People's Education Society's (Mumbai)

P.E.S. College of Engineering, Aurangabad

Best Practices

1. Pass out student's old projects are displayed like Museum to get intuition/ motivation for development of new projects.

   Objective: Letting passed out graduates to exhibit their technical projects in various disciplines which offers on opportunity to sharpen new comers' technical skills.

   Context: Development of project work is a part of curriculum and making its display for next batches is an asset, which helps the students to add new technological skills in it and design an extended version. Keeping in view of this framed work few projects like Gear Test Rig for the testing of Gear, two wheeler working mechanism, Pico-Hydroelectric generator, Navigation System for blind people, etc. are displayed.

2. Right from the inception, the institute has the practice of performing all the maintenance works (Electrical maintenance, civil work maintenance, IT infrastructure maintenance, furniture and fabrication work) in-house.

   Objective: Performing most of in-house work, thereby making a good saving and involving graduate learner in actual practical work.

   Context: Maintenance work in Electrical, Civil, IT infrastructure is being carried out in-house, to make saving. Additionally, through regular and planned procedure, complete monitoring is carried out. This scheduled work is being carried out by our staff members with involvement of the students, to give them necessary working experience.

3. Inculcating the moral values by conducting the Buddha Vandana at the beginning of every college activity.

   Objective: To deepen our devotion to the Lord Buddha, thereby nurturing morality in everyone's work culture.

   Context: At the beginning of each and every activity of the institute and the department, we all worship Lord Buddha with Buddha Vandana. Such devotion is necessary for maintaining peace and harmony amongst us. Inculcation moral values in all the minds is our motto, and through this prayer at the beginning of every program, this is routed properly.

People's Education Society's (Mumbai)

P.E.S. College of Engineering, Aurangabad

Best Practices

1.Waste water of RO Water Purifier is used for gardening.

Objective: To reuse the waste water of RO Water Purifier.

Context: To get clean and pure water to the students and staff, RO Water Purifier is installed in the college. Waste water of this is collected in the tank and from tank it is used for garden.

2.Pass out student's old projects are displayed like Museum to get intuition / motivation for development of new projects.

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College of Engineering P.E.S.

Principal
P.E.S.College of Engineering
Aurangabad.

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Principal
P.E.S.College of Engineering
Aurangabad.

Key Indicator - 7.2 Best Practices

(I) BEST PRACTICE

1. Title of the Practice:
   Teaching Learning process through offline lectures and through virtual classes with the help of ICT enabled tools.

2. Objectives of the Practice:
   To enhance teaching learning process carried out for the in-depth education.
   To carry out teaching learning process in all situations.

3. The Context:
   The institute has adapted the practice of teaching the students in actual classrooms (offline) as well as through online teaching along with the various ICT enabled tools including video lectures of NPTEL courses.
   During pandemic when everything was stopped except education. Institute carried out education successfully with the help of ICT tools.

4. The Practice:
   Teaching faculty adapted and got well acquainted with the virtual teaching system by using the blend of or either of the following techniques.
   (a) Use of digital notepad in online/virtual class.
   (b) Use of Google Classroom, Google Meet, Google form, Microsoft 365, Cisco WebEx, OBS studio.
   (c) Use 0f Audio/Video lectures with PPT. and video lectures from NPTEL.
   (d) Use of virtual lab
   (e) Use of ICT enabled smart classroom for live streaming of lectures.

5. Evidence of Success:
   Effective teaching was carried out throughout the year. Majority of the students attended the lectures online and excelled in university examination.

6. Problems Encountered and Resources Required:
   Non availability of internet facility to the students at remote places. Keeping in view such students, faculty have prepared video lectures and made available to the students.

7. Notes (Optional):
   To conduct online lectures, we have faced few problems for which feasible solutions are offered by the institute. During lockdown period, online lectures are conducted by the faculty from home.
   As many students are belonging from financial weak background and rural areas where internet facility was not available up to the mark.
   We have prepared video lectures, which are provided to the students.
   When few students could not attend the offline lectures because of lockdown in their cities. We use to conduct offline lectures in the class which are live

streamed.
Sincere efforts are made by all the faculties to continue teaching in all situations. Efforts taken resulted in very good results in university examination and successful completion of the program of final year students.

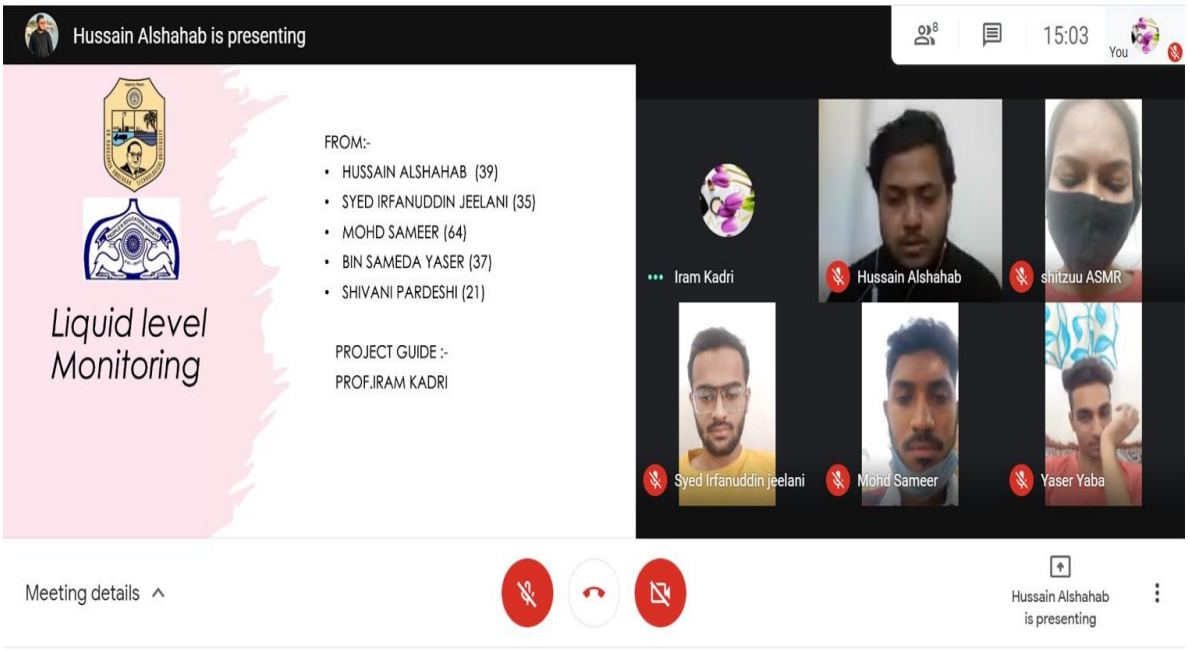
Video Lecture of Prof. Y.S. Pagar (Class: SY CSE Sub: EL- OOPS in C++ : Pointers in c++

https://drive.google.com/file/d/1mfdyDq7C3qc1ampbg7FWxa2_kvt-CNAQ/view?usp=sharing

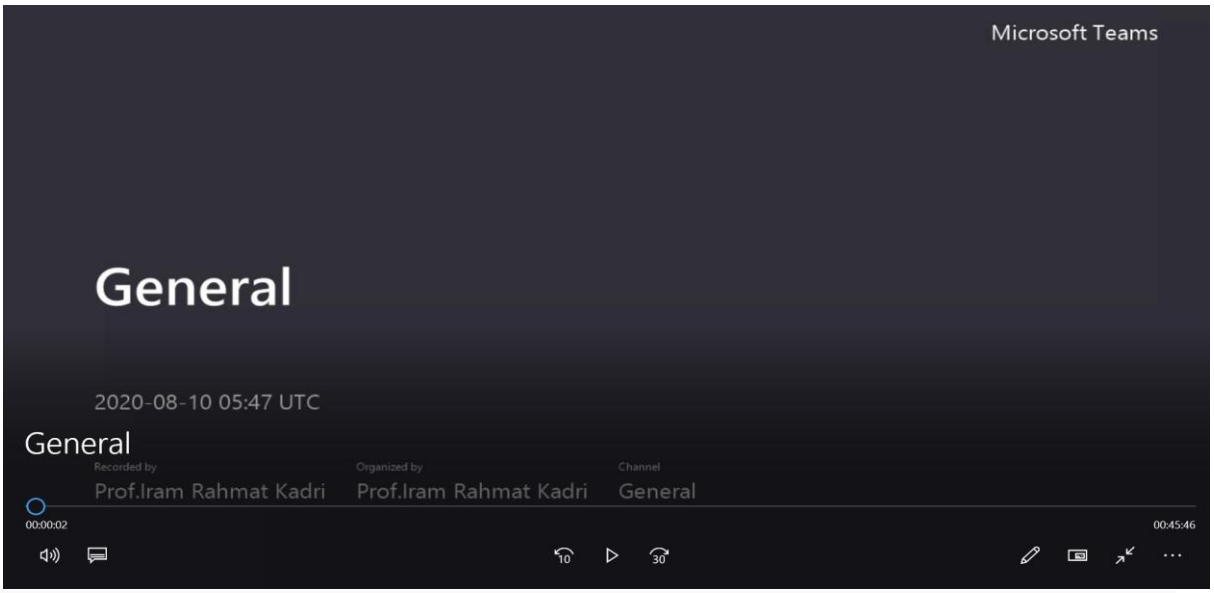
Virtual Classroom: Class B.Tech Final Sub: Digital Image Processing

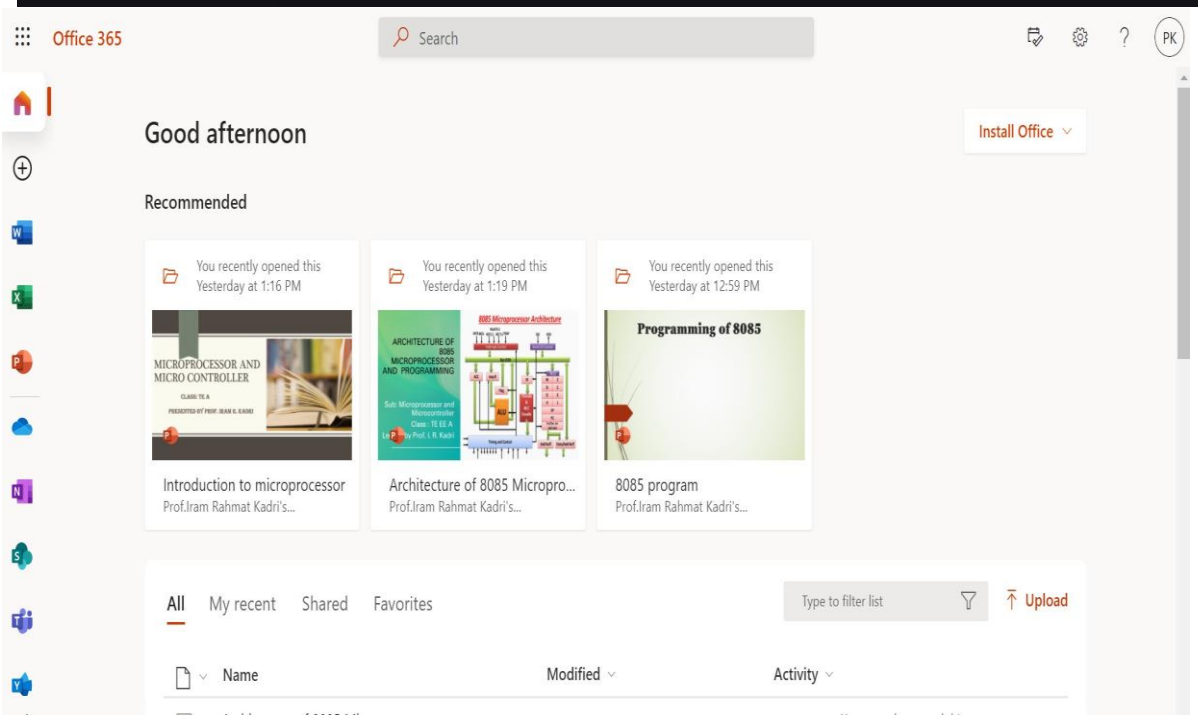
Welcome to Virtual Labs - A MHRD Govt of india Initiative

Apps Used For Lectures

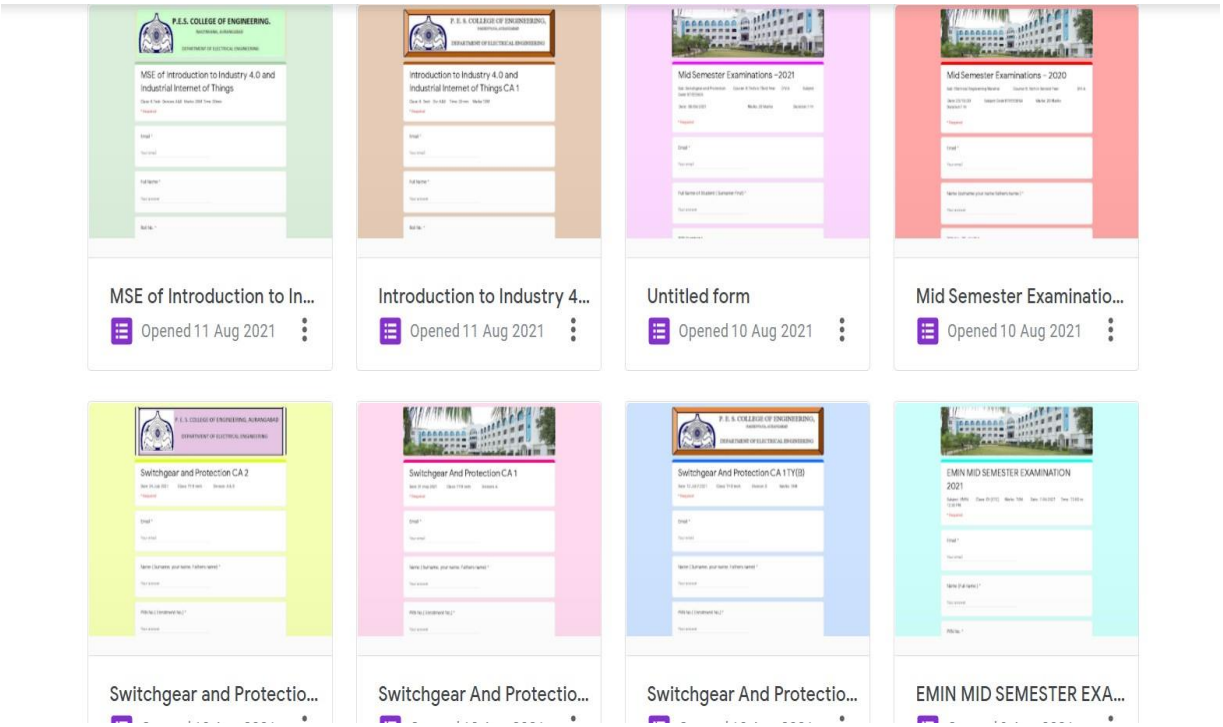


1) **Google meet**

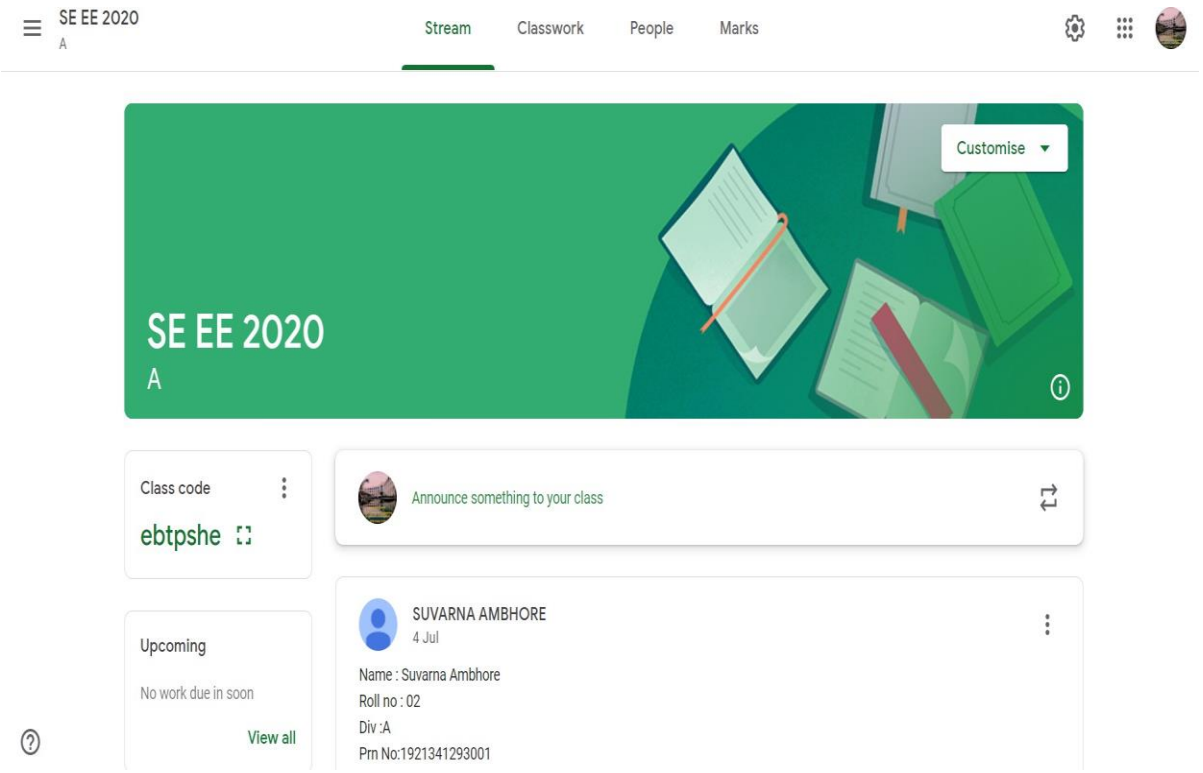




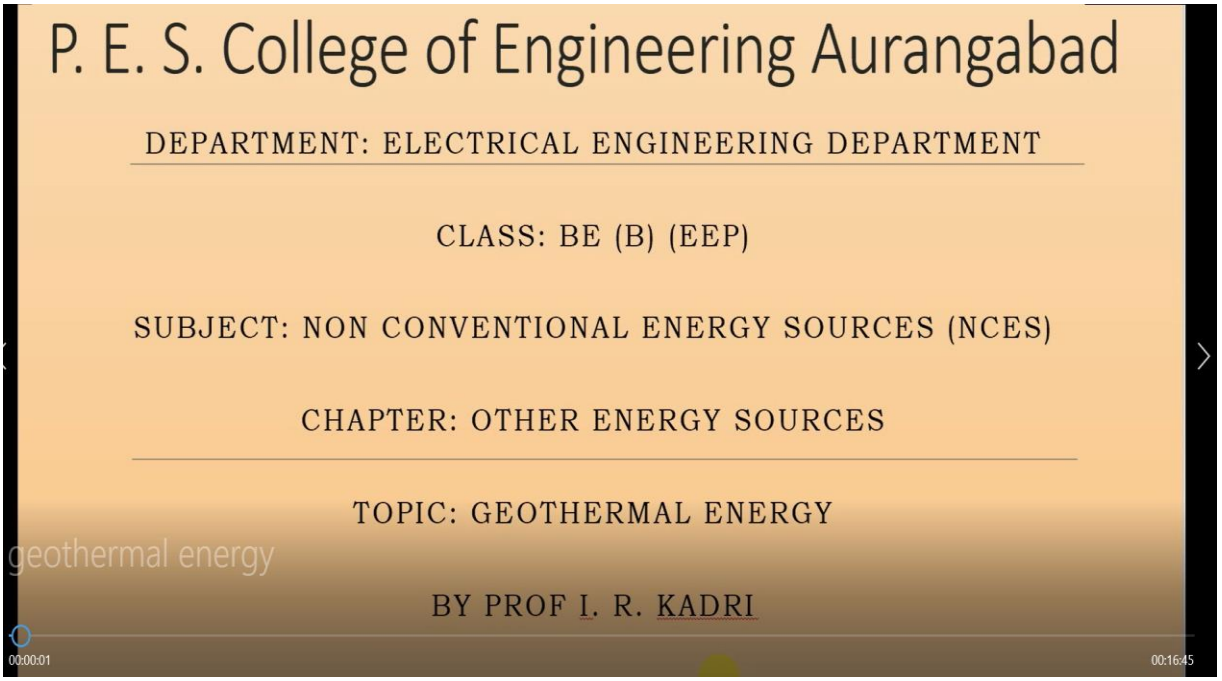
2) Microsoft 365



3) Google form

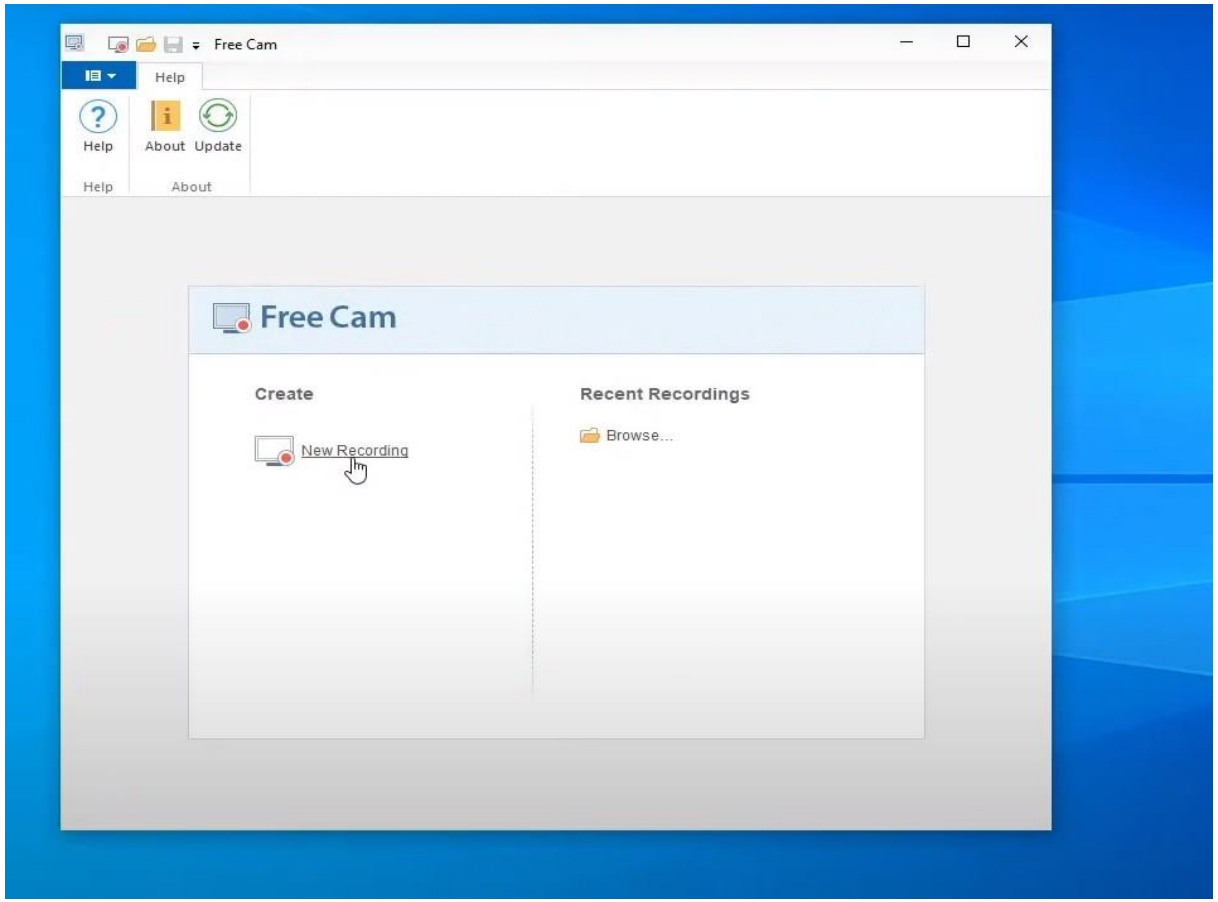


4) Google Classroom

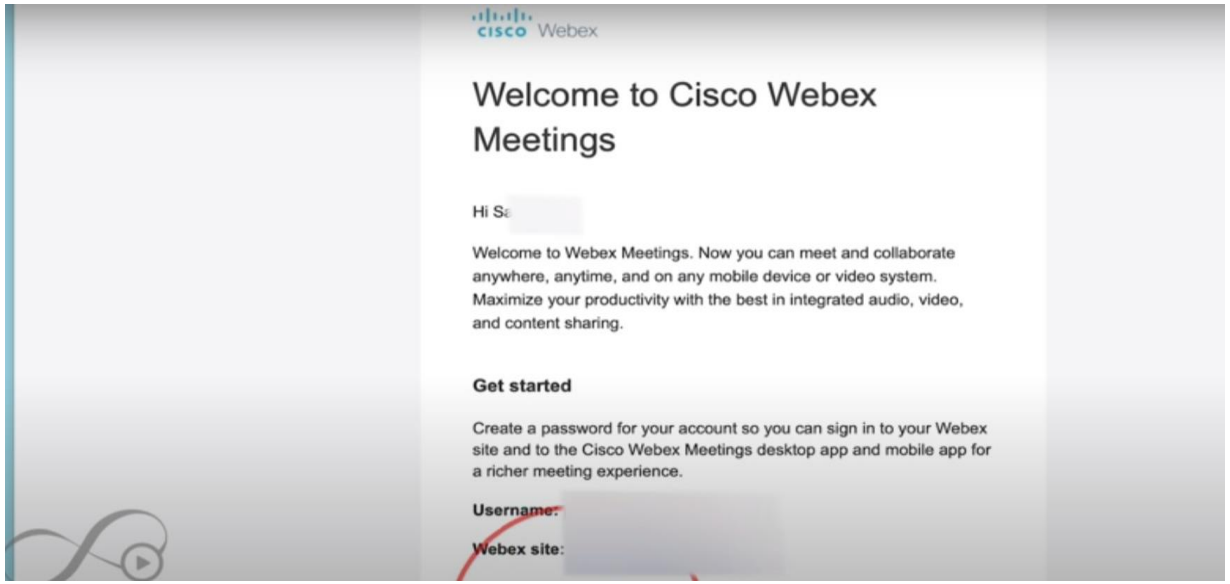


5) ApowerSoft Screen recorder

6) Lecture were recorded and screen shared using OBS Studio



7) Free Cam Recorder



8) Lectures by using cisco webex

Unit-III : PPT’S (ECA)

ENERGY CONSERVATION

Law of conservation of energy

- The law of conservation of energy is a law of science that states that energy cannot be created or destroyed, but only changed from one form into another or transferred from one object to another.
- The law of conservation of energy can be seen in these everyday examples of energy transference:
- Water can produce electricity. Water falls from the sky, converting potential energy to kinetic energy. This energy is then used to rotate the turbine of a generator to produce electricity. In this process, the potential energy of water in a dam can be turned into kinetic energy which can then become electric energy.
- Fingers hitting piano keys transfer energy from the player's hand to the keys.

ENERGY CONSERVATION:

- 1. Conservation of electrical energy means the reduction in energy consumption but without making any sacrifice of quantity & quality of production.
- In other words, for the same energy consumption, higher production, it does not prevent you use of energy by fixing some limit quantitatively within the agreement but insists for use efficiently thus decreasing the cost of production to some extent by the way of reduction in the energy bill.

Why is Energy Conservation So Important?

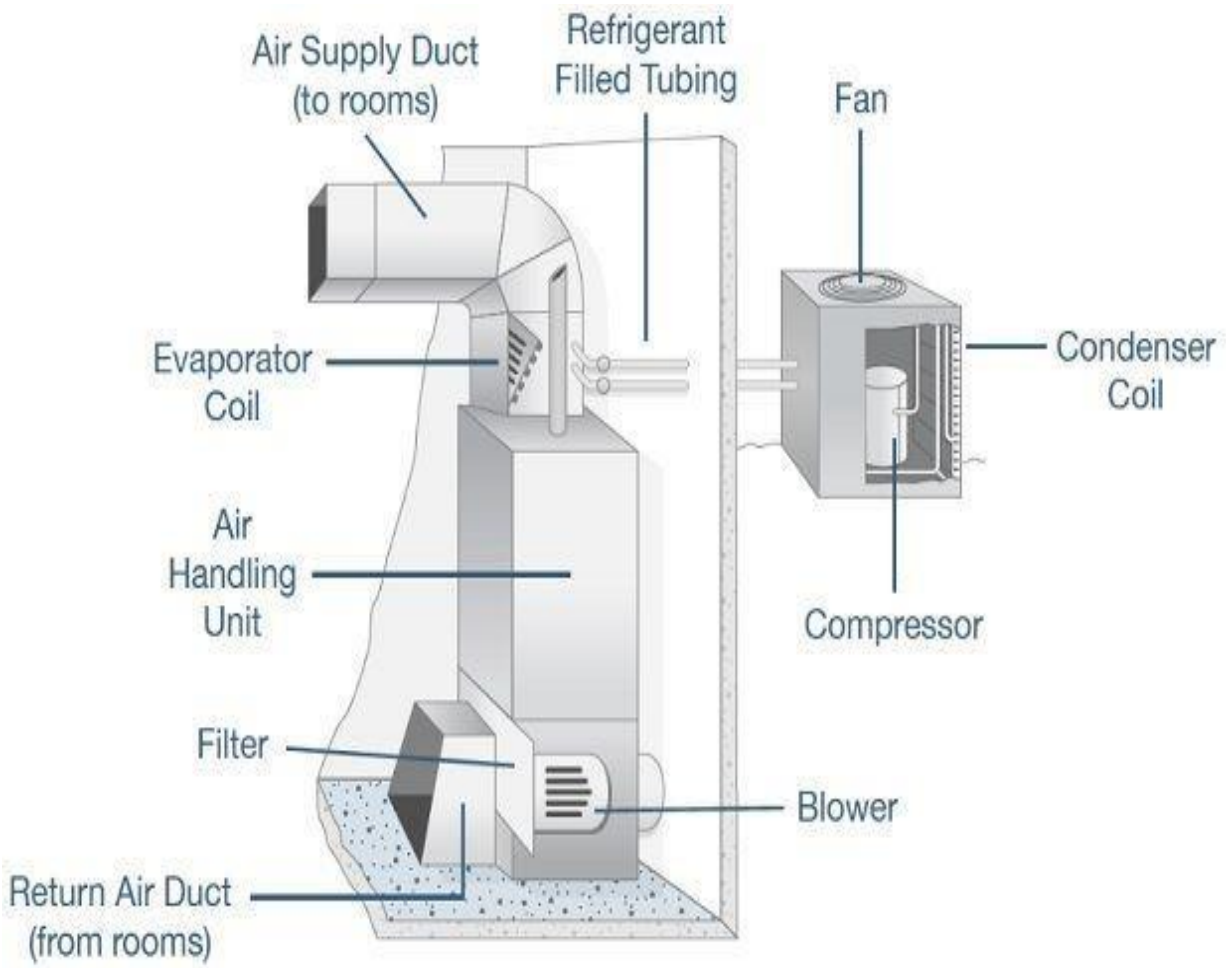
- Reducing the amount of energy that we use is a good way to save money, and there are also other benefits to decreasing energy consumption.
- For example, a large portion of the energy we use is derived from oil. Some experts claim that we will run out of oil in just a few decades. As natural resources used to produce energy become scarce, the cost of energy will most likely increase.
- Also, toxins and pollution are released into the atmosphere during the production and consumption of energy. Not only we are running out of some valuable natural resources, but we are also destroying the environment in the process of using them!

Energy Efficiency

- **It involves use of energy more effectively at the technical level.**
- **Energy efficient products provides same level comfort at low cost and protecting the environment**
- **Eg. Use of high energy star ratings**
- **Energy Efficiency is also defined as use of low cost resources with variety of benefits to the consumer and to the society.**
- **It is the utilization of energy in the most cost effective manner to carry out a manufacturing process ,where by energy waste is minimised and overall consumption of primary energy recourses is reduced.**

Energy conservation In ventilation and air conditioners

- The main purposes of a Heating, Ventilation and Air-Conditioning (HVAC) systemare to help maintain good indoor air quality through adequate ventilation with filtration and provide thermal comfort.
- HVAC system consist of motors ,pumps, fans, compressor, ducting and filters.
- Refrigeration system consist of cooling coil, evaporators, condenser and cooling towers.


Air Supply Duct
(to rooms)
Refrigerant
Filled Tubing
Fan
Evaporator
Coil
Condenser
Coil
Air
Handling
Unit
Compressor
Filter
Blower
Return Air Duct
(from rooms)

Energy conservation techniques in HVAC

- Optimise the number, shape and size of intakes
- Manage airflow, including andconsidering dual flow ventilation
- Stop or reduce ventilation where possible
- Use automatic control systems and integrate with centralised technical management systems
- Check system is balanced or not.
- Ensure system is airtight, check joints
- Optimize air system design:
  - ducts are of a sufficient size
  - circular ducts
  - avoid long runs and obstacles such as bends, narrow sections

The amount of electricity air-conditioning systems use also depends on the cooling load – the amount of heat the system has to be remove. There are several steps to reducing cooling load.

- Reduce warm air filtration into the cooled space by keeping windows and doors closed when HVAC systems are in use.
- All lights emit heat, so lights and equipment that are not required at any particular time should be switched off to help in reducing the cooling load.
- Investing in variable speed drives (VSDs) for motors to the match speed with output demand ,

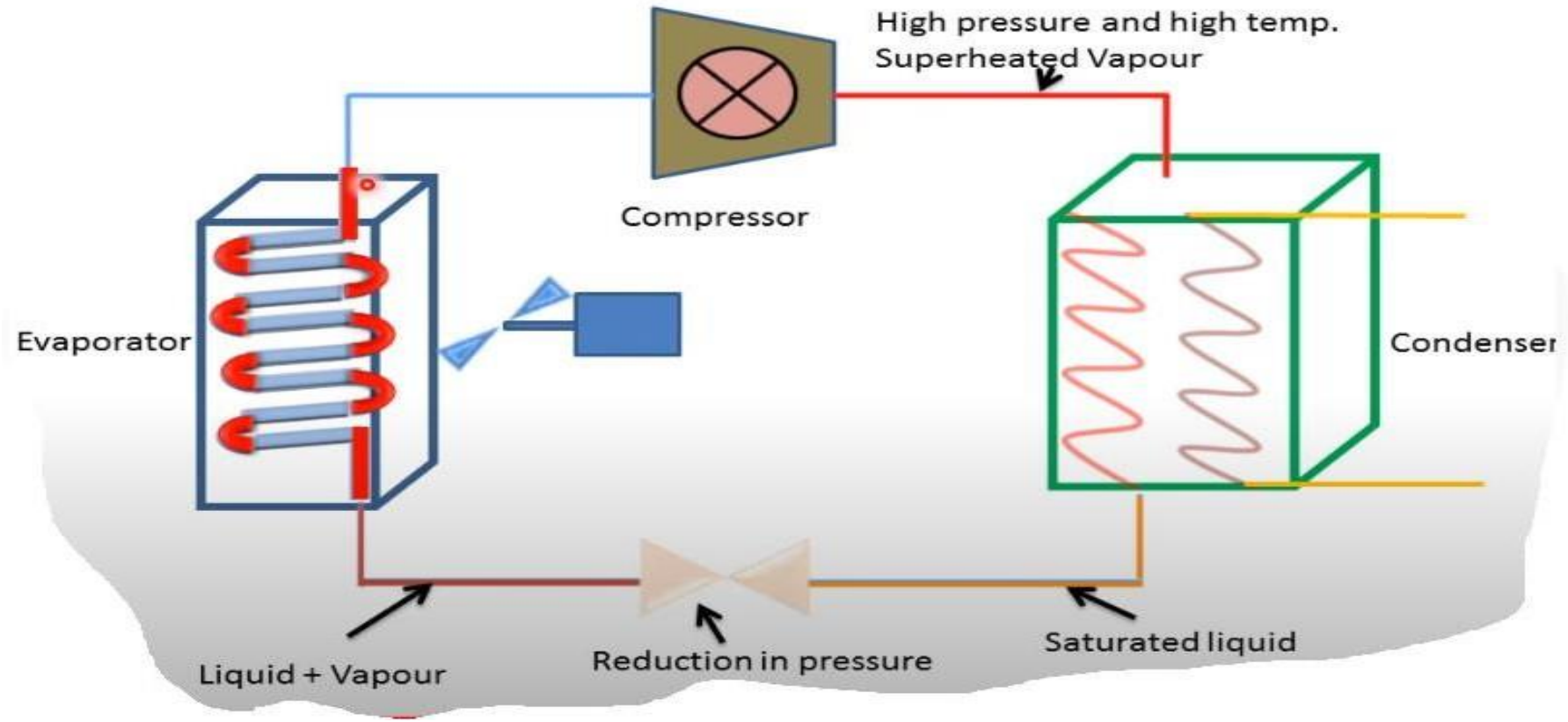
Which results in lower energy usage and heat load.

- HVAC loads vary at different times and in different parts of a building throughout the day. Well set time and occupancy controls should ensure that systems only operate when and where required during core business hours.

Some basic techniques as

- Turn off all the HVACs when not needed.
- Reduce ceiling hights if possible
- Use temperature sensor to lower down HVAC device operating time.
- Always set routine maintenance schedule like checking of ductwork for insulation condition and any leakages.
- Motor and drive bearings should be lubricated
- Check HVAC filter regularly.
- Clean HVAC coils regularly.

Refrigeration System

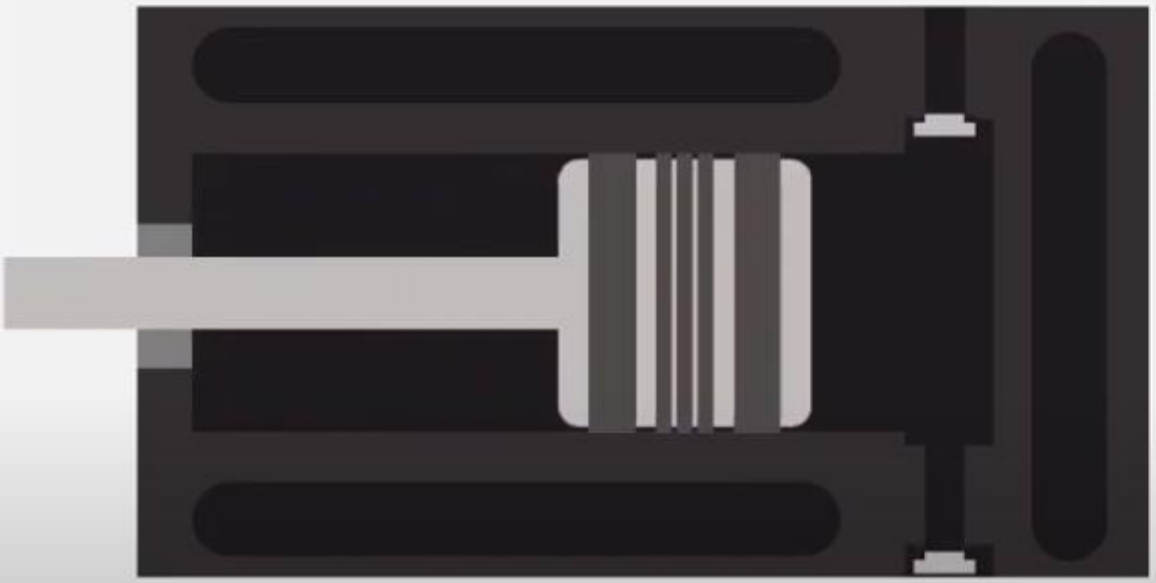


Energy Conservation In Refrigeration System

- Keep refrigerators less loaded for improving efficiency
- Always keep cooling coils as clean as possible
- Keep refrigerator 10 cm away from the walls
- Duct system should be less leak
- Moister or liquid indicators should be checked regularly
- Use gas powered refrigerator device to lower down electrical demand charges.
- Maintenance should be done regularly.
- Maintenance of condenser should be done regularly for proper heat exchanger.

Air Compressors

- Air compressor are used in industries to operate pneumatic tools and equipment depending on process need.
- Compressors are classified in two types called positive displacement compressor and dynamic compressor.
- In positive displacement compressor, pressure of gas is increased by reducing its volume.
- In dynamic compressor air velocity is raised to increase the air pressure.



Molecular Weight

Low Flow

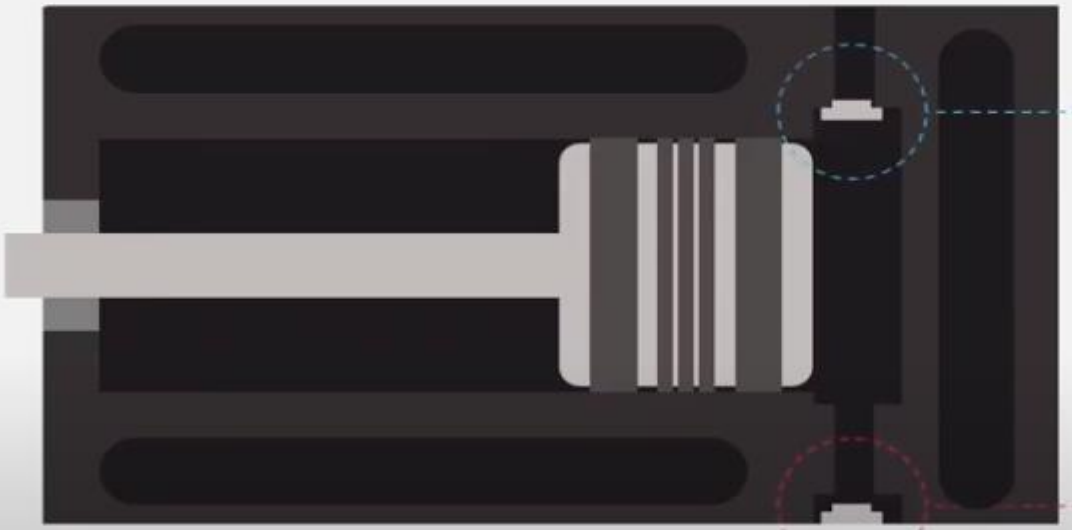
Very Light Gas

Cylinder Size

Very Heavy Gas

Stroke

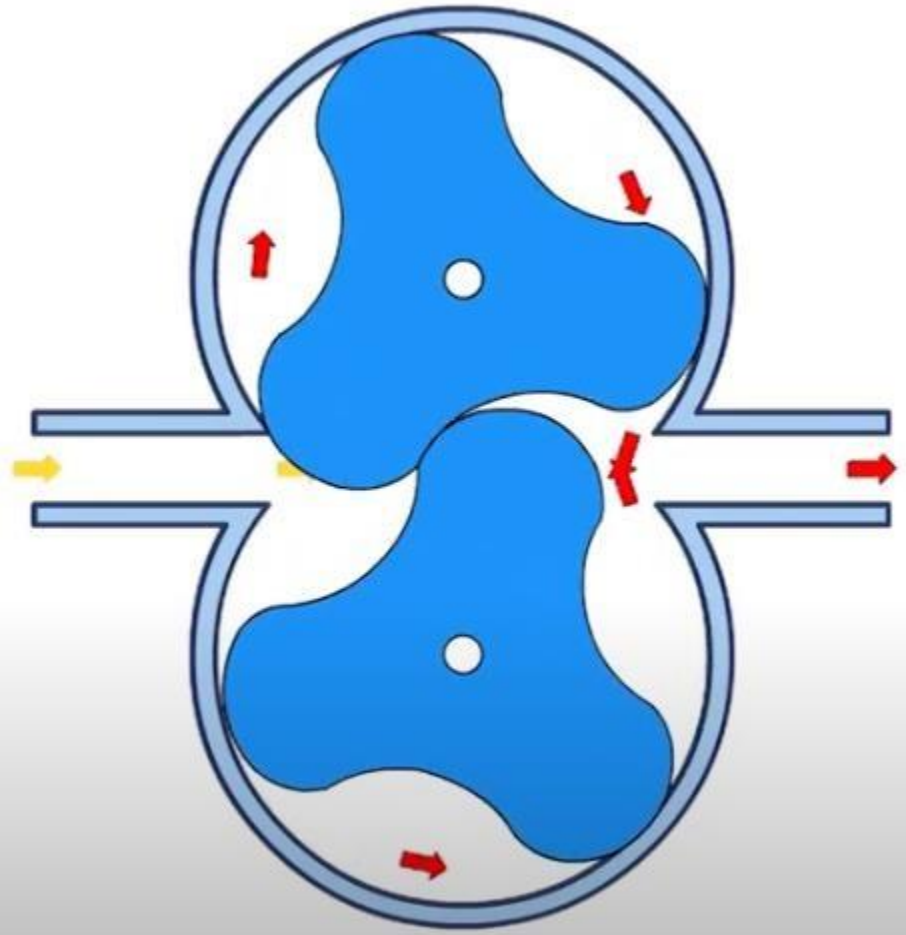
Speed



Suction Valve

Discharge Valve

Rotary compressor



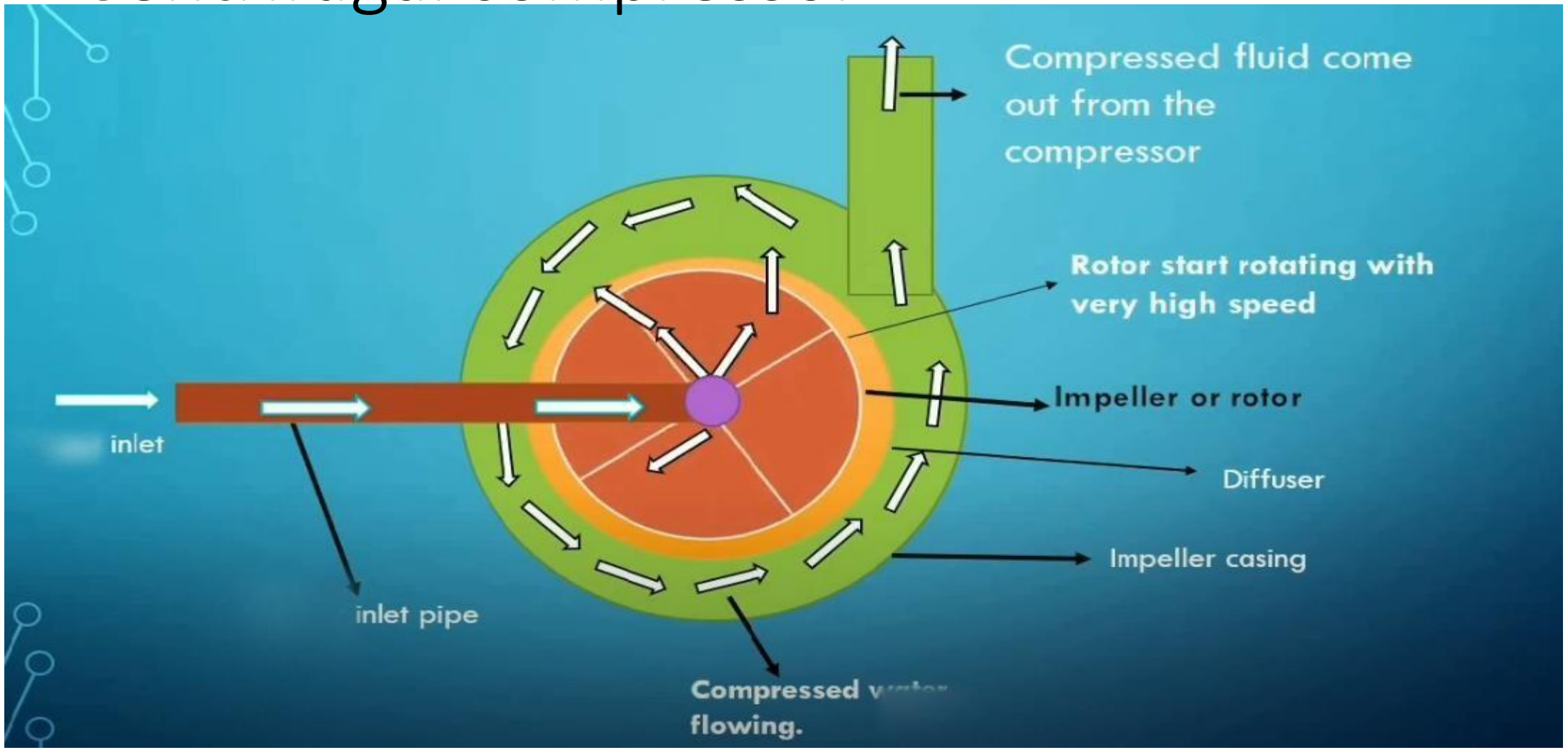
Rotary Compressors

- Less noise and vibration
- Best for large scale air-conditioning applications
- Have to be used continuously
- Expensive

Reciprocating Compressors

- Increased efficiency
- Easy maintanance
- Vibration & noise

Centrifugal compressor



Components of Air Compressor System :-

- Compressed air systems usually consist of the following components :-
- compressor
- air cooler
- air receiver tank
- filter
- dryer
- condensate trap
- distribution system
- The **compressor** produces compressed air at the required pressure.
- The **air receiver tank** acts as a reservoir to store and cool the compressed air and helps make sure the system can cope with variations in demand.
- The **air cooler**, **filter** and **dryer** all treat the air at different points in the system. They remove impurities such as water, dirt and oil from the air taken in by the compressor, as well as those added by the compressor.
- Compressed air may be fed to various uses on a site via a **distribution system**. These distribution systems can be relatively straight forward or very complex.

Ways to Conserve Energy & Improve Performance of Compressed Air Systems

- **1. Location of Compressors :**

The location of compressor & use of filters plays an important role on the amount of energy consumed.

- The lower inlet temperature to compressor results into lower energy input.

-- It is observed that *"Every 40C rise in inlet air temperature results in a higher energy consumption by 1 % to achieve equivalent output"*.

- **2. Use of Air-filters:**
- Air filters must be used to supply clean air at suction to compressor to avoid wear of moving parts.
- Filters should have high dust separation capacity with minimum pressure drop .
- If higher pressure drop across the filter increases the power consumption

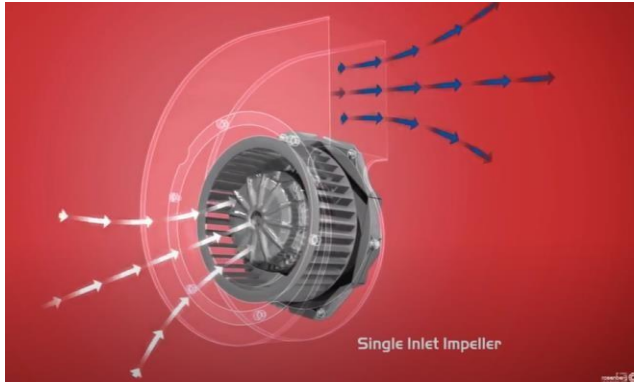
- **Intercooling in between the stages :**

- Intercoolers should be provided in between the stages to reduce the power requirement to run the compressor. It is observed that "*An Increasein 6 degree Celsius in the inlet air temperature to second stage results in 2%of specific energy consumption*".

- **Using Variable Speed Drives:**

Variable speed drives should be used for capacity control of compressors toreduce power consumption.

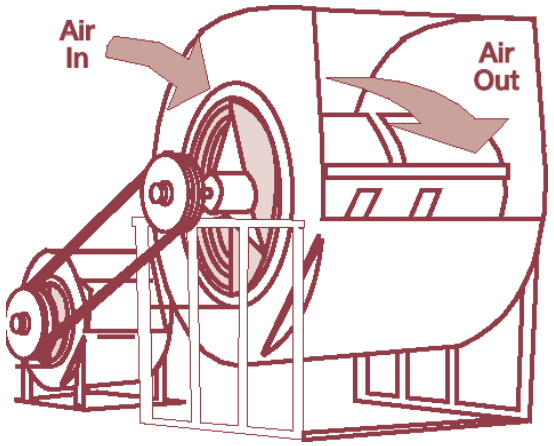
FANS AND BLOWERS

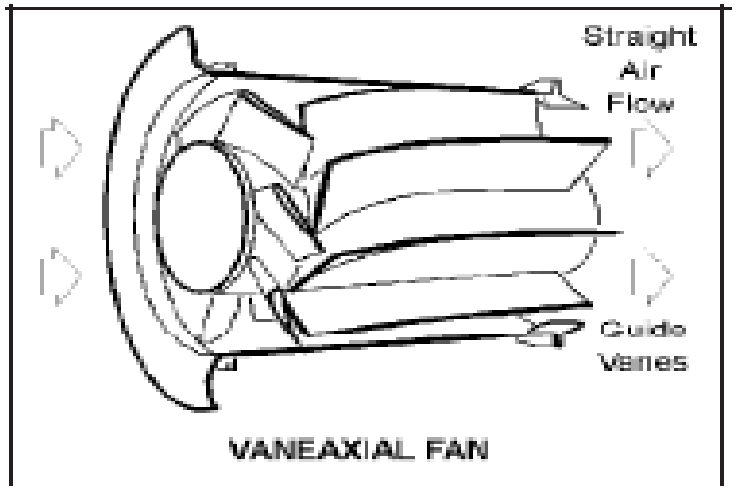


- Fans and blowers provide air for ventilation and industrial process requirements.
- Fans generate a pressure to move air (or gases) against a resistance caused by ducts, dampers, or other components in a fan system. The fan rotor receives energy from a rotating shaft and transmits it to the air.
- Fan and blower selection depends on the volume flow rate, pressure, type of material handled, space limitations, and efficiency.
- Industrial applications of blowers
- Centrifugal blowers are widely used in industrial applications where there is a requirement for constant flow of larger volumes of air such as in ventilation, combustion, transporting materials, cooling and heating systems, dust control, air conveyor systems, industrial vacuum applications and in other industrial processes.

Types of fans

- Fans fall into two general categories: centrifugal flow and axial flow.
- In centrifugal flow, airflow changes direction twice - once when entering and second when leaving (forward curved, backward curved or inclined, radial)
- In axial flow, air enters and leaves the fan with no change in direction (propeller, tube axial, vaneaxial)





Energy Saving Opportunities In Fans And Blowers

- **Minimizing demand on the fan.**

1. Minimising excess air level in combustion systems to reduce FD fan and IDfan load.

2. Minimising air in-leaks in hot flue gas path to reduce ID fan load, especiallyin case of kilns, boiler plants, furnaces, etc.

Cold air in-leaks increase ID fan load tremendously, due to density increaseof flue gases and in-fact choke up the capacity of fan, resulting as a bottleneck for boiler / furnace itself.

3. In-leaks / out-leaks in air conditioning systems also have a major impact on energy efficiency and fan power consumption and need to be minimized.

- **A good pressure monitoring system** that controls system volumetric flowrate can save thousands of money every year on the operation of even medium-sized systems
- **Proper fan sizing** Most of the fans are oversized for the particular application, which can result in **efficiency losses of 1-5%**. However, it may be more cost-effective to control the speed than to replace the fan system
- **Adjustable speed drives (ASDs)** Significant energy savings can be achieved **by installing adjustable speed drives on fans**. Savings may varybetween 14 and 49% of fan system energy use when retrofitting fans with adjustable speed drives.
- **Replacing standard V-belts with cogged belts** can save energy and money, even as a retrofit. Cogged belts run cooler, last longer, require less maintenance and have an efficiency that is about **2% higher** than standard V-belts.

Energy Conservation In Boilers

- A boiler is an enclosed vessel that provides a means for combustion heat to be transferred into water until it becomes heated water or steam. The hot water or steam under pressure is then usable for transferring the heat to a process.
- Boiler Efficiency Thermal efficiency of boiler is defined as the percentage of heat input that is effectively utilised to generate steam. There are two methods of assessing boiler efficiency.
- 1) The Direct Method: Where the energy gain of the working fluid (water and steam) is compared with the energy content of the boiler fuel.
- 2) The Indirect Method: Where the efficiency is the difference between the losses and the energy input.

The principle losses that occur in a boiler are:

- Loss of heat due to dry flue gases
- Loss of heat due to moisture in fuel and combustion air
- Loss of heat due to combustion of hydrogen
- Loss of heat due to radiation
- Loss of heat due to unburnt

Energy Conservation Opportunities in Boilers

- Examining the following factors can indicate if a boiler is being run to maximize its efficiency:
- 1. Stack Temperature : The stack temperature should be as low as possible. However, it should not be so low that water vapor in the exhaust condenses on the stack walls. Stack temperatures greater than 200°C indicates potential for recovery of waste heat.
- 2. Combustion Air Preheat :Combustion air preheating is an alternative to feedwater heating. In order to improve thermal efficiency by 1%, the combustion air temperature must be raised by 20 °C.

- Incomplete Combustion: Incomplete combustion can arise from a shortage of air or surplus of fuel or poor distribution of fuel. It isusually obvious from the colour or smoke, and must be correctedimmediately.
- Excess Air Control :Excess air is required in all practical cases to ensure complete combustion, to allow for the normal variations in combustion and to ensure satisfactory stack conditions for some fuels. The optimum excess air level for maximum boiler efficiency occurs when the sum of the losses due to incomplete combustion and loss due to heat in flue gases is minimum.
- Repairing or augmenting insulation can reduce heat loss through boiler walls and piping.
- Automatic blowdown controls can be installed that sense and respond to boiler water conductivity and pH. A 10% blow down in a 15 kg/cm^2 boiler results in 3% efficiency loss.

Useful Tips for Conserving Energy in lighting system

- Unplug! Up to 75% of the electricity used to power home electronics is consumed while the products are turned off. Appliances like computers, tv's, cable boxes, cell phone chargers, coffee makers, etc. all continue to consume energy just by being plugged in into an outlet.
- Set your thermostat at 78 degrees or higher in the summer. Use fans whenever possible instead of AC, and ventilate at night this way when practical. Using fans to supplement AC allows you to raise the thermostat temperature, using less energy. Fans cost less to use than AC.
- Keep the thermostat at 70 degrees or lower in the colder months. Turn down the thermostat at night to 65 degrees, lower when you go to bed or leave your house for more than four hours.
- Clean the lint filter in your dryer after every load to improve air circulation, and periodically check the dryer vent to ensure it is not blocked.
- Turn lights off in unoccupied areas, including porch lights when you go to bed.
- Buy light bulbs that are 60 watts or less. Even better, get energy-saving compact fluorescent lights. They last much longer and you won't have to change them as often.
- Set your refrigerator temperature at to 40 degrees and your freezer at 0-5 degrees. Close the door quickly after you select an item.

Energy Conservation in Pumps

1.Select the most efficient pump type for the application

Generally the average pump efficiency is below 40 percent and that 10 percent of pumps are 10 percent efficient or less. Oversizing often comes in the design phase, since the practice for adding multiple safety factors is quite common. This means that both pressure and flow parameters for the pump design may be 25 percent more than the actual system operation. The specifying engineer may need to work closely with the pump manufacturer or distributor to optimally select the pump, in addition to its size, speed, power requirements, and type of drive, as well as the mechanical seal and ancillary equipment.

2.Right-size the pump

Right-sizing the pump represents a significant economic opportunity to reduce energy consumption. This isimportant because centrifugal pumps can consume up to 60 percent of motor energy in a facility, and also have the highest process equipment maintenance cost. When engineers add too much of a safety factor during the design phase, the pump can be oversized, resulting in higher energy and maintenance costs.

3.Trim the impeller

The impeller should not be trimmed any smaller than the minimum diameter shown on the manufacturer's pump curve. This is typically about 75 percent of a pump's maximum impeller diameter. Pump curves and affinity rules (which are valid for a maximum of approximately 5 percent change in diameter) can both provide information on impeller trim changes and the affected performance. In practice, impeller trimming is typically used to avoid throttling losses associated with control valves.

4.Minimize system pressure drop

A key way to reduce pressure drop is through pipe-sizing optimization. Hydraulic friction loss creates a reduction in pressure from one end of a straight pipe to another. Factors such as the flow rate, pipe size (diameter), overall pipe length, pipe characteristics (surface roughness, material, etc.), and properties of the fluidbeing pumped all influence the system pressure drop.

5.Implement proper control valves

Control valves are typically used to control flow and/or pressure. They can help to reduce energy losses over non-controlled systems such as irrigation systems with a fixed-speed pump and multiple locations with different distances and elevations. The main functions of control valves are throttling flow or for bypassing flow. Throttling reduces the flow but increases the pressure. You can minimize excess pressure by bypassing excess flow back to the reservoir or another location.

6.Implement variable speed drives (VSDs)

Drivers are used for either fixed-speed or variable-speed operation. For many applications, you can save energy by implementing variable speed drives. With a variable speed drive, the rotational speed of the pump is adjusted to achieve the desired head and flow necessary for the process application. A VSD can often be added to an existing pump motor system to slow the pump down to meet the actual requirements verses the theoretical requirements that were calculated at the start of the project. Once installed, the VSD can accommodate changing system demands, including many potential future expansion plans. This method often results in the highest energy efficiency with lowest life cycle costs.

7.Maintain pumping systems effectively

Effective pump maintenance allows facilities to keep their pumps operating efficiently. Regular maintenance may reveal deteriorations in efficiency and capacity, which can occur long before a pump fails. Wear ring and rotor erosion, for example, can be costly problems that reduce efficiency by 10 percent or more. Most maintenance activities can be classified as either preventive or predictive. Preventive maintenance addresses routine system needs such as lubrication, periodic adjustments, and removal of contaminants. Predictive maintenance focuses on tests and inspections that detect deteriorating conditions. Sometimes called "condition assessment" or "condition monitoring," it has become easier to conduct with modern testing methods and equipment. This can help minimize unplanned equipment outages, which can be very costly.

8.Use higher efficiency/proper pump seals

Sealing systems impact efficiency, and mechanical friction losses are only the beginning. Leaks from static and dynamic seals waste fluid and can contaminate the environment. Leaks between the pump suction to the pump discharge reduce pump volumetric efficiency. Dynamic seals consume energy from the mechanical friction between the static and moving parts. Potential sealing system savings can exceed the energy savings obtained from switching to variable frequency drives, trimming impellers, or re-sizing pumps in many applications.

9.Use multiple pumps

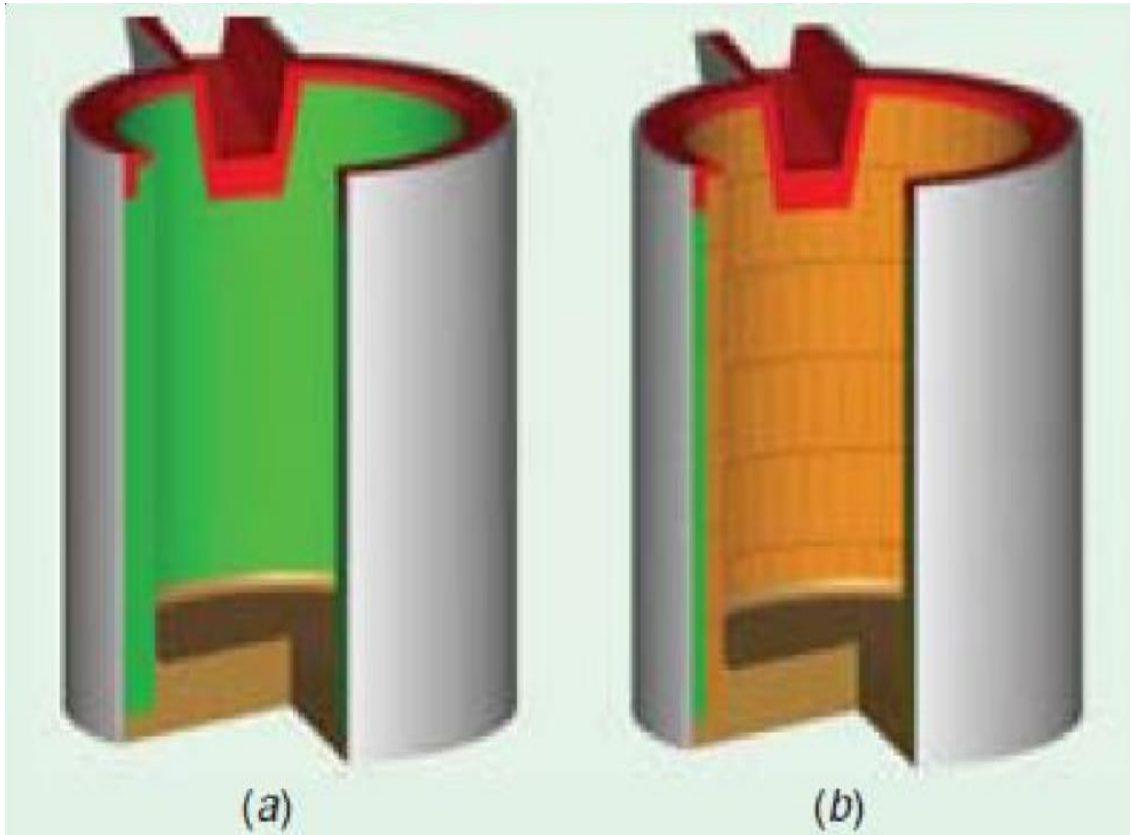
When multiple pumps operate as part of a parallel pumping system, there are opportunities for significant energy savings. A multiple pump parallel system works best when each pump is run individually, not concurrently, most or all of thetime. Running multiple pumps simultaneously is appropriate as dictated by the flow requirements specific to the application and duty cycle.

10.Eliminate unnecessary uses

One of the most simple, but often overlooked, measures to save energy is to eliminate unnecessary use. Pumping system efficiency measures include shutting down unnecessary pumps and using pressure switches to control the number of pumps in service when flow-rate requirements vary. Each pump system is different and there are many opportunities to save energy. Don’t forget to look for the obvious

Electric Furnace

- Electric heating is extensively used both for domestic and industrial applications.
- Electric Furnace is are used to melt metals for casting .change of shape and change of properties.
- The primary energy required for reheating / heat treatment (say annealing) furnaces are in the form of Furnace oil, LSHS, LDO or electricity



Inside views of an induction furnaces: (*a*) Rammed induction furnace and (*b*) bricked induction furnace

energy conservation in electric furnaces

- Match the load level to the furnace capacity.
- Use proper temperature controller.
- To avoid heat losses improve the insulation system of electric furnace
- Recover and utilize waste heat from furnace flue gases for preheating of combustion air. Every 21^{o}C rise in combustion air temperature results in 1% fuel oil savings.

energy conservation in electric Ovens

- 1. Microwaves use around 50% less energy than conventional ovens: they're most efficient for small portions or defrosting.
- 2. Check the seal on your oven door to see if there are cracks or tears in it.
- 3. Develop the habit of “lids-on” cooking to permit lower temperature settings.
- 4. Carefully measure water used for cooking to avoid having to heat more than is needed.
- 5. Begin cooking on highest heat until liquid begins to boil. Then lower the heat control settings and allow food to simmer until fully cooked.
- 6. Rearrange oven shelves before turning your oven on – and don't peep at food in the oven. Every time open the oven door,4°-5° is lost.
- 7. When preheating an oven for baking, time the preheat period carefully. Five to eight minutes should be sufficient.
- 8. For large items, stove-top cooking is most efficient, especially with gas.
- 9. Microwaves cook food from the outside edge toward the centre of the dish, soif you're cooking more than one item, place larger and thicker items on the outside.

Energy Efficient Motor Steps to Improving Electric Motor System

Efficiency Tips for energy saving Energy Efficient Motors

1. Use Adjustable Speed Drives (ASDs) or two-speed motors where appropriate.

2. Consider load shedding.

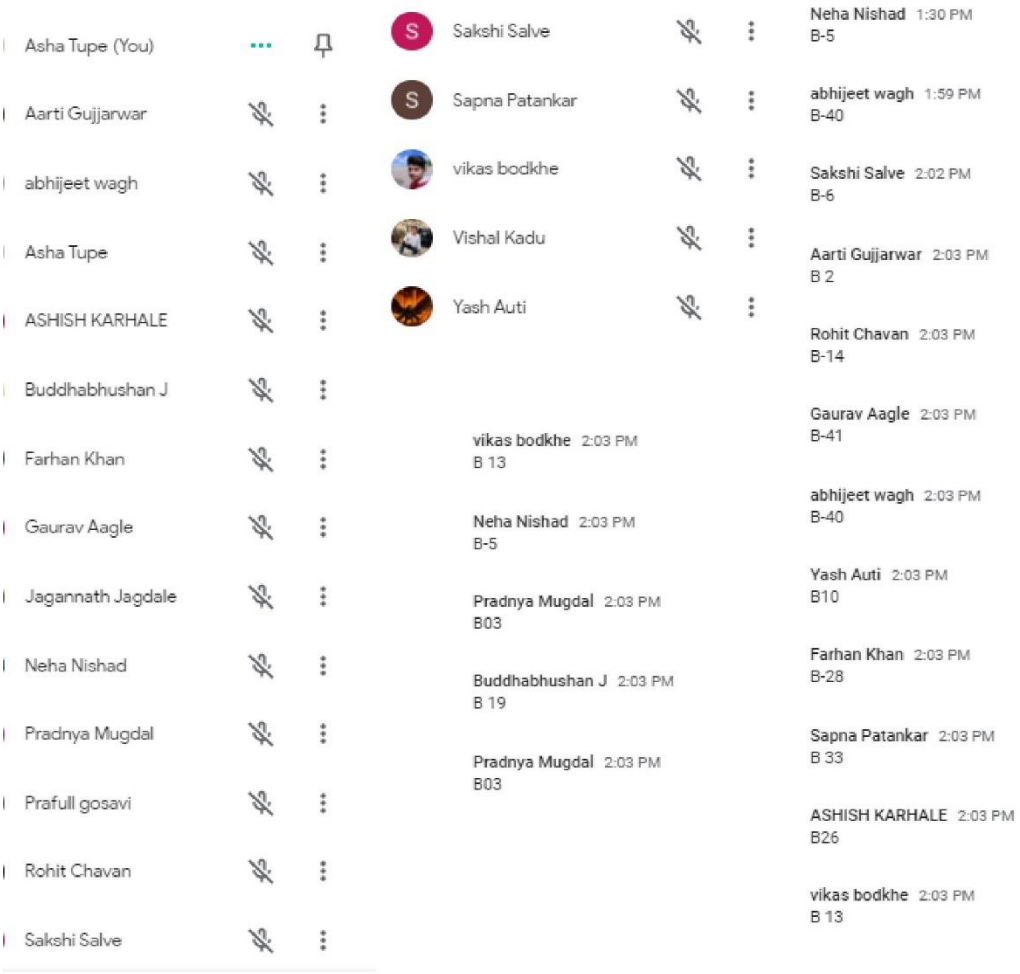
3. Consider replacing existing V-belts with cogged belts.

4. Choose energy-efficient motors for new applications. Consider replacement vs.

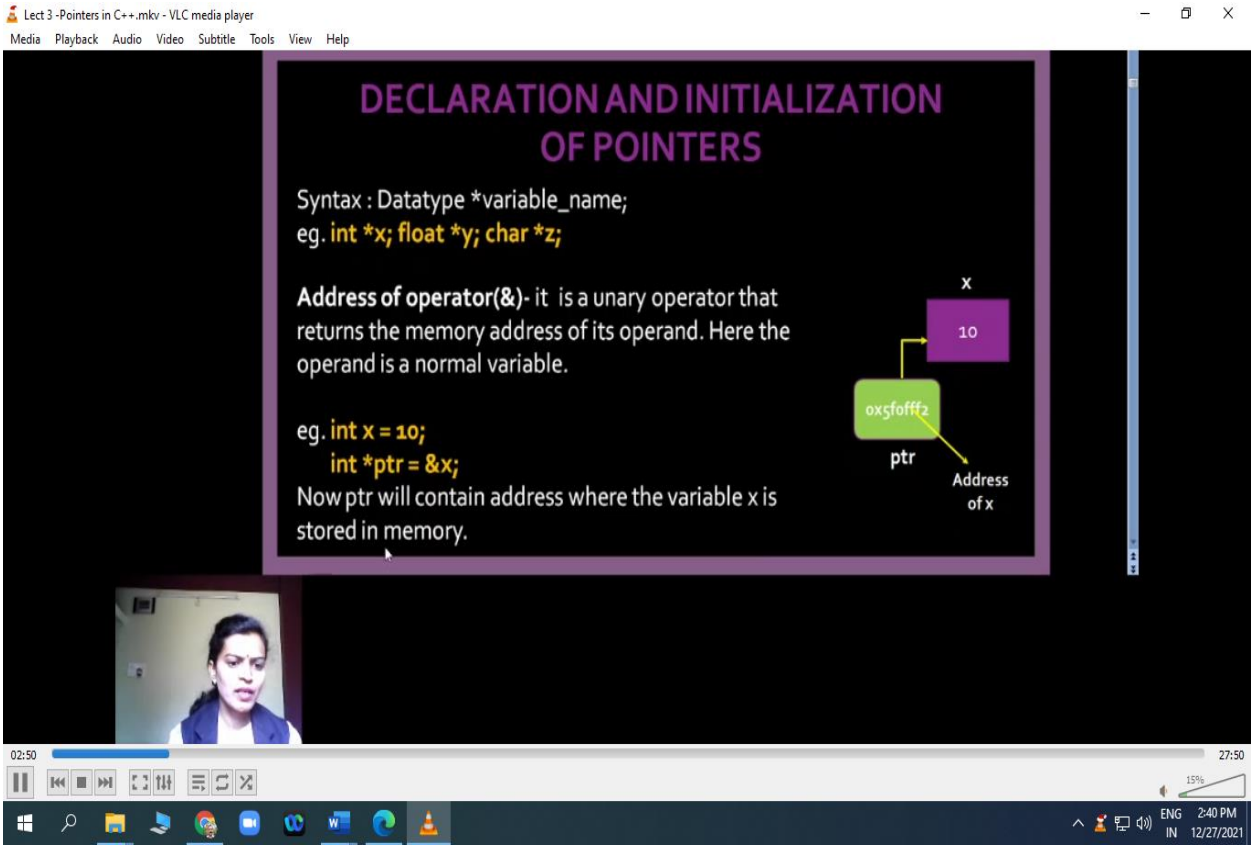
   Repair for older, inefficient motors.

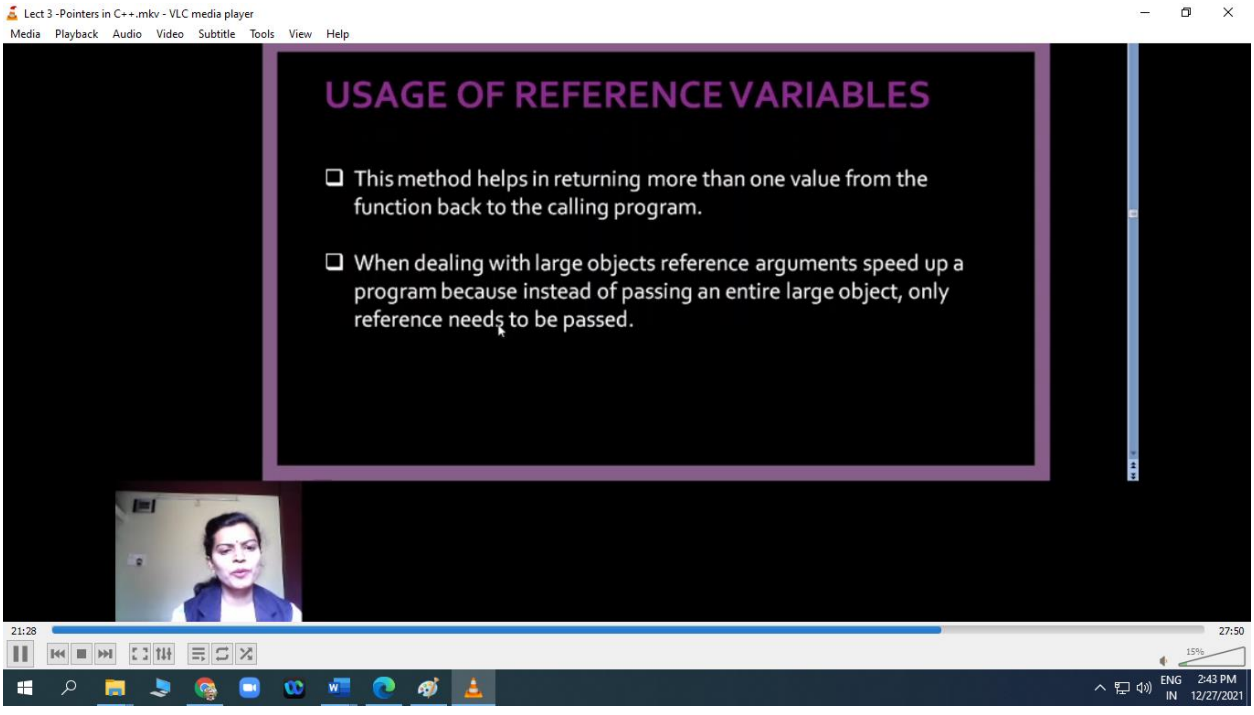
5. Match motor operating speeds, and size motors for overall system efficiency

Fy. B.Tech : Attendance



Video Lectures





(II) BEST PRACTICE

1.Title of the Practice:

Hands-on training & practice for students through Maintenance & reparation activities of Utilities & facilities, done at the Institute for CSE, Civil & Electrical Departments.

2.Objectives of the Practice:

To spark the curiosity of learning & discovering through examples of daily applications & amenities.

To heighten & enhance the overall perspective of concepts & Engineering products.

3.The Context:

Electrical Department curate's platforms of learning through Maintenance of various appliances, services and facilities by its trained personnel. Simultaneously, real-time instructions are given to students to perceive theory with practical. Students are demonstrated viable strategies of troubleshooting & maintenance, and at the same time, given the opportunity to carry out guided repairing & fixing of items & services.

4. The Practice:

The Trained Staff & personnel have expertise and technical know-how of handling various devices and malfunctioning of services / devices. The students are made aware with IS rules, safety norms and maintenance work. Students take active participation in the actual repair and maintenance work carried out at Institute level. Electrical circuit design along with the switchgear and protection, actual wiring work is carried out at department level. Training is given to the students regarding the following,

a. Use of handy toolkits and demos of their usage,
b. Use of Precautionary instructions, Dos and Donts and Safety norms to be followed,
c. Use of Instructional Material covering basics of a concept
d. Use of Pictorial representations for better understanding.

Also streamlining the concepts by clarifying the applications and relevance of the activities is being carried out.

5. Evidence of Success:

Students become receptive to an interactive & riveting learning environment which is apparently being done through this practice

6. Problems Encountered and Resources Required:

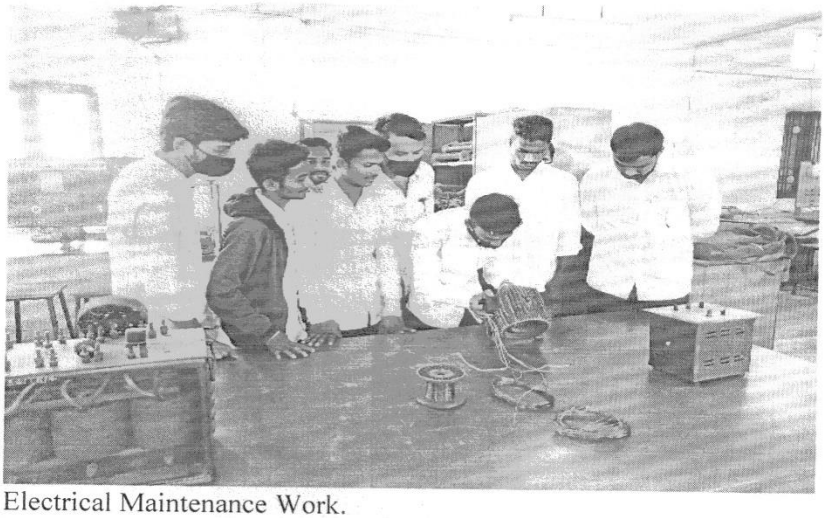
Students come with a lot of pre-conceived notions & theoretical concepts about how Engineering Stuff works which are erroneous and faulty. As such, they have difficulty grasping the live rectifying operations being done on dysfunctional/repair-worthy instruments.

7. Notes (Optional):

It has been observed that students have been ingrained with a very rote and mechanical method of learning. When it comes to implementing their learning, their performance is very disappointing. The underlying cause behind this lack of ability is lack of proper skills and know-how which should be inculcated during practical or lab sessions in their education.

To overcome this flaw, the best practice of integrating real-life problems and their feasible solutions has been implemented by the Electrical Department, Computer Department by taking issues faced in daily life at an Institute level. This helps the students to upgrade their skills and take initiatives in solving practical problems relating to engineering products and services, which are vetted by Authorized personnel before interfacing them with students.

Computer Hardware Maintenance work.



Electrical Maintenance Work.

HEAD

Dr. Chaudhari B.N.
Professor & Head
Department of Electrical Engineering
P.E.S. College of Engineering
Aurangabad (M.S.)

Key Indicator - 7.2 Best Practices

(I) BEST PRACTICE

1. Title of the Practice:
   Teaching Learning process through offline lectures and through virtual classes with the help of ICT enabled tools.

2. Objectives of the Practice:
   To enhance teaching learning process carried out for the in-depth education.
   To carry out teaching learning process in all situations.

3. The Context:
   The institute has adapted the practice of teaching the students in actual classrooms (offline) as well as through online teaching along with the various ICT enabled tools including video lectures of NPTEL courses.
   During pandemic when everything was stopped except education. Institute carried out education successfully with the help of ICT tools.

4. The Practice:
   Teaching faculty adapted and got well acquainted with the virtual teaching system by using the blend of or either of the following techniques.
   (a) Use of digital notepad in online/virtual class.
   (b) Use of Google Classroom, Google Meet, Google form, Microsoft 365, Cisco WebEx, OBS studio.
   (c) Use 0f Audio/Video lectures with PPT. and video lectures from NPTEL.
   (d) Use of virtual lab
   (e) Use of ICT enabled smart classroom for live streaming of lectures.

5. Evidence of Success:
   Effective teaching was carried out throughout the year. Majority of the students attended the lectures online and excelled in university examination.

6. Problems Encountered and Resources Required:
   Non availability of internet facility to the students at remote places. Keeping in view such students, faculty have prepared video lectures and made available to the students.

7. Notes (Optional):
   To conduct online lectures, we have faced few problems for which feasible solutions are offered by the institute. During lockdown period, online lectures are conducted by the faculty from home.
   As many students are belonging from financial weak background and rural areas where internet facility was not available up to the mark.
   We have prepared video lectures, which are provided to the students.
   When few students could not attend the offline lectures because of lockdown in their cities. We use to conduct offline lectures in the class which are live

streamed.
Sincere efforts are made by all the faculties to continue teaching in all situations. Efforts taken resulted in very good results in university examination and successful completion of the program of final year students.

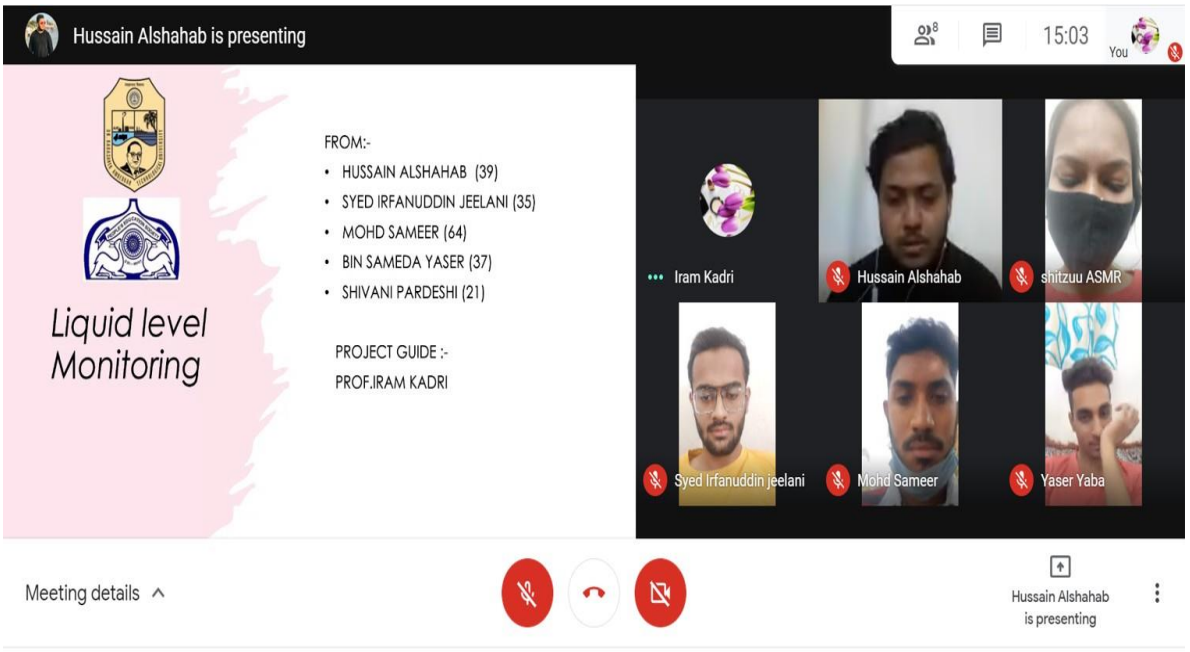
Video Lecture of Prof. Y.S. Pagar (Class: SY CSE Sub: EL- OOPS in C++ : Pointers in c++

https://drive.google.com/file/d/1mfdyDq7C3qc1ampbg7FWxa2_kvt-CNAQ/view?usp=sharing

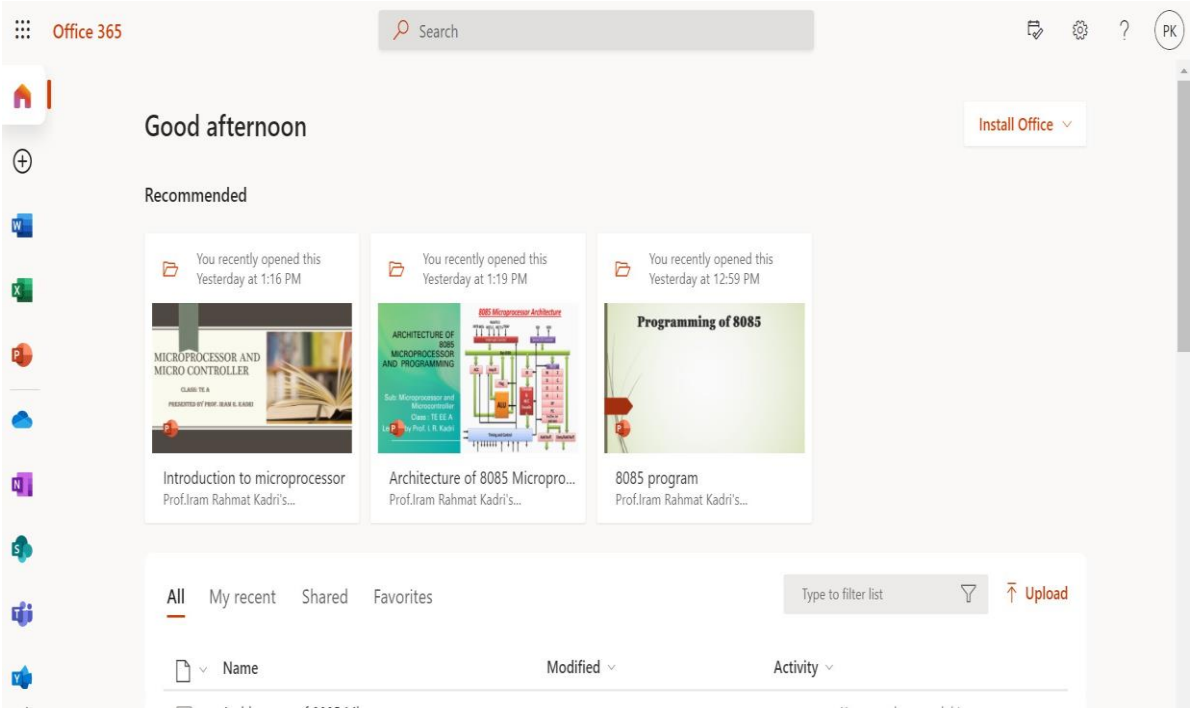
Virtual Classroom: Class B.Tech Final Sub: Digital Image Processing

Welcome to Virtual Labs - A MHRD Govt of india Initiative

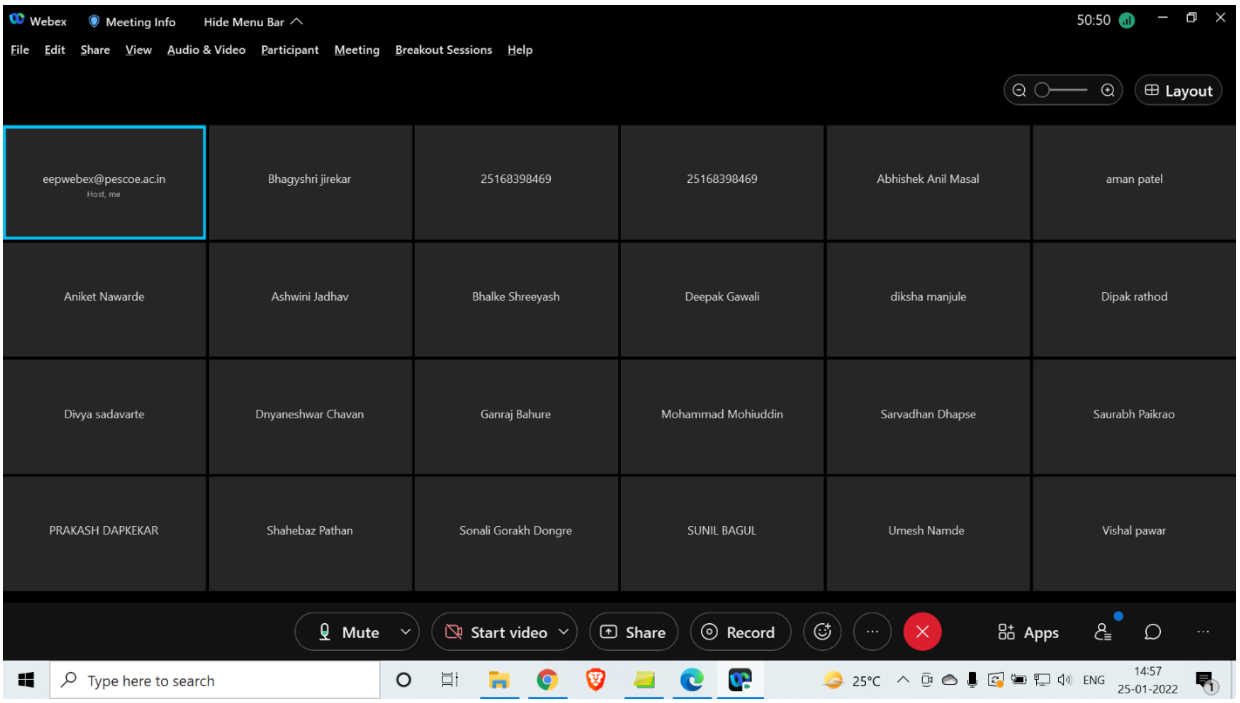
Apps Used For Lectures

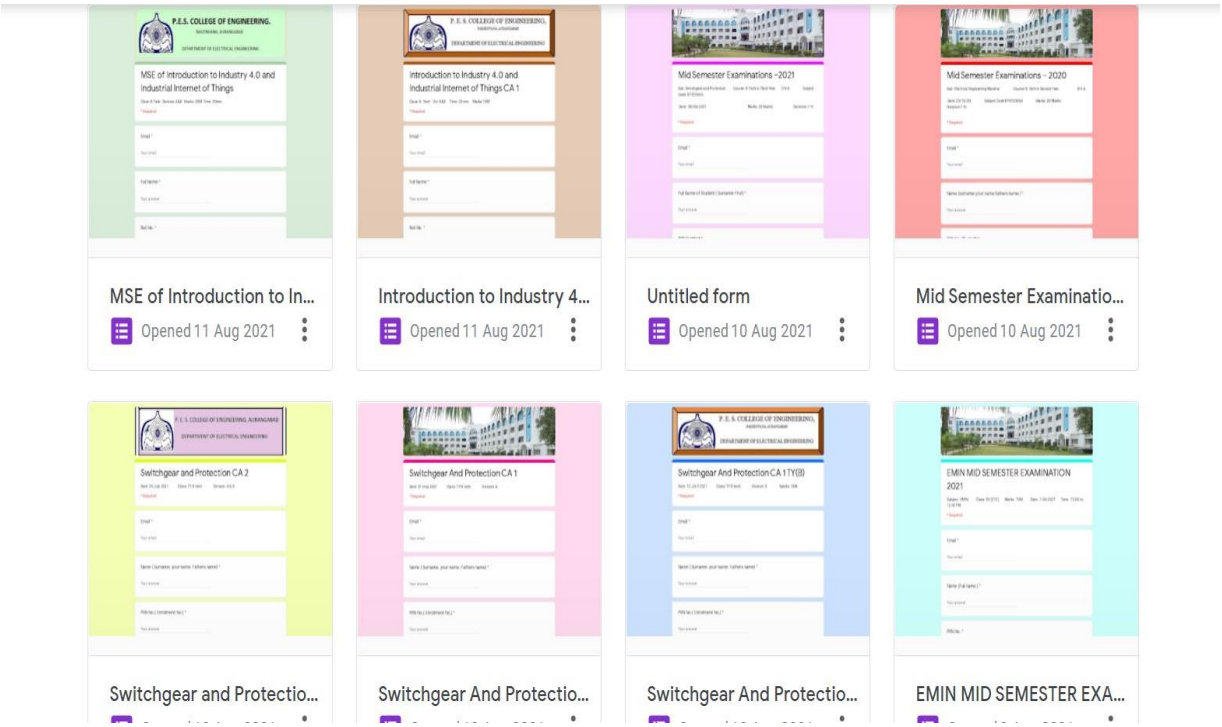


1) **Google meet**

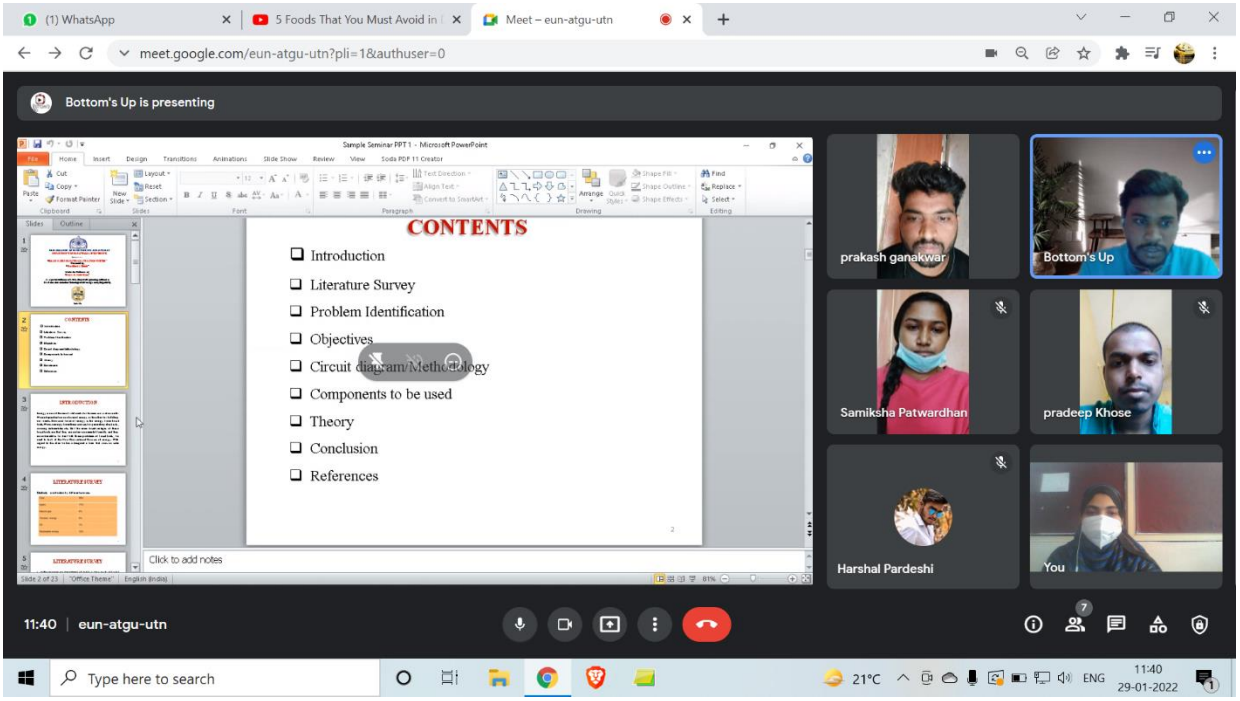


2) CiscoWebex

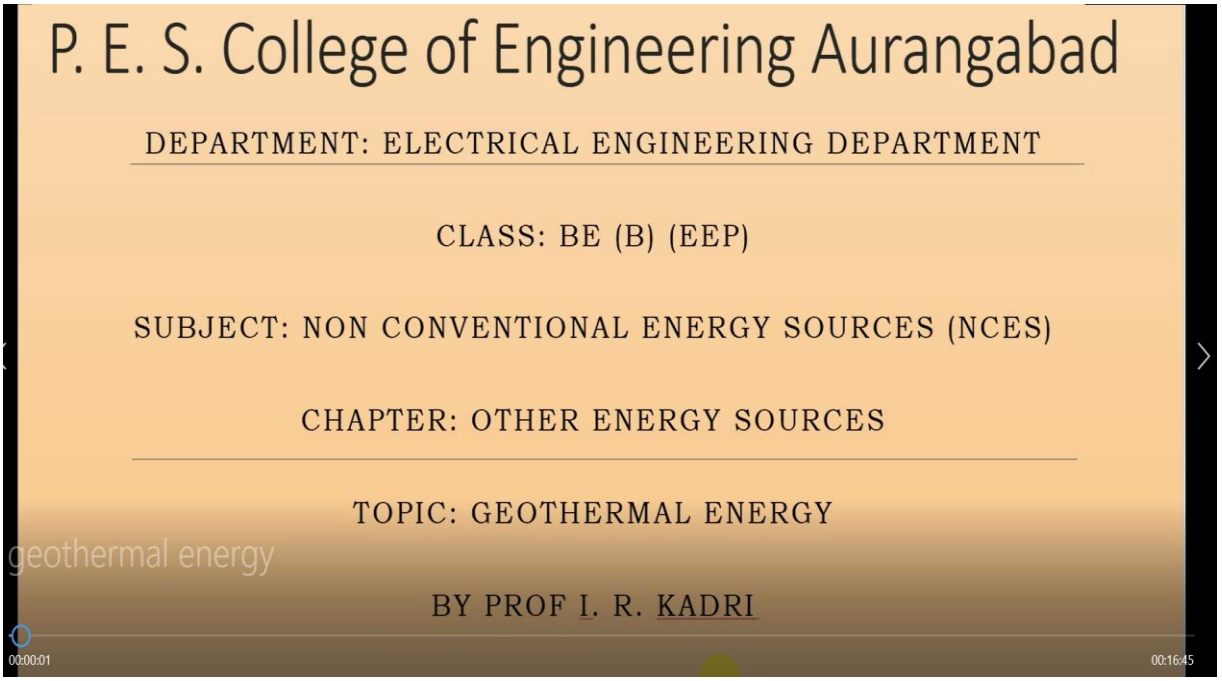




3) Google form

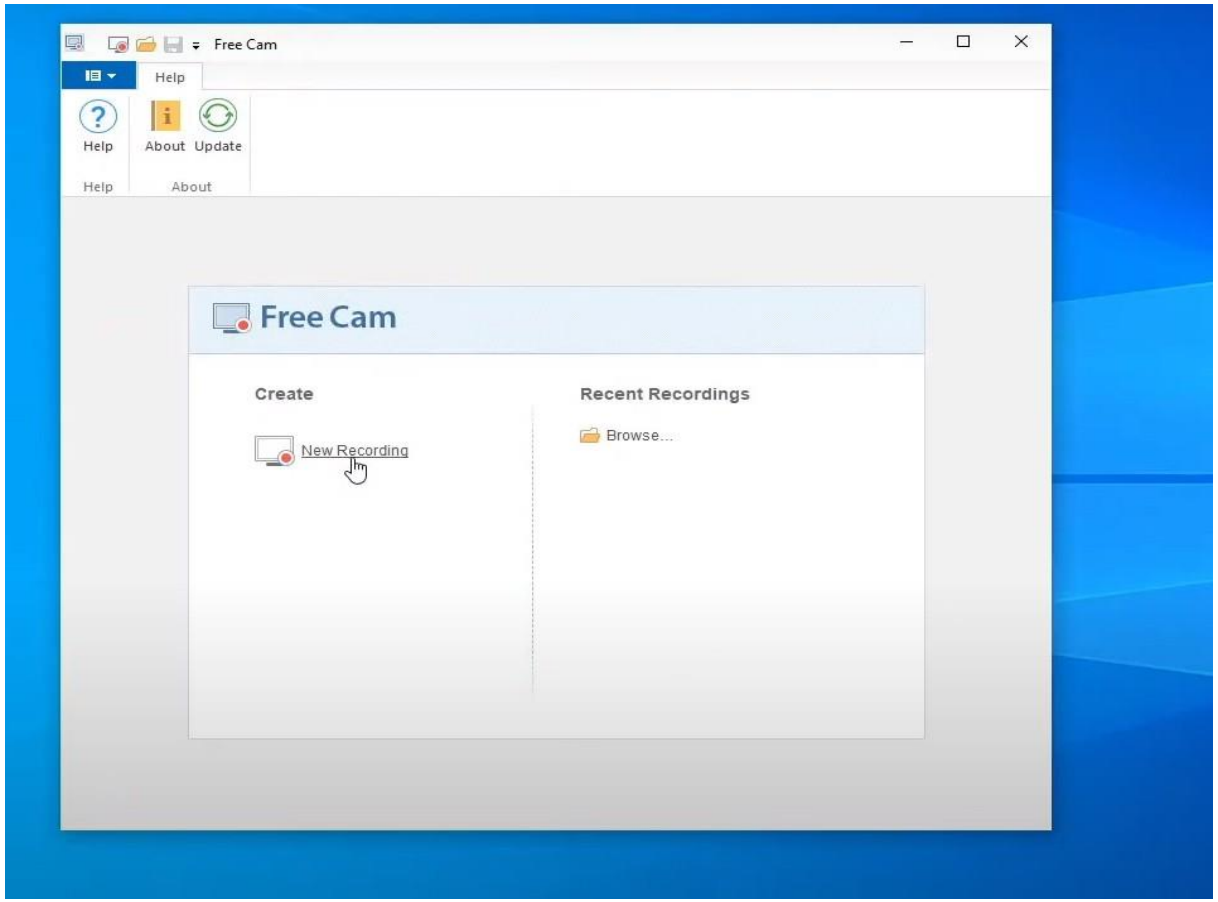


4) Google Meet.

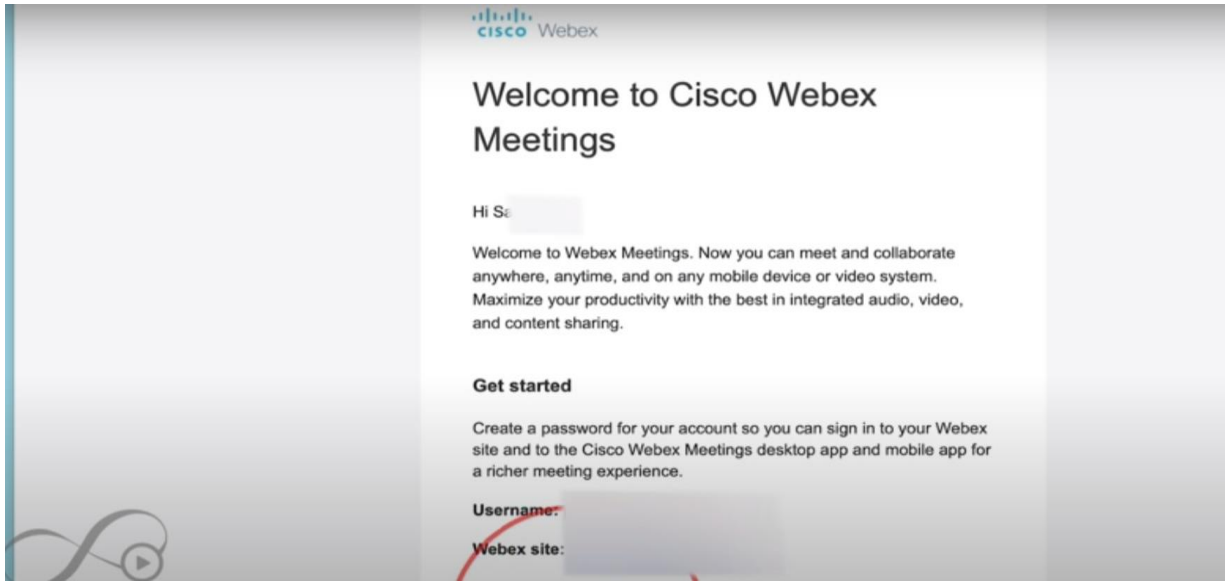


5) ApowerSoft Screen recorder

6) Lecture were recorded and screen shared using OBS Studio



7) Free Cam Recorder



8) Lectures by using cisco webex

Unit-III: PPT’S (ECA)

ENERGY CONSERVATION

Law of conservation of energy

- The law of conservation of energy is a law of science that states that energy cannot be created or destroyed, but only changed from one form into another or transferred from one object to another.
- The law of conservation of energy can be seen in these everyday examples of energy transference:
- Water can produce electricity. Water falls from the sky, converting potential energy to kinetic energy. This energy is then used to rotate the turbine of a generator to produce electricity. In this process, the potential energy of water in a dam can be turned into kinetic energy which can then become electric energy.
- Fingers hitting piano keys transfer energy from the player's hand to the keys.

ENERGY CONSERVATION:

- 1. Conservation of electrical energy means the reduction in energy consumption but without making any sacrifice of quantity & quality of production.
- In other words, for the same energy consumption, higher production, it does not prevent you use of energy by fixing some limit quantitatively within the agreement but insists for use efficiently thus decreasing the cost of production to some extent by the way of reduction in the energy bill.

Why is Energy Conservation So Important?

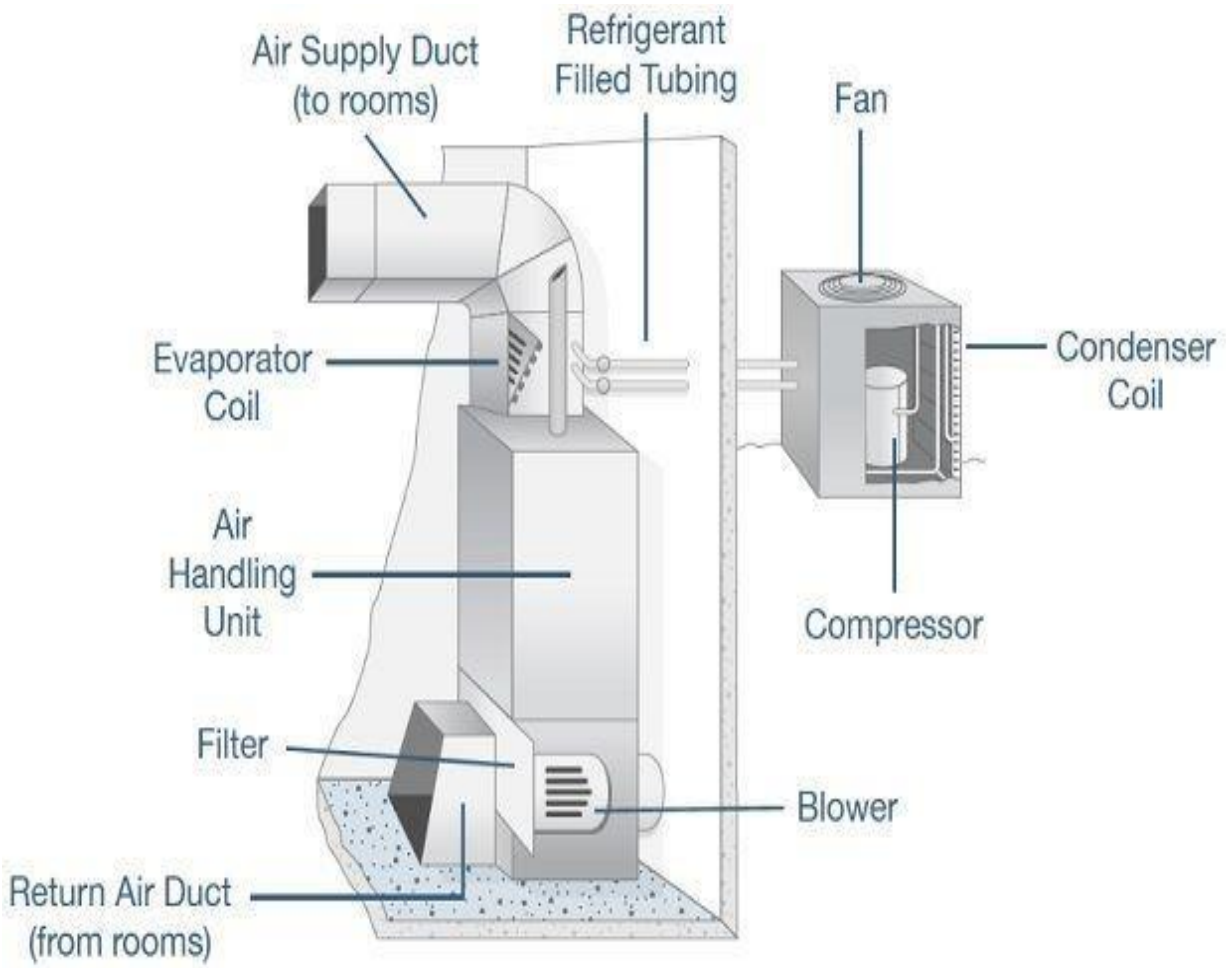
- Reducing the amount of energy that we use is a good way to save money, and there are also other benefits to decreasing energy consumption.
- For example, a large portion of the energy we use is derived from oil. Some experts claim that we will run out of oil in just a few decades. As natural resources used to produce energy become scarce, the cost of energy will most likely increase.
- Also, toxins and pollution are released into the atmosphere during the production and consumption of energy. Not only we are running out of some valuable natural resources, but we are also destroying the environment in the process of using them!

Energy Efficiency

- **It involves use of energy more effectively at the technical level.**
- **Energy efficient products provides same level comfort at low cost and protecting the environment**
- **E.g. Use of high energy star ratings**
- **Energy Efficiency is also defined as use of low-cost resources with variety of benefits to the consumer and to the society.**
- **It is the utilization of energy in the most cost-effective manner to carry out a manufacturing process, where by energy waste is minimized and overall consumption of primary energy recourses is reduced.**

Energy conservation in ventilation and air conditioners

- The main purposes of a Heating, Ventilation and Air-Conditioning (HVAC) systemare to help maintain good indoor air quality through adequate ventilation with filtration and provide thermal comfort.
- HVAC system consist of motors, pumps, fans, compressor, ducting and filters.
- Refrigeration system consist of cooling coil, evaporators, condenser and cooling towers.


Air Supply Duct
(to rooms)
Refrigerant
Filled Tubing
Fan
Evaporator
Coil
Condenser
Coil
Air
Handling
Unit
Compressor
Filter
Blower
Return Air Duct
(from rooms)

Energy conservation techniques in HVAC

- Optimise the number, shape and size of intakes
- Manage airflow, including and considering dual flow ventilation
- Stop or reduce ventilation where possible
- Use automatic control systems and integrate with centralised technical management systems
- Check system is balanced or not.
- Ensure system is airtight, check joints
- Optimize air system design:
  - ducts are of a sufficient size
  - circular ducts
  - avoid long runs and obstacles such as bends, narrow sections

The amount of electricity air-conditioning systems use also depends on the cooling load – the amount of heat the system has to be remove. There are several steps to reducing cooling load.

- Reduce warm air filtration into the cooled space by keeping windows and doors closed when HVAC systems are in use.
- All lights emit heat, so lights and equipment that are not required at any particular time should be switched off to help in reducing the cooling load.
- Investing in variable speed drives (VSDs) for motors to the match speed with output demand ,

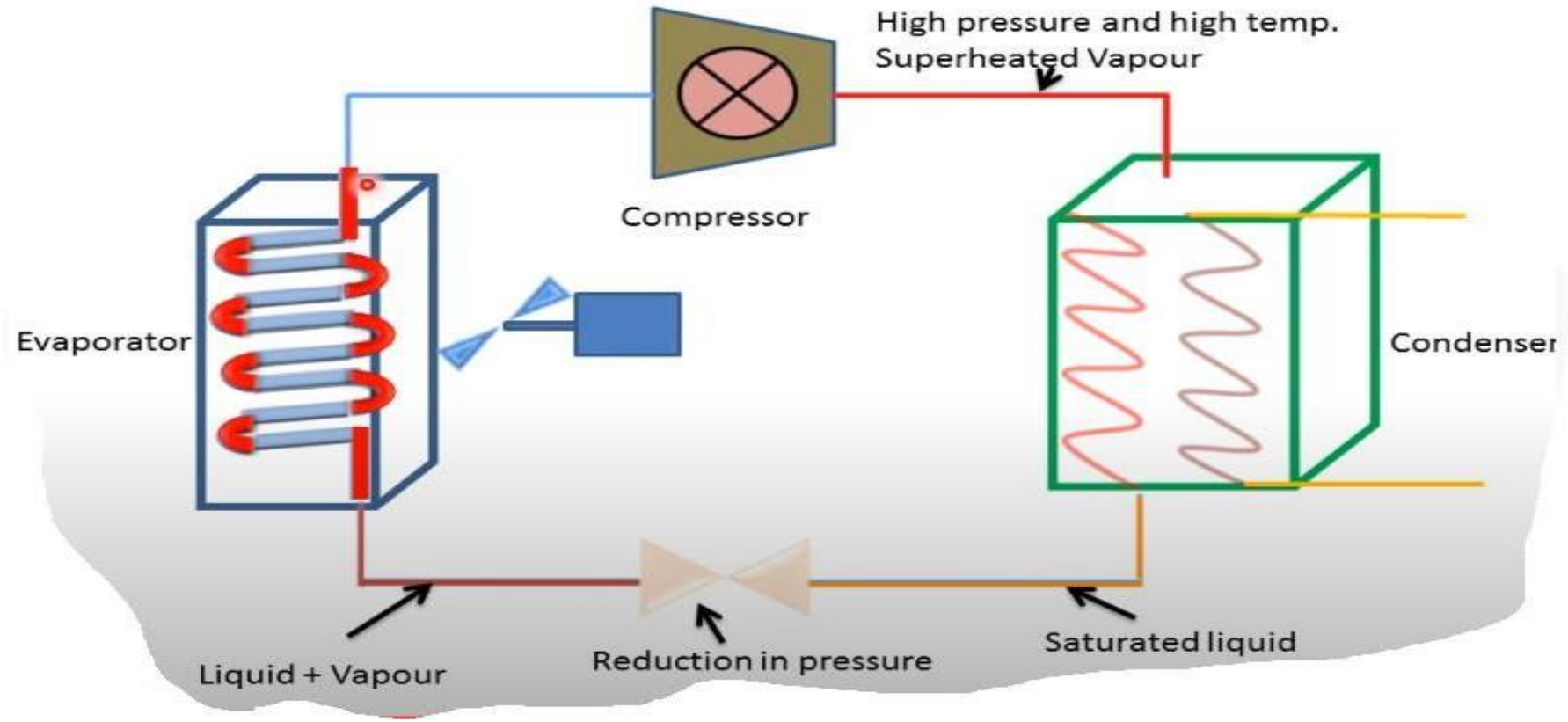
Which results in lower energy usage and heat load.

- HVAC loads vary at different times and in different parts of a building throughout the day. Well set time and occupancy controls should ensure that systems only operate when and where required during core business hours.

Some basic techniques as

- Turn off all the HVACs when not needed.
- Reduce ceiling hights if possible
- Use temperature sensor to lower down HVAC device operating time.
- Always set routine maintenance schedule like checking of ductwork for insulation condition and any leakages.
- Motor and drive bearings should be lubricated
- Check HVAC filter regularly.
- Clean HVAC coils regularly.

Refrigeration System

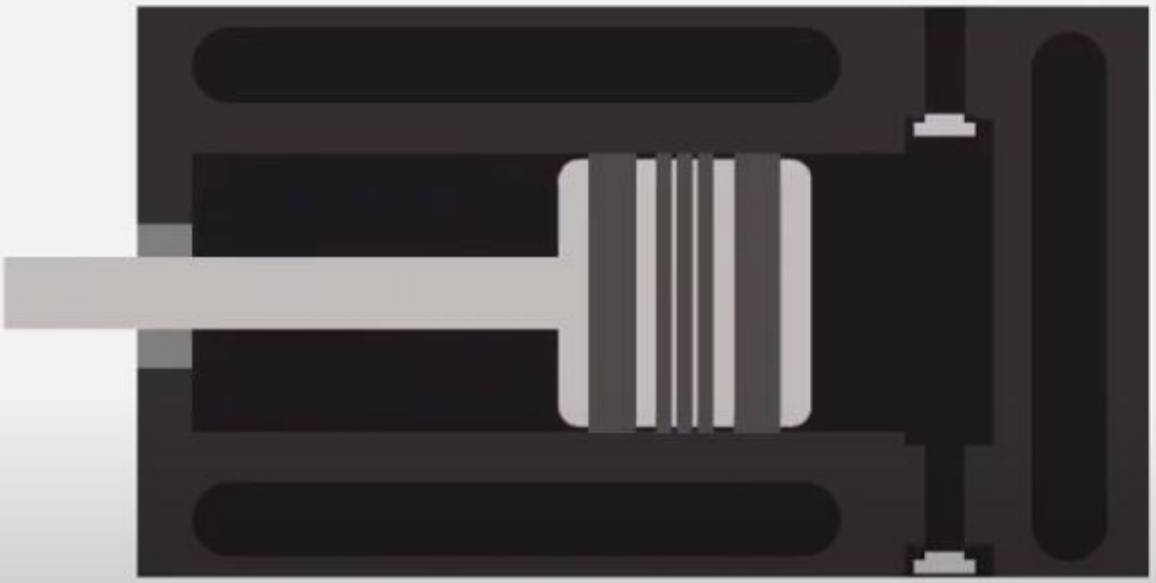


Energy Conservation In Refrigeration System

- Keep refrigerators less loaded for improving efficiency
- Always keep cooling coils as clean as possible
- Keep refrigerator 10 cm away from the walls
- Duct system should be less leak
- Moister or liquid indicators should be checked regularly
- Use gas powered refrigerator device to lower down electrical demand charges.
- Maintenance should be done regularly.
- Maintenance of condenser should be done regularly for proper heat exchanger.

Air Compressors

- Air compressor are used in industries to operate pneumatic tools and equipment depending on process need.
- Compressors are classified in two types called positive displacement compressor and dynamic compressor.
- In positive displacement compressor, pressure of gas is increased by reducing its volume.
- In dynamic compressor air velocity is raised to increase the air pressure.



Molecular Weight

Low Flow

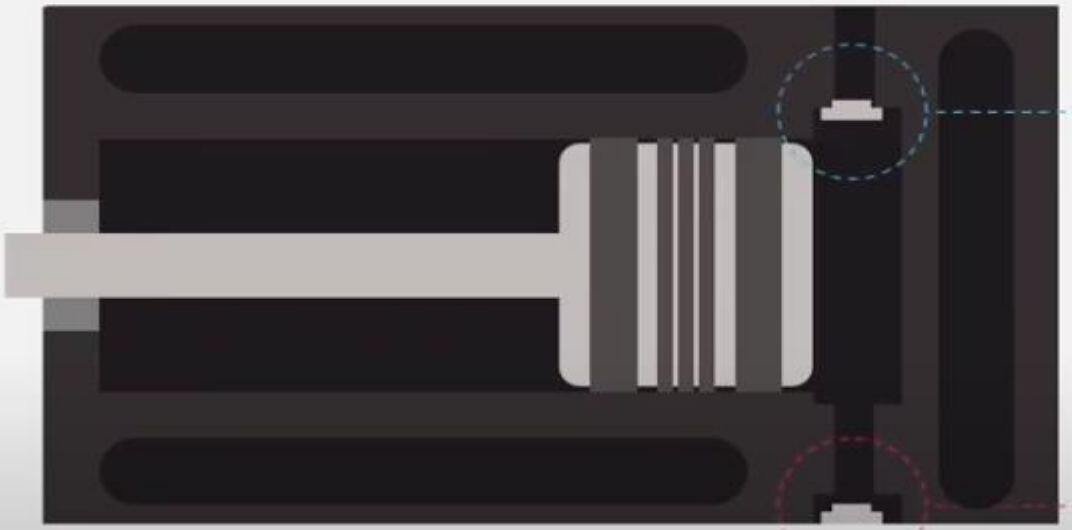
Very Light Gas

Cylinder Size

Very Heavy Gas

Stroke

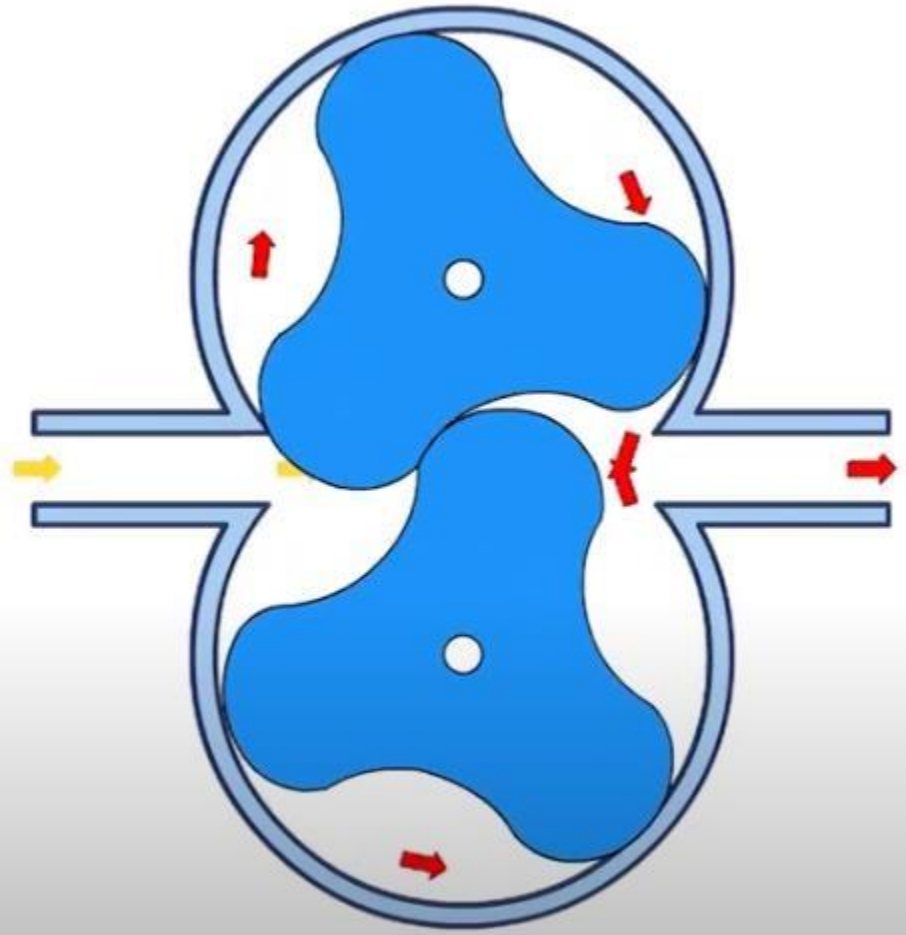
Speed



Suction Valve

Discharge Valve

Rotary compressor



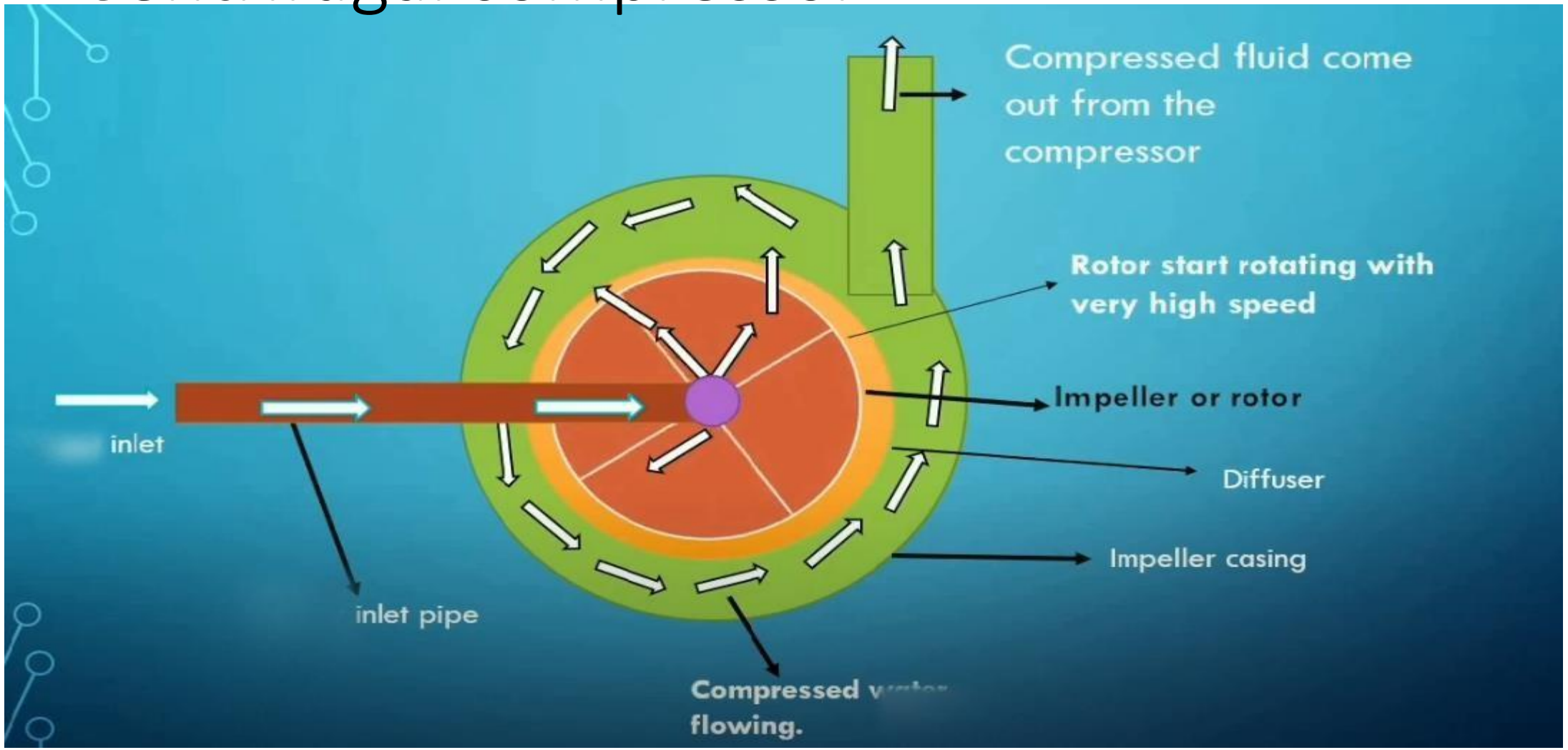
Rotary Compressors

- Less noise and vibration
- Best for large scale air-conditioning applications
- Have to be used continuously
- Expensive

Reciprocating Compressors

- Increased efficiency
- Easy maintanance
- Vibration & noise

Centrifugal compressor



Components of Air Compressor System :-

- Compressed air systems usually consist of the following components :-
- compressor
- air cooler
- air receiver tank
- filter
- dryer
- condensate trap
- distribution system
- The **compressor** produces compressed air at the required pressure.
- The **air receiver tank** acts as a reservoir to store and cool the compressed air and helps make sure the system can cope with variations in demand.
- The **air cooler**, **filter** and **dryer** all treat the air at different points in the system. They remove impurities such as water, dirt and oil from the air taken in by the compressor, as well as those added by the compressor.
- Compressed air may be fed to various uses on a site via a **distribution system**. These distribution systems can be relatively straight forward or very complex.

Ways to Conserve Energy & Improve Performance of Compressed Air Systems

- **1. Location of Compressors :**

The location of compressor & use of filters plays an important role on the amount of energy consumed.

- The lower inlet temperature to compressor results into lower energy input.

-- It is observed that *"Every 40C rise in inlet air temperature results in a higher energy consumption by 1 % to achieve equivalent output"*.

- **2. Use of Air-filters:**
- Air filters must be used to supply clean air at suction to compressor to avoid wear of moving parts.
- Filters should have high dust separation capacity with minimum pressure drop .
- If higher pressure drop across the filter increases the power consumption

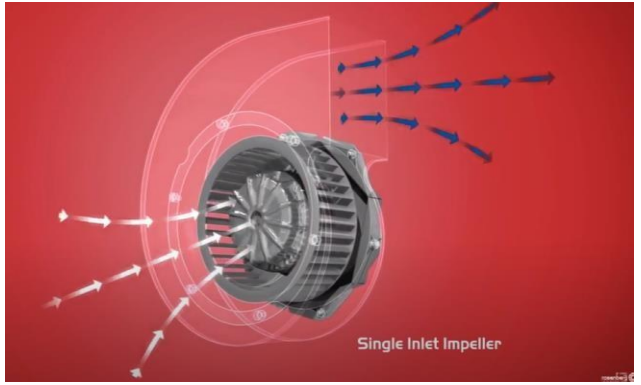
- **Intercooling in between the stages :**

- Intercoolers should be provided in between the stages to reduce the power requirement to run the compressor. It is observed that "*An Increasein 6 degree Celsius in the inlet air temperature to second stage results in 2%of specific energy consumption*".

- **Using Variable Speed Drives:**

Variable speed drives should be used for capacity control of compressors toreduce power consumption.

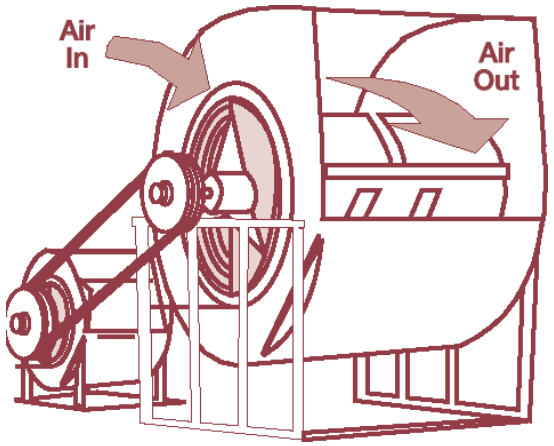
FANS AND BLOWERS

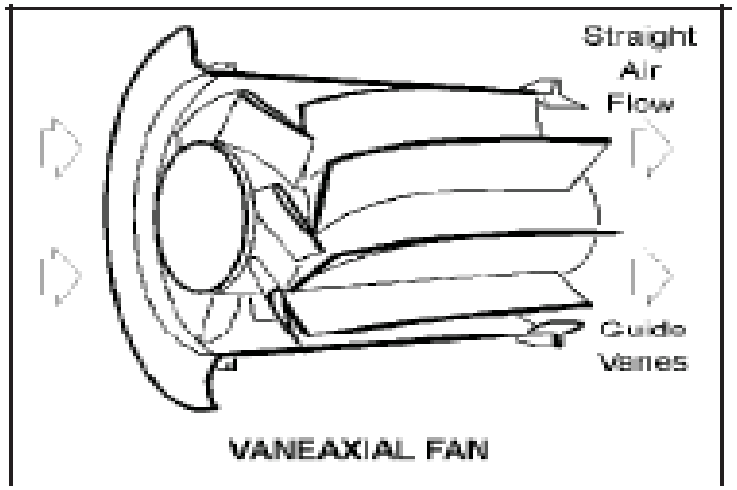


- Fans and blowers provide air for ventilation and industrial process requirements.
- Fans generate a pressure to move air (or gases) against a resistance caused by ducts, dampers, or other components in a fan system. The fan rotor receives energy from a rotating shaft and transmits it to the air.
- Fan and blower selection depends on the volume flow rate, pressure, type of material handled, space limitations, and efficiency.
- Industrial applications of blowers
- Centrifugal blowers are widely used in industrial applications where there is a requirement for constant flow of larger volumes of air such as in ventilation, combustion, transporting materials, cooling and heating systems, dust control, air conveyor systems, industrial vacuum applications and in other industrial processes.

Types of fans

- Fans fall into two general categories: centrifugal flow and axial flow.
- In centrifugal flow, airflow changes direction twice - once when entering and second when leaving (forward curved, backward curved or inclined, radial)
- In axial flow, air enters and leaves the fan with no change in direction (propeller, tube axial, vaneaxial)





Energy Saving Opportunities In Fans And Blowers

- **Minimizing demand on the fan.**

1. Minimising excess air level in combustion systems to reduce FD fan and IDfan load.

2. Minimising air in-leaks in hot flue gas path to reduce ID fan load, especiallyin case of kilns, boiler plants, furnaces, etc.

Cold air in-leaks increase ID fan load tremendously, due to density increaseof flue gases and in-fact choke up the capacity of fan, resulting as a bottleneck for boiler / furnace itself.

3. In-leaks / out-leaks in air conditioning systems also have a major impact on energy efficiency and fan power consumption and need to be minimized.

- **A good pressure monitoring system** that controls system volumetric flowrate can save thousands of money every year on the operation of even medium-sized systems
- **Proper fan sizing** Most of the fans are oversized for the particular application, which can result in **efficiency losses of 1-5%**. However, it may be more cost-effective to control the speed than to replace the fan system
- **Adjustable speed drives (ASDs)** Significant energy savings can be achieved **by installing adjustable speed drives on fans**. Savings may varybetween 14 and 49% of fan system energy use when retrofitting fans with adjustable speed drives.
- **Replacing standard V-belts with cogged belts** can save energy and money, even as a retrofit. Cogged belts run cooler, last longer, require less maintenance and have an efficiency that is about **2% higher** than standard V-belts.

Energy Conservation In Boilers

- A boiler is an enclosed vessel that provides a means for combustion heat to be transferred into water until it becomes heated water or steam. The hot water or steam under pressure is then usable for transferring the heat to a process.
- Boiler Efficiency Thermal efficiency of boiler is defined as the percentage of heat input that is effectively utilised to generate steam. There are two methods of assessing boiler efficiency.
- 1) The Direct Method: Where the energy gain of the working fluid (water and steam) is compared with the energy content of the boiler fuel.
- 2) The Indirect Method: Where the efficiency is the difference between the losses and the energy input.

The principle losses that occur in a boiler are:

- Loss of heat due to dry flue gases
- Loss of heat due to moisture in fuel and combustion air
- Loss of heat due to combustion of hydrogen
- Loss of heat due to radiation
- Loss of heat due to unburnt

Energy Conservation Opportunities in Boilers

- Examining the following factors can indicate if a boiler is being run to maximize its efficiency:
- 1. Stack Temperature : The stack temperature should be as low as possible. However, it should not be so low that water vapor in the exhaust condenses on the stack walls. Stack temperatures greater than 200°C indicates potential for recovery of waste heat.
- 2. Combustion Air Preheat :Combustion air preheating is an alternative to feedwater heating. In order to improve thermal efficiency by 1%, the combustion air temperature must be raised by 20 °C.

- Incomplete Combustion: Incomplete combustion can arise from a shortage of air or surplus of fuel or poor distribution of fuel. It isusually obvious from the colour or smoke, and must be correctedimmediately.
- Excess Air Control :Excess air is required in all practical cases to ensure complete combustion, to allow for the normal variations in combustion and to ensure satisfactory stack conditions for some fuels. The optimum excess air level for maximum boiler efficiency occurs when the sum of the losses due to incomplete combustion and loss due to heat in flue gases is minimum.
- Repairing or augmenting insulation can reduce heat loss through boiler walls and piping.
- Automatic blowdown controls can be installed that sense and respond to boiler water conductivity and pH. A 10% blow down in a 15 kg/cm^2 boiler results in 3% efficiency loss.

Useful Tips for Conserving Energy in lighting system

- Unplug! Up to 75% of the electricity used to power home electronics is consumed while the products are turned off. Appliances like computers, tv's, cable boxes, cell phone chargers, coffee makers, etc. all continue to consume energy just by being plugged in into an outlet.
- Set your thermostat at 78 degrees or higher in the summer. Use fans whenever possible instead of AC, and ventilate at night this way when practical. Using fans to supplement AC allows you to raise the thermostat temperature, using less energy. Fans cost less to use than AC.
- Keep the thermostat at 70 degrees or lower in the colder months. Turn down the thermostat at night to 65 degrees, lower when you go to bed or leave your house for more than four hours.
- Clean the lint filter in your dryer after every load to improve air circulation, and periodically check the dryer vent to ensure it is not blocked.
- Turn lights off in unoccupied areas, including porch lights when you go to bed.
- Buy light bulbs that are 60 watts or less. Even better, get energy-saving compact fluorescent lights. They last much longer and you won't have to change them as often.
- Set your refrigerator temperature at to 40 degrees and your freezer at 0-5 degrees. Close the door quickly after you select an item.

Energy Conservation in Pumps

1.Select the most efficient pump type for the application

Generally the average pump efficiency is below 40 percent and that 10 percent of pumps are 10 percent efficient or less. Oversizing often comes in the design phase, since the practice for adding multiple safety factors is quite common. This means that both pressure and flow parameters for the pump design may be 25 percent more than the actual system operation. The specifying engineer may need to work closely with the pump manufacturer or distributor to optimally select the pump, in addition to its size, speed, power requirements, and type of drive, as well as the mechanical seal and ancillary equipment.

2.Right-size the pump

Right-sizing the pump represents a significant economic opportunity to reduce energy consumption. This isimportant because centrifugal pumps can consume up to 60 percent of motor energy in a facility, and also have the highest process equipment maintenance cost. When engineers add too much of a safety factor during the design phase, the pump can be oversized, resulting in higher energy and maintenance costs.

3.Trim the impeller

The impeller should not be trimmed any smaller than the minimum diameter shown on the manufacturer's pump curve. This is typically about 75 percent of a pump's maximum impeller diameter. Pump curves and affinity rules (which are valid for a maximum of approximately 5 percent change in diameter) can both provide information on impeller trim changes and the affected performance. In practice, impeller trimming is typically used to avoid throttling losses associated with control valves.

4.Minimize system pressure drop

A key way to reduce pressure drop is through pipe-sizing optimization. Hydraulic friction loss creates a reduction in pressure from one end of a straight pipe to another. Factors such as the flow rate, pipe size (diameter), overall pipe length, pipe characteristics (surface roughness, material, etc.), and properties of the fluidbeing pumped all influence the system pressure drop.

5.Implement proper control valves

Control valves are typically used to control flow and/or pressure. They can help to reduce energy losses over non-controlled systems such as irrigation systems with a fixed-speed pump and multiple locations with different distances and elevations. The main functions of control valves are throttling flow or for bypassing flow. Throttling reduces the flow but increases the pressure. You can minimize excess pressure by bypassing excess flow back to the reservoir or another location.

6.Implement variable speed drives (VSDs)

Drivers are used for either fixed-speed or variable-speed operation. For many applications, you can save energy by implementing variable speed drives. With a variable speed drive, the rotational speed of the pump is adjusted to achieve the desired head and flow necessary for the process application. A VSD can often be added to an existing pump motor system to slow the pump down to meet the actual requirements verses the theoretical requirements that were calculated at the start of the project. Once installed, the VSD can accommodate changing system demands, including many potential future expansion plans. This method often results in the highest energy efficiency with lowest life cycle costs.

7.Maintain pumping systems effectively

Effective pump maintenance allows facilities to keep their pumps operating efficiently. Regular maintenance may reveal deteriorations in efficiency and capacity, which can occur long before a pump fails. Wear ring and rotor erosion, for example, can be costly problems that reduce efficiency by 10 percent or more. Most maintenance activities can be classified as either preventive or predictive. Preventive maintenance addresses routine system needs such as lubrication, periodic adjustments, and removal of contaminants. Predictive maintenance focuses on tests and inspections that detect deteriorating conditions. Sometimes called "condition assessment" or "condition monitoring," it has become easier to conduct with modern testing methods and equipment. This can help minimize unplanned equipment outages, which can be very costly.

8.Use higher efficiency/proper pump seals

Sealing systems impact efficiency, and mechanical friction losses are only the beginning. Leaks from static and dynamic seals waste fluid and can contaminate the environment. Leaks between the pump suction to the pump discharge reduce pump volumetric efficiency. Dynamic seals consume energy from the mechanical friction between the static and moving parts. Potential sealing system savings can exceed the energy savings obtained from switching to variable frequency drives, trimming impellers, or re-sizing pumps in many applications.

9.Use multiple pumps

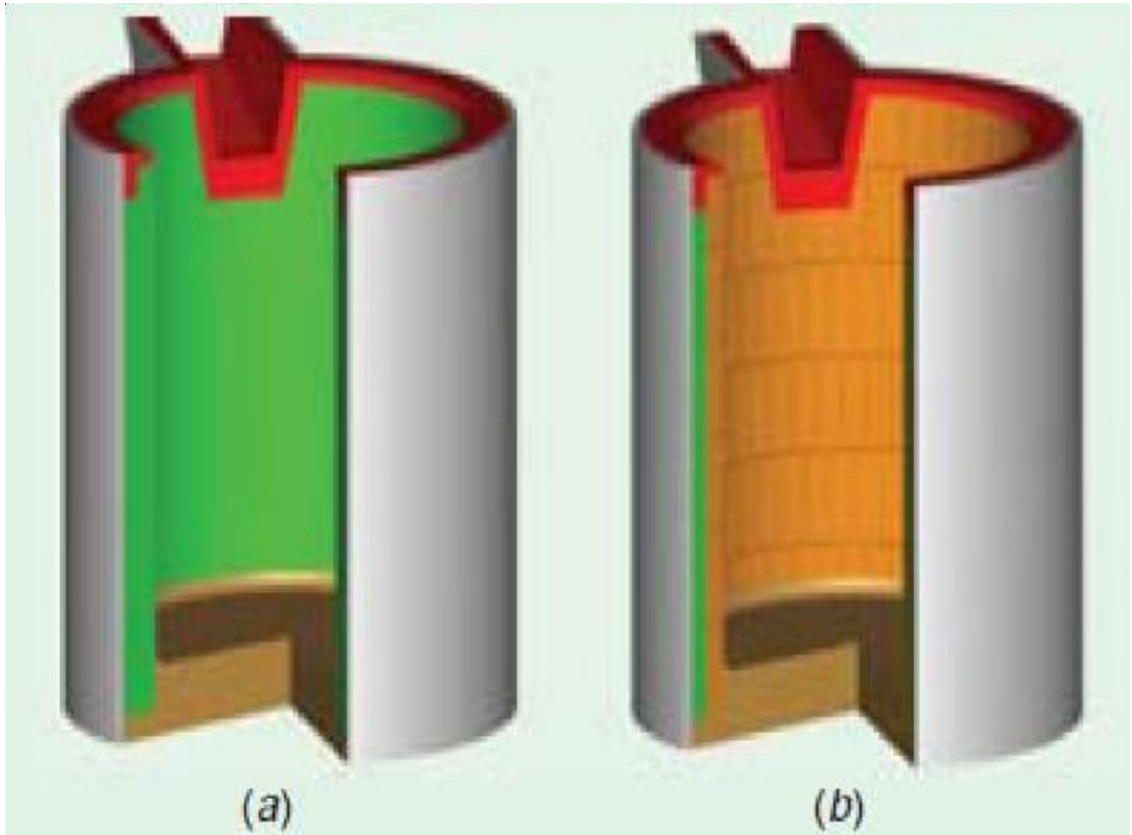
When multiple pumps operate as part of a parallel pumping system, there are opportunities for significant energy savings. A multiple pump parallel system works best when each pump is run individually, not concurrently, most or all of thetime. Running multiple pumps simultaneously is appropriate as dictated by the flow requirements specific to the application and duty cycle.

10.Eliminate unnecessary uses

One of the most simple, but often overlooked, measures to save energy is to eliminate unnecessary use. Pumping system efficiency measures include shutting down unnecessary pumps and using pressure switches to control the number of pumps in service when flow-rate requirements vary. Each pump system is different and there are many opportunities to save energy. Don’t forget to look for the obvious

Electric Furnace

- Electric heating is extensively used both for domestic and industrial applications.
- Electric Furnace is are used to melt metals for casting .change of shape and change of properties.
- The primary energy required for reheating / heat treatment (say annealing) furnaces are in the form of Furnace oil, LSHS, LDO or electricity



Inside views of an induction furnaces: (*a*) Rammed induction furnace and (*b*) bricked induction furnace

energy conservation in electric furnaces

- Match the load level to the furnace capacity.
- Use proper temperature controller.
- To avoid heat losses improve the insulation system of electric furnace
- Recover and utilize waste heat from furnace flue gases for preheating of combustion air. Every 21^{o}C rise in combustion air temperature results in 1% fuel oil savings.

energy conservation in electric Ovens

- 1. Microwaves use around 50% less energy than conventional ovens: they're most efficient for small portions or defrosting.
- 2. Check the seal on your oven door to see if there are cracks or tears in it.
- 3. Develop the habit of “lids-on” cooking to permit lower temperature settings.
- 4. Carefully measure water used for cooking to avoid having to heat more than is needed.
- 5. Begin cooking on highest heat until liquid begins to boil. Then lower the heat control settings and allow food to simmer until fully cooked.
- 6. Rearrange oven shelves before turning your oven on – and don't peep at food in the oven. Every time open the oven door,4°-5° is lost.
- 7. When preheating an oven for baking, time the preheat period carefully. Five to eight minutes should be sufficient.
- 8. For large items, stove-top cooking is most efficient, especially with gas.
- 9. Microwaves cook food from the outside edge toward the centre of the dish, soif you're cooking more than one item, place larger and thicker items on the outside.

Energy Efficient Motor Steps to Improving Electric Motor System

Efficiency Tips for energy saving Energy Efficient Motors

1. Use Adjustable Speed Drives (ASDs) or two-speed motors where appropriate.

2. Consider load shedding.

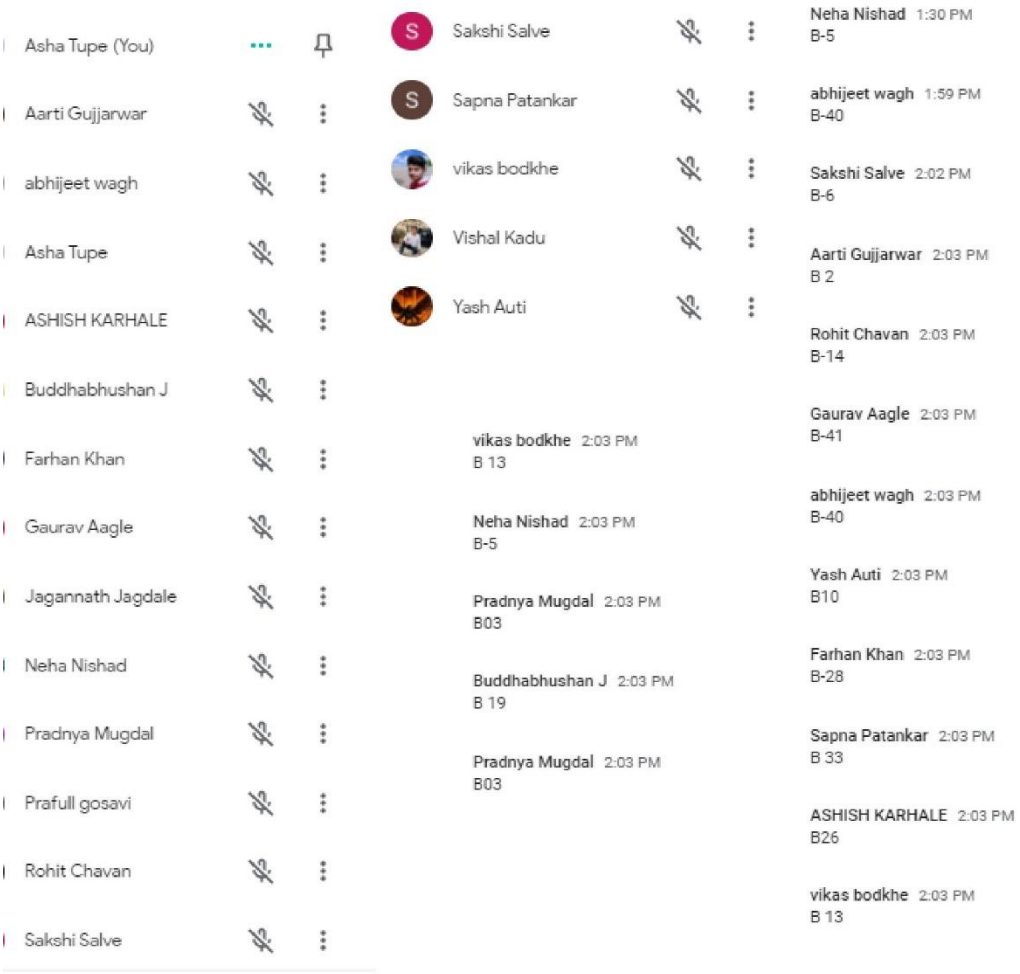
3. Consider replacing existing V-belts with cogged belts.

4. Choose energy-efficient motors for new applications. Consider replacement vs.

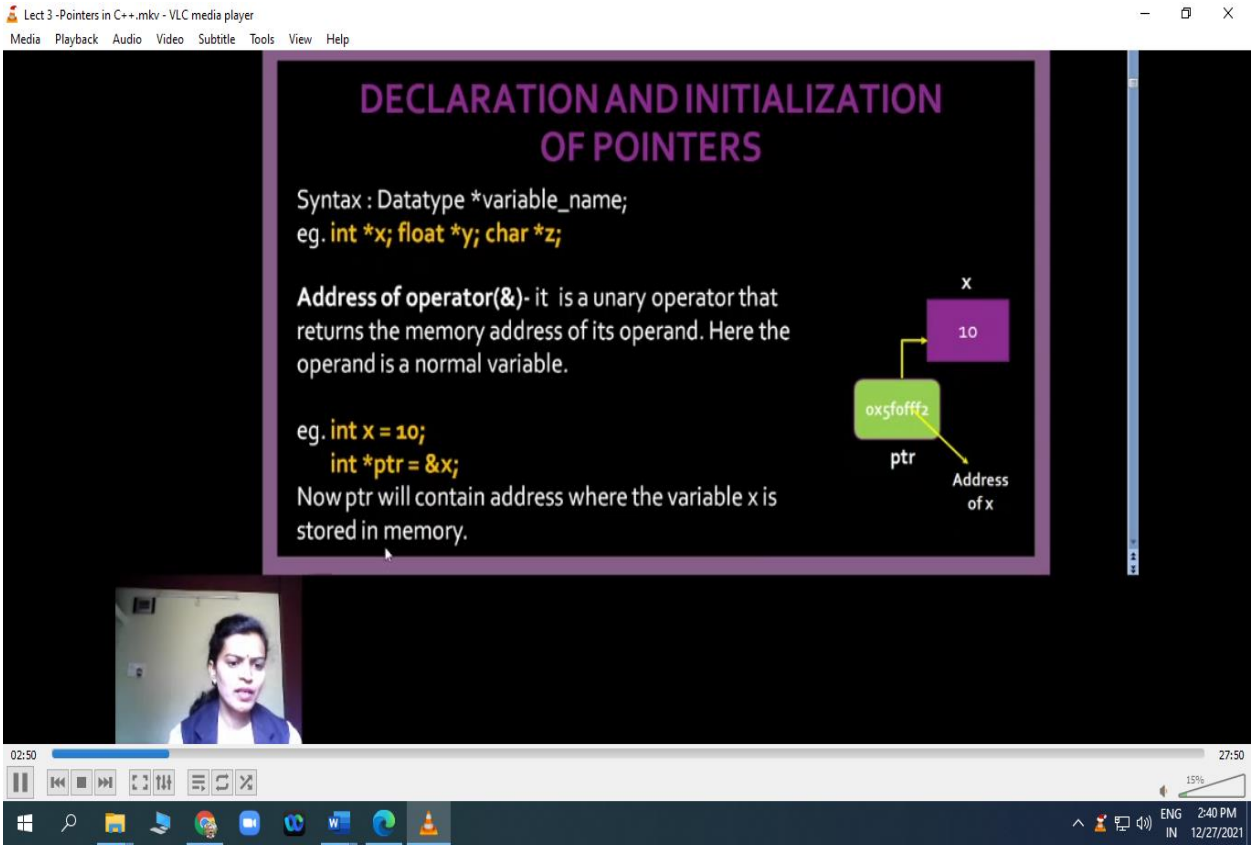
   Repair for older, inefficient motors.

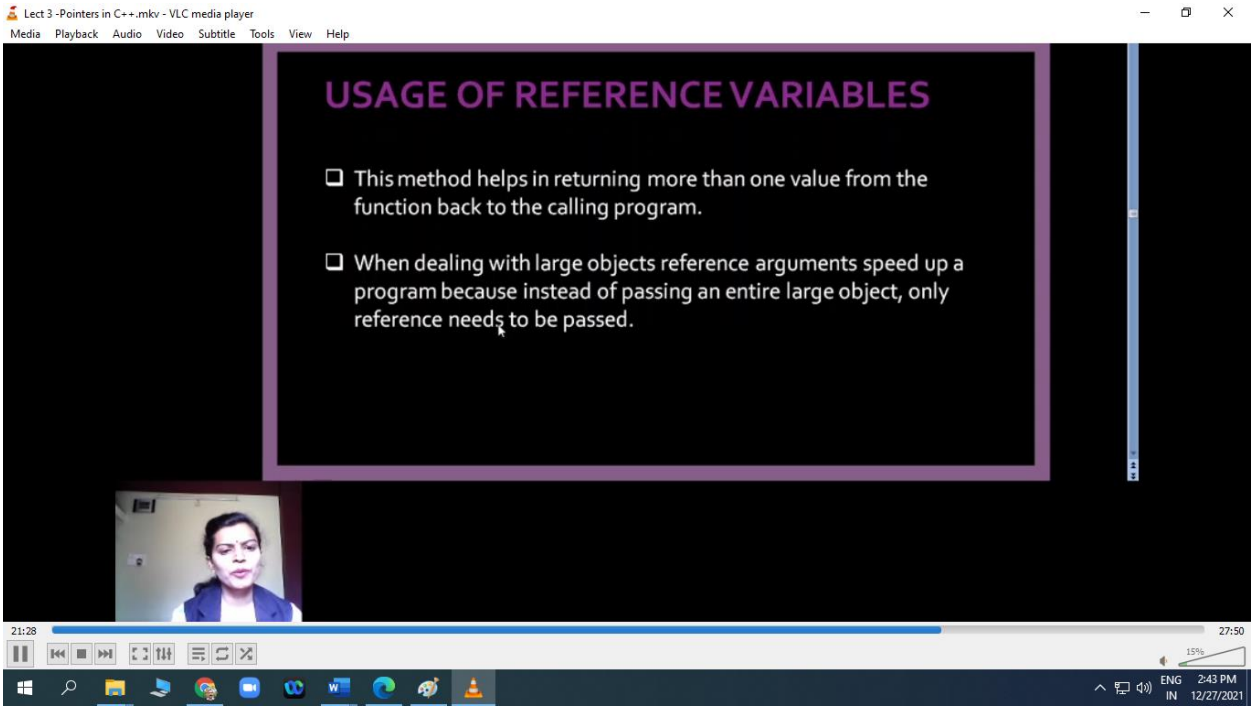
5. Match motor operating speeds, and size motors for overall system efficiency

Fy. B.Tech : Attendance



Video Lectures





(II) BEST PRACTICE

1.Title of the Practice:

Hands-on training & practice for students through Maintenance & reparation activities of Utilities & facilities, done at the Institute for CSE, Civil & Electrical Departments.

2.Objectives of the Practice:

To spark the curiosity of learning & discovering through examples of daily applications & amenities.

To heighten & enhance the overall perspective of concepts & Engineering products.

3.The Context:

Electrical Department curate's platforms of learning through Maintenance of various appliances, services and facilities by its trained personnel. Simultaneously, real-time instructions are given to students to perceive theory with practical. Students are demonstrated viable strategies of troubleshooting & maintenance, and at the same time, given the opportunity to carry out guided repairing & fixing of items & services.

4. The Practice:

The Trained Staff & personnel have expertise and technical know-how of handling various devices and malfunctioning of services / devices. The students are made aware with IS rules, safety norms and maintenance work. Students take active participation in the actual repair and maintenance work carried out at Institute level. Electrical circuit design along with the switchgear and protection, actual wiring work is carried out at department level. Training is given to the students regarding the following,

a. Use of handy toolkits and demos of their usage,
b. Use of Precautionary instructions, Dos and Donts and Safety norms to be followed,
c. Use of Instructional Material covering basics of a concept
d. Use of Pictorial representations for better understanding.

Also streamlining the concepts by clarifying the applications and relevance of the activities is being carried out.

5. Evidence of Success:

Students become receptive to an interactive & riveting learning environment which is apparently being done through this practice

6. Problems Encountered and Resources Required:

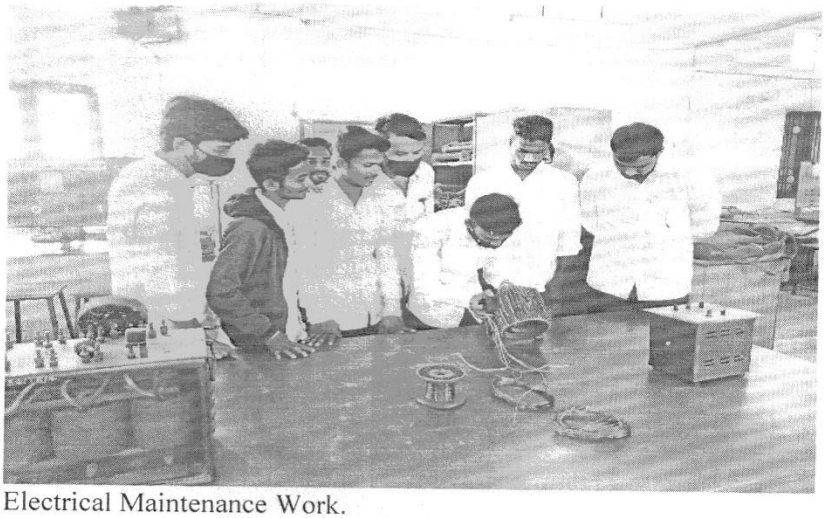
Students come with a lot of pre-conceived notions & theoretical concepts about how Engineering Stuff works which are erroneous and faulty. As such, they have difficulty grasping the live rectifying operations being done on dysfunctional/repair-worthy instruments.

7. Notes (Optional):

It has been observed that students have been ingrained with a very rote and mechanical method of learning. When it comes to implementing their learning, their performance is very disappointing. The underlying cause behind this lack of ability is lack of proper skills and know-how which should be inculcated during practical or lab sessions in their education.

To overcome this flaw, the best practice of integrating real-life problems and their feasible solutions has been implemented by the Electrical Department, Computer Department by taking issues faced in daily life at an Institute level. This helps the students to upgrade their skills and take initiatives in solving practical problems relating to engineering products and services, which are vetted by Authorized personnel before interfacing them with students.

Computer Hardware Maintenance work.



Electrical Maintenance Work.

HEAD

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