motivated the students to pursue careers in the field of HVAC along with giving details about scope in these domains.

Then the students moved to the compressor, condenser units and observed the actual working of system along with getting to know about the specifications of the units in application. We then moved to the cold storage chamber and understood the evaporator system.

The session was concluded with Question-Answer session. Many of the students asked different questions on current demanding technologies, market scenarios etc. and he cleared all the doubts and myths, which was in students mind about the technologies in HVAC sector. All students were satisfied after the session.

At last, snacks were served that consisted of freshly fried potato chips of the potatoes stored in the storage itself.

Cold storage: A cold storage is a commercial facility for storing perishable products such as fruits, vegetables, meat, fish etc. under controlled conditions for longer periods. Based on the storage conditions, cold storages may be classified into three categories:

i) Short-term or temporary storage
ii) Long-term storage, and
iii) Frozen storage

For short and long term storage, the product is cooled and stored at a temperature that is slightly above the freezing point. Depending upon the product, the storage temperature varies and in general it may lie anywhere between - 2^{o}C to 16^{o}C.

Short-term or temporary storage is usually associated with retail establishments such as supermarkets, where rapid turnover of the product is normally expected. Depending upon the product the storage period may vary from 1 to 15 days. Long-term storage is usually associated with large-scale cold storages. The storage period again depends upon the type of product and also the condition of the product at which it is brought in to the cold storage. This period may be as short as 7 to 10 days for sensitive products such as ripe tomatoes and as long as 6 to 8 months for products such as onions and potatoes.

Using frozen storage, most of the food products can be stored for considerably longer periods, sometimes as high as a few years. However, certain fresh products such as tomatoes cannot be stored under frozen conditions. The storage temperatures for frozen foods typically lie between –23^{o}C to –12^{o}C, with –18^{o}C being the most frequently employed storage temperature.

HOW DOES COLD STORAGE WORK?

It keeps your products at a set temperature of your choosing, which keeps them fresh and makes them last longer.

For example, say you need to store fresh fruit and vegetables. Keeping them at the right temperature will reduce the risk of damage and extend their shelf life. These same foods stored in a warm environment will mold faster and attract pests.

Perishable foods stored at the wrong temperature will spoil, leading to changes in color, texture, and flavor. Eating food that hasn't been kept at the right temperature will also increase your chances of getting food poisoning.

Obviously, that isn't something you want to risk with your products.

Photographs:-

❖ Industrial Visit at "Chiller, Cooling tower, Pumps and AHU with ducting @ Ashokraj Resort & Farms Khandwa Road Indore" on January 24, 2020.

Introduction: - A **chiller** is a machine that removes heat from a liquid via a vapor-compression or absorption refrigeration cycle. This liquid can then be circulated through a heat exchanger to cool equipment, or another process stream (such as air or process water). As a necessary by-product, refrigeration creates waste heat that must be exhausted to ambience, or for greater efficiency, recovered for heating purposes.

Chilled water is used to cool and dehumidify air in mid- to large-size commercial, industrial, and institutional facilities. Water chillers can be water-cooled, air-cooled, or evaporatively cooled. Water-cooled systems can provide efficiency and environmental impact advantages over air-cooled systems.

In air conditioning systems, chilled water is typically distributed to heat exchangers, or coils, in air handlers or other types of terminal devices which cool the air in their respective space(s). The water is then recirculated to the chiller to be recooled. These cooling coils transfer sensible heat and latent heat from the air to the chilled water, thus cooling and usually dehumidifying the air stream.

The Ashokraj Resort and Farms located in Khandwa Road, Indore has Wedding Hotels, Cocktail Venues, Banquet Halls and Wedding Lawns. Lawn can accommodate upto 1000 guests in seating and 1500 guests in floating. Hall can accommodate upto 850 guests in seating and 1300 guests in floating. The chiller plant is installed at the roof of the resort, in which three chillers of 50 TR capacities are installed for cooling purpose. Scroll compressors were using there. R-407 and Freon based refrigerant is using in the chillers.

About Visit:-

ISHRAE Indore Chapter, IPS Academy, Institute of Engineering & Science, Mechanical Engineering Department, organized an Industrial visit at "**Chiller, Cooling tower, Pumps and AHU with ducting @ Ashokraj Resort & Farms Khandwa Road Indore** ", on January 24, 2020.

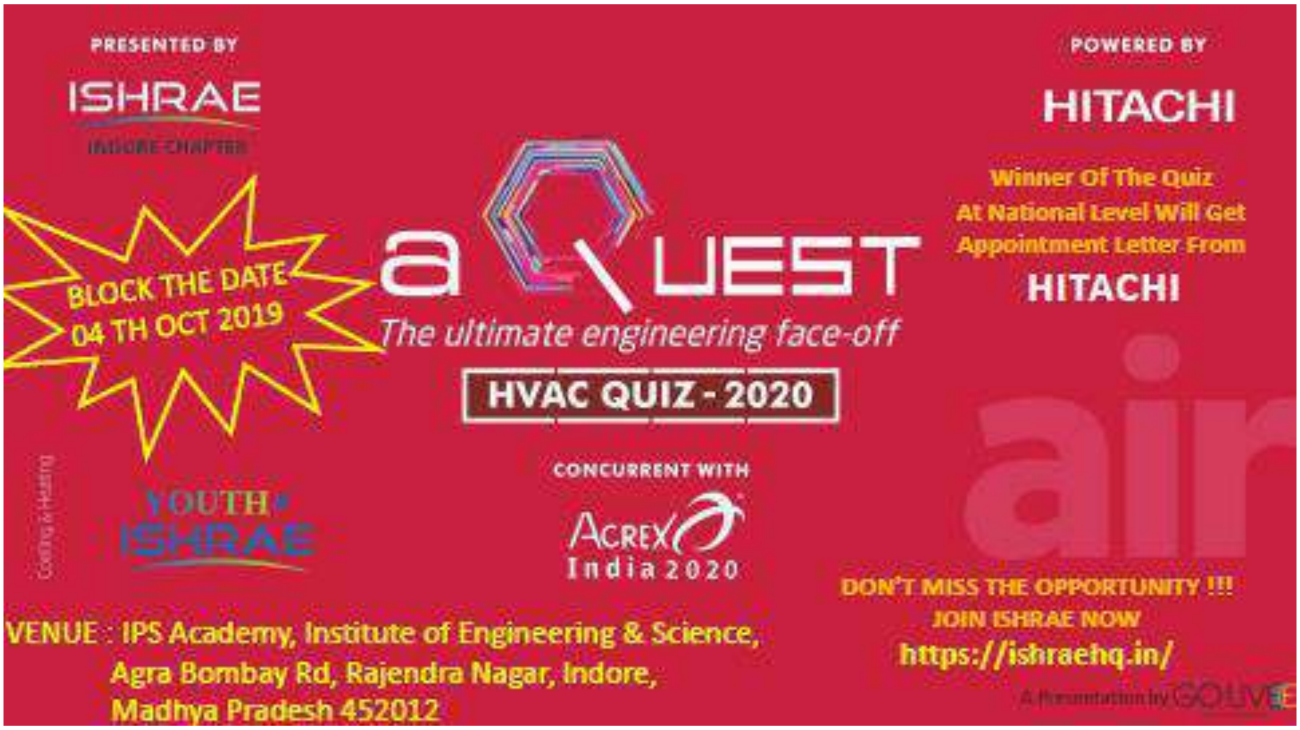
Forty seven mechanical engineering students from II, III and IV year and three faculty members visited to Chiller plant to interact with the professionals working there along with having an interactive informative session with Mr. Shishir Jain & Mr. Kapil Jain who has great experience working in the field of HVAC (Heating, Ventilation & Air Conditioning) specially in the installation and maintenance of the cold storage sector. The expert expresses their knowledge about the chiller plant and working principle of complete cooling system of the chiller plant. The resort chiller plant was designed by Mr. Shishir Jain.
Mr. Ravindra Malakaar, (HVAC consultant) also express their experience about the design of cooling system.

The session was concluded with Question-Answer session. Many of the students asked different questions based on chiller plant, the expert cleared all the doubts and myths, which was in students mind about the technologies in HVAC sector. All students were satisfied after the session.

At the last Dr. Sharad Choudhary (Student Chair) invited for the vote of thank to ISHRAE Indore for organizing such a nice activity.

Visit Photographs:-

❖ A-Quest Quiz Competition (Indore Chapter Level): 04 October 2019

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TEAM
THERMODYNAMICS


IPS Acad
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TEAM HEATING

Departmental News & Updates

Students Achievements

(A) Special Award

S. No.	Name of Student	Department	Date	Achievement (Detail)
1	Mr. Pranshu Parouha	ME	13/01/20	Second Position in National Level Quiz competition(ISHRAE)
2	Mr. Shubham Patel	ME	13/01/20	Second Position in National Level Quiz competition(ISHRAE)

(B) **Vice Chancellor Scholarship** received from Rajiv Gandhi Technical University, Bhopal (M.P.)

Sangam Vishwakarma received **Vice Chancellor Scholarship** from Rajiv Gandhi Technical University, Bhopal (M.P.)

(C) Paper Published in Journals International

S. No.	Deptt.	Name	Topic / Title of the Paper	Name of Journal (refereed)	Year of publish (with month)
1	ME	Ms. Mansi Pare	Design of Organic Compost Machine	International Research Journal of Engineering and Technology (IRJET)	Dec 2019
2	ME	Ms. Mansi Pare	CAE Analysis of Off-Road Vehicle Rollcage Subjected to Various Impact Forces	International Research Journal of Engineering and Technology (IRJET)	Jan 2020
3	ME	Mr. Mohak Gupta	Comparison of Various Methods for Solving Linearly Programmed	International Journal of Mathematics	Jan 2020

			Transportation Problem	Trends and Technology (IJMTT)	
4	ME	Aman Sen,Akash Joshi, Divyanshu Pawar, Bhavesh Bhadnore	Investigation and Design Modification in Exhaust Manifold Through Static Structural Analysis Using Hypermesh	International Journal of Mechanical Dynamics & Analysis	June 2020

(D) Workshop Attended

S. No.	Deptt.	Date	Details of	Topic
1	18/09/2019	18/09/2019	One Day workshop on Vibration	01

Result Analysis

MECHANICAL ENGINEERING DEPARTMENT

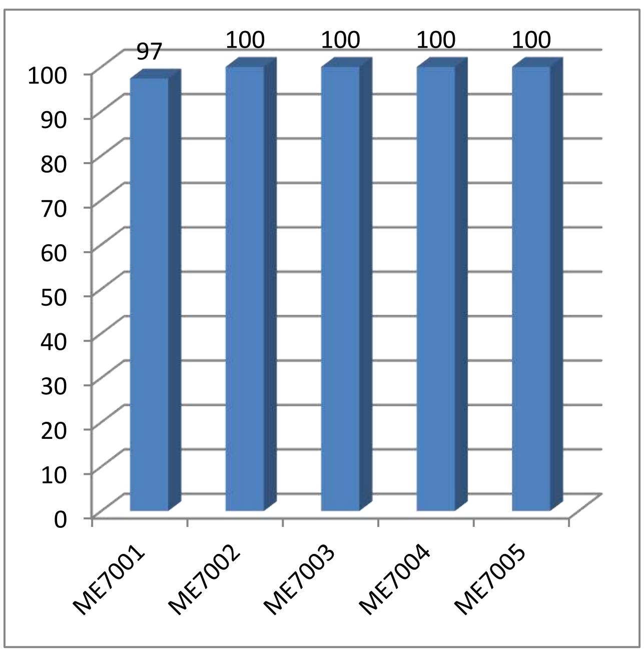
Final Year 2015-2019 Batch

(IV Year VII Sem)

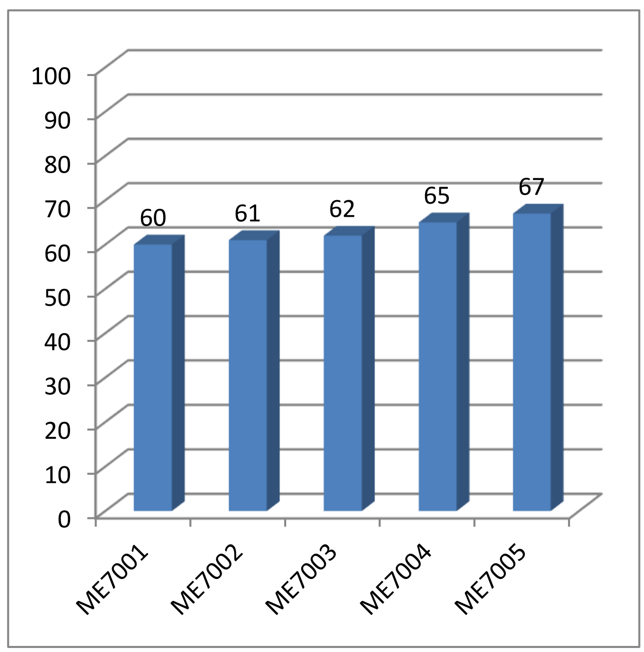
Top Five Students

S. No.	Student Name	CGPA/SGPA
1	Shubham Choudhary	8.5
2	Arun Gupta	8.31
3	Vishnu Dev Mishra	8.3
4	Shubham Patel	8.26
5	Simon Pathak	8.22

- Pass Percentage = 97%
- Total Students Appearing = 115
- No. of Students Pass = 112
- No. of Student Passed with Hons. = 35
- No. of Students Passed In I Division = 87
- No. of Students Passed In II Division = 25



Pass % age of Students



Average % age of Marks

Result Analysis

MECHANICAL ENGINEERING DEPARTMENT

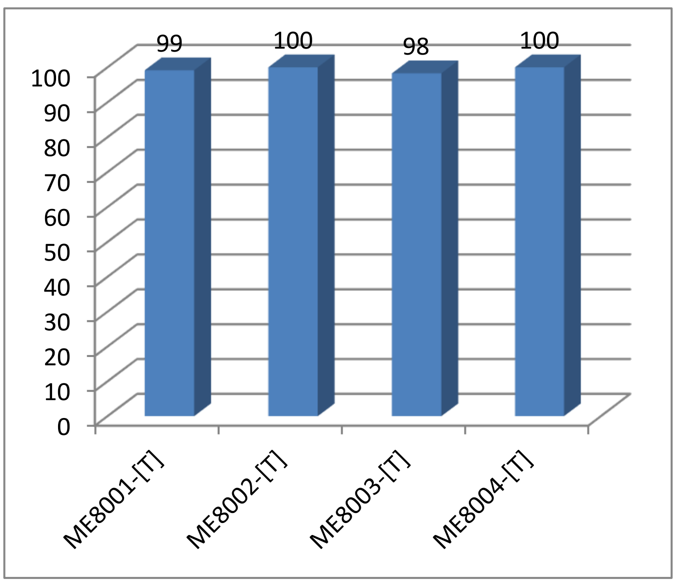
Final Year 2015-2019 Batch

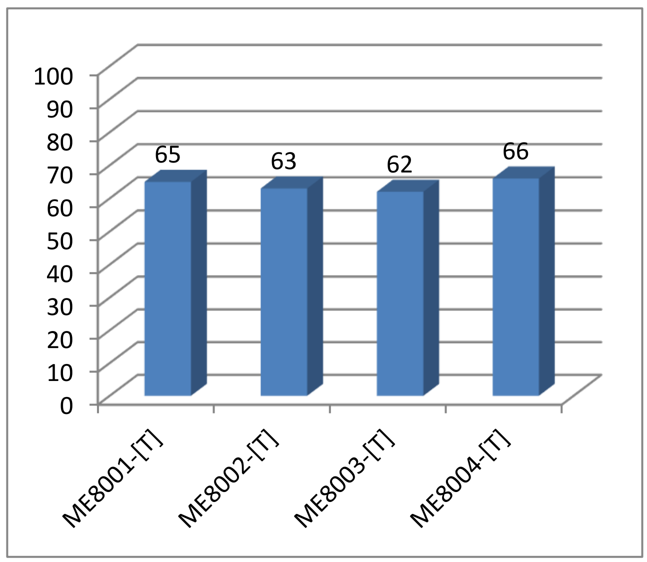
(IV Year VIII Sem)

Top Five Students

S. No.	Student Name	CGPA
1	Shubham Choudhary	8.50
2	Arun Gupta	8.40
3	Vishnu Dev Mishra	8.34
4	Sarthak Nagori	8.29
5	Shubham Patel	8.28

- Pass Percentage = 95%
- Total Students Appearing = 116
- No. of Students Pass = 110
- No. of Student Passed with Hons. = 39
- No. of Students Passed In I Division = 70
- No. of Students Passed In II Division = 1





Pass % age of Students

Average % age of Marks

Result Analysis

MECHANICAL ENGINEERING DEPARTMENT

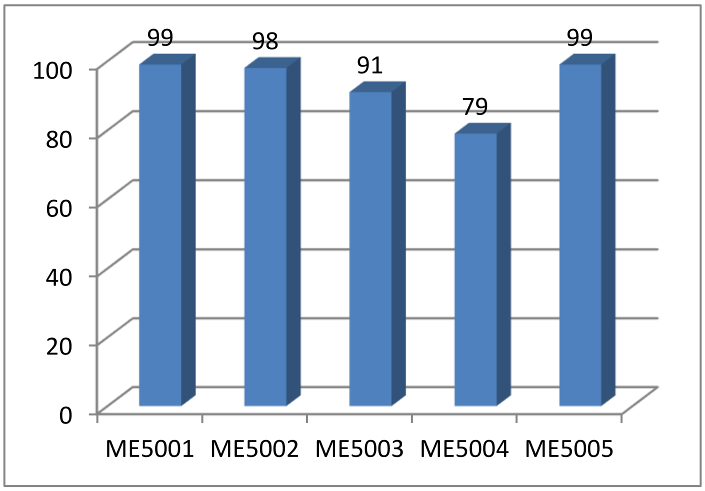
Third Year 2016-2020 Batch V Sem

(III Year V Sem)

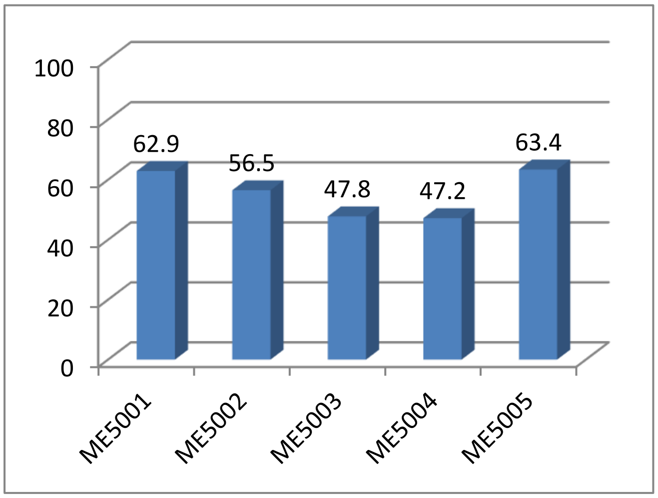
Top Five Students

S. No.	Student Name	CGPA
1	Yash Ghanshani	8.81
2	Sangam Vishwakarma	8.66
3	Pranshu Parouha	8.45
4	Jahnvi Burman	8.42
5	Abhishek Tiwari	8.34

- Pass Percentage = 75%
- Total Students Appearing = 100
- No. of Students Pass = 75
- No. of Student Passed with Hons. = 28
- No. of Students Passed In I Division = 42
- No. of Students Passed In II Division = 5



Pass % age of Students



Average % age of Marks

Result Analysis

MECHANICAL ENGINEERING DEPARTMENT

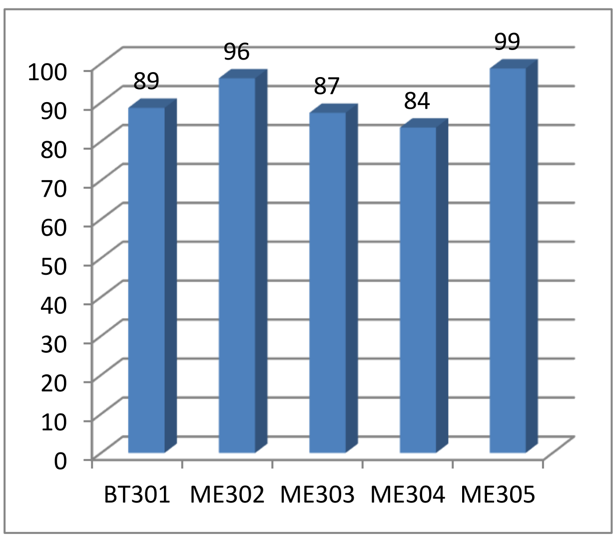
Second Year 2017-2021 Batch III Sem

(II Year III Sem)

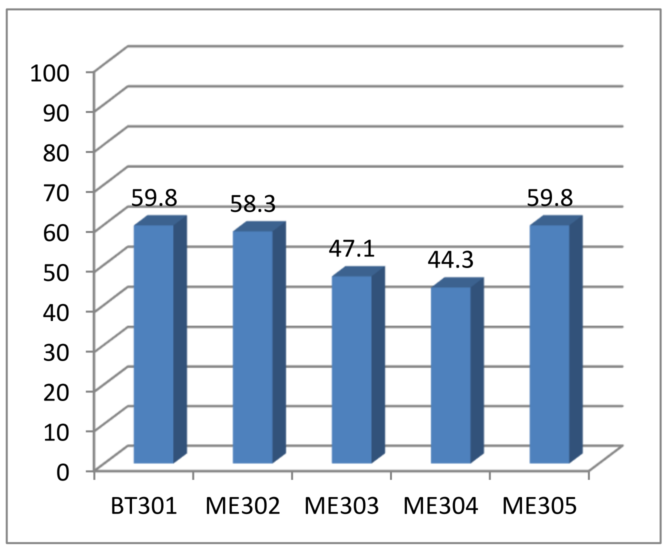
Top Five Students

S. No.	Student Name	CGPA
1	Prajjwal Saxena	8.52
2	Nishant Soni	8.1
3	Vaibhav Kumar Thakre	8.09
4	Pratik Gondane	8.03
5	Prakhar Sharma	7.99

- Pass Percentage = 72%
- Total Students Appearing = 79
- No. of Students Pass = 57
- No. of Student Passed with Hons. = 11
- No. of Students Passed In I Division = 43
- No. of Students Passed In II Division = 3



Pass % age of Students



Average % age of Marks

Result Analysis

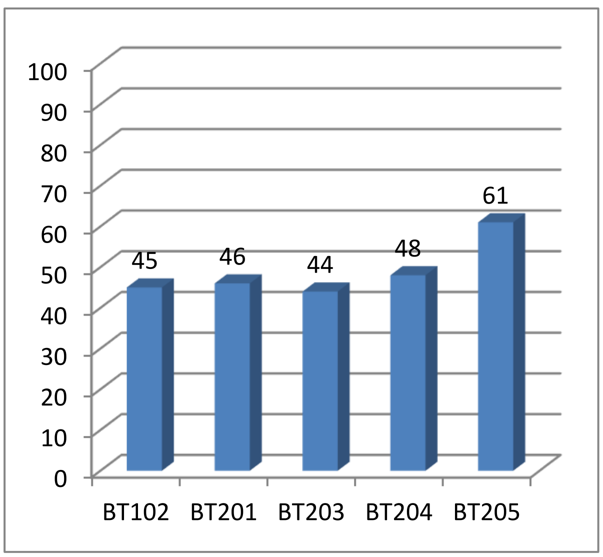
MECHANICAL ENGINEERING DEPARTMENT

First Year 2018-2022 Batch I Sem

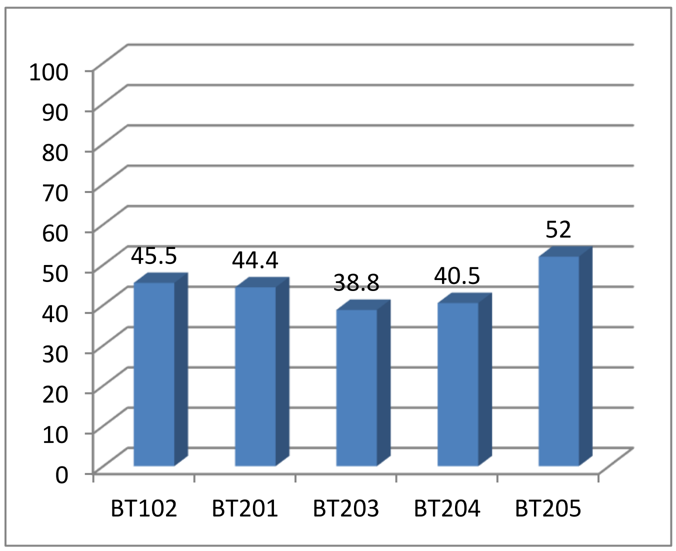
Top Five Students

S. No.	Student Name	CGPA
1	Saurabh Tiwari	8.38
2	Shiv Pratap Singh	8.19
3	Anshul Kumar Tiwari	8.05
4	Rishi Saxena	7.90
5	Aman Patel	7.86

- Pass Percentage = 53%
- Total Students Appearing = 64
- No. of Students Pass = 34
- No. of Student Passed with Hons. = 10
- No. of Students Passed In I Division = 27
- No. of Students Passed In II Division = 7



Pass % age of Students



Average % age of Marks

Placement Details (2015-2019 Batch)

S.No	Name of Students	Package
Tata Consultancy Services(TCS)		
1	Kunal Gupta	3.30
2	Sarthak Nagori	
3	Bhavya Tongia	
4	Bipendra Singh	
CYIENT Technology		
5	Arpit Malaiya	3.25
COOLAID HVAC		
6	Vishal Rathore	1.8