# G. H. RAISONI INSTITUTE OF ENGINEERING AND TECHNOLOGY, NAGPUR

## DEPARTMENT OF ELECTRICAL ENGINEERING

# " vidyut "

**A monthly newsletter of Electrical Department for Institute Friends, Patrons, Mentors and Alumni….**

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## Electrical Department News

**Mini Project Competition** was organized by Electrical Engineering Department of GHRIET, Nagpur on 24/10/16 at 1.30 pm in Power Electronics lab. The Mini projects were prepared by the student of 3rd and 5th semester on EDC (Electronic Devices & Circuits) and Electrical Machines under the guidance of Prof. M. J. Katira and Prof. A. A. Dongre respectively. The event was inaugurated by Dr. M. B. Daigavane, Principal, GHRIET and Prof. Anjali Khare, G. H. Raisoni Academy of Engg. & Technology. The projects were categorized under drawing sheet, display board and models. All the mini projects prepared by the students were very good, innovative and subject oriented and were appreciated by the judge Prof. Anjali Khare, GHRAET, Nagpur.

**Winners**

**Models**

1st Prize : Shraddha Darkonde & Avantika Mangde (5th Sem)

2nd Prize : Pranita Kshirsagar (5th Sem)

3rd Prize : Mayuri Dongre (3rd Sem)

**Poster**

1st Prize : Swati Patle (5th Sem)

2nd Prize : Roshni Dubey & Pujashree Walde(5th Sem)

3rd Prize : Urmila Chauhan (3rd Sem)

The program was anchored by Ms. Bipasha Sarkar, student of 5th sem. The whole event was coordinated by Prof. Shweta Rajurkar under the guidance of Prof. M. J. Katira, Head Electrical Engg. Department & Dean Academics.

**AAVISHKAR-2016** is the 11th Maharashtra state Inter-university research Festival has been organized by Santaji Mahavidyalaya on 18/10/2016 Nagpur. Under this students from undergraduate, post graduates and PhD level of various colleges has been participated. Under these students has to display their projects in the form of demonstration /model or posters. Two students, Nilima Mohod and Snehal Digorikar of 7th semester from Electrical Engineering Department has participated and present a poster on Smart power management scheme for critical load and non critical load.

## ARTICLEs

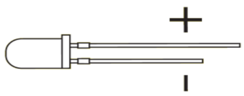
## "I Didn't Know That"

**Diode and LED Polarity:**Diodes only allow current to flow in one direction, and they're always polarized. A diode has two terminals. The positive side is called the anode, and the negative one is called the cathode.


Current through a diode can only flow from the anode to the cathode, which would explain why it's important for a diode to be connected in the correct direction. Physically, every diode should have some sort of indication for either the anode or cathode pin. Usually the diode will have a **line near the cathode pin**, which matches the vertical line in the diode circuit symbol. Below are a few examples of diodes. The top diode, a 1N4001 rectifier, has a grey ring near the cathode. Below that, a 1N4148 signal diode uses a black ring to mark the cathode. At the bottom are a couple surface mount diodes, each of which use a line to mark which pin is the cathode.

*Notice the lines on each device, denoting the Cathode side, which match the line in the symbol above.*

**LEDs:** LED stands for light-emitting *diode*, which means that much like their diode cousins, they're polarized. There are a handful of identifiers for finding the positive and negative pins on an LED. You can try to find the **longer leg**, which should indicate the positive, anode pin. Or, if someone's trimmed the legs, try finding the flat edge on the LED's outer casing. The pin nearest the **flat edge**will be the negative, cathode pin.



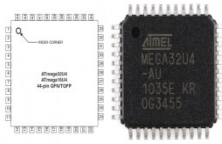

There might be other indicators as well. SMD diodes have a range of anode/cathode identifiers. Sometimes it's easiest to just use a multimeter to test for polarity. Turn the multimeter to the diode setting (usually indicated by a diode symbol), and touch each probe to one of the LED terminals. If the LED lights up, the positive probe is touching the anode, and the negative probe is touching the cathode. If it doesn't light up, try swapping the probes around.

*The polarity of a tiny, yellow, surface-mount LED is tested with a multimeter. If the positive lead touches the anode and negative touches the cathode, the LED should light up.*

Diodes certainly aren't the only polarized component. There are tons of parts out there that won't work if connected incorrectly. Next we'll discuss some of the other common polarized components, beginning with integrated circuits.

**Integrated Circuit Polarity:** Integrated circuits (ICs) might have eight pins or eighty pins, and each pin on an IC has a unique function and position. It's very important to keep polarity straight with ICs. There's a good chance they'll smoke, melt, and be ruined if connected incorrectly.

Through-hole ICs usually come in a dual-inline package (DIP) – two rows of pins, each spaced by 0.1" wide enough to straddle the center of a breadboard. DIP ICs usually have a **notch** to indicate which of the many pins is the first. If not a notch, the IC might have an etched **dot** in the casing near pin 1.

An IC with both a dot and a notch to indicate polarity. Sometimes you get both, sometimes you only get one or the other.

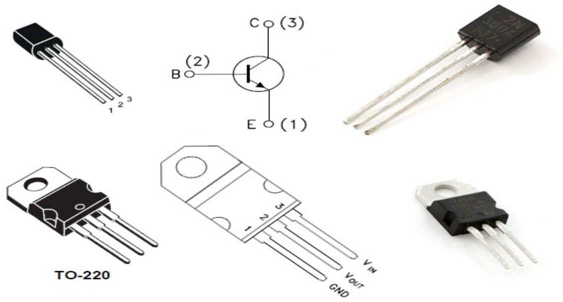
For all IC packages, pin numbers increase sequentially as you move counter-clockwise away from pin 1.

Surface-mount ICs might come in QFN, SOIC, SSOP, or a number of other form-factors. These ICs will usually have a **dot** near pin 1.

An ATmega32U4 in a TQFP package, next to the datasheet pinout.

## Transistors, MOSFETs, and Voltage Regulators

These (traditionally) three-terminal, polarized components are lumped together because they share similar package types. Through-hole transistors, MOSFETs, and voltage regulators commonly come in a TO-92 or TO-220 package, seen below. To find which pin is which, look for the flat edge on the TO-92 package or the metal heatsink on the TO-220, and match that up to the pin-out in the datasheet.




Above, a 2N3904 transistor in a TO-92 package, note the curved and straight edges. A 3.3V regulator in a TO-220 package, note the metal heatsink on the back.

***Contributed By Prof. M. J. Katira***

# "The future of lighting: Compact Fluorescent Light bulbs (CFLs) and Light Emitting Diodes (LEDs)"

Homeowners today are shifting towards more cost efficient and eco-friendly solutions for managing energy consumption in their homes. Proper lighting improves the appearance and safety of a home both inside and out, yet it can also account for nearly 25% of a home's electricity. Most people don't realize that the standard incandescent bulbs they've been using for years are only 10% efficient; meaning only 10% of the electricity they use is transferred into light and the rest into heat! Fortunately, the push for a greener way of life has brought rise to two major alternative options for standard incandescent light bulbs: the compact fluorescent light bulb (CFL) and a light emitting diode light bulb (LED). Knowing what to look for and the difference between the two will help the average consumer save energy dollars each month.

**CFL Lighting:** As a replacement for your average screw in light bulb, CFL bulbs are an excellent option. In simplest terms, CFLs are a miniature version of the common fluorescent light, using an electrical current to make phosphor gas glow. Older CFLs use magnetic ballasts which usually cause a delay and/or flicker when they are turned on, however most new CFLs use electronic ballasts that eliminate this. When compared to incandescent bulbs, CFLs are approximately four times as efficient; a 25 Watt CFL will have the same light output as a 100 Watt incandescent. They also last up to 10 times longer, meaning that over the life of a standard CFL, you would expect to have used 10 incandescent bulbs. Unlike a regular fluorescent light, a CFL gives off light that looks just like a standard incandescent.

Choosing the bulb design that best suits the application is also a factor; available form factors include spiral, triple tube, standard, globe, flood and candelabra style bulbs to name a few. While the purchase price of a CFL is typically 3 to 10 times greater than that of an equivalent incandescent bulb, over the lifespan of the bulb you can expect a large return on energy savings. Continuously turning a CFL bulb on and off, or exposure to outdoor elements, can reduce the expected life span, so consider where you will be using them. While dimmable CFLs and CFLs that can be used with timers are available, they may not always work with dimmer switches, dimmer modules, or timers. Lastly, CFL bulbs contain trace amounts of mercury which is a toxic metal, and although they can be disposed of in your regular trash, caution should be taken if a bulb is broken in your home.

**LED Lighting:** Recently, advances in technology have given rise to LED lighting as a replacement for the traditional incandescent bulb. LEDS are small, solid light bulbs which drive their light in one direction or in cones of varying width depending on the bulb design. Traditionally this type of directional lighting has been used for task lighting, flashlights and headlamps. However, grouping these light in clusters and applying new designs have led to the LED as an extremely energy efficient replacement for the standard incandescent bulb. A LED style bulb will generally last approximately 100 times as long as an incandescent; meaning that over the life of a standard LED style bulb, you would expect to have used 100 incandescent bulbs! When compared to incandescent bulbs, LEDs are approximately six times as efficient; in simplest terms a 16 Watt LED style bulb will have the same light output as a 100 Watt incandescent.

A LED style bulb can be upward of 50 to 100 times the cost of standard incandescent bulb (although costs continue to drop), but you can expect a large return on your investment do to the lifespan and energy savings when compared to an incandescent bulb. Another great feature of LED style bulbs are their durability; because they don't have a filament they can withstand jarring and bumping making them less likely to be damaged under circumstances when a regular incandescent bulb would be broken. When used with a dimmer, LED bulbs can brighten and dim fairly consistently from 30% brightness up. They will also work well with most timers. On the low end, instead of going completely off, LEDs tend to exhibit a slight glow due to the small amount of current that LEDs require to illuminate. Because this type of alternative lighting is still at the beginning stages, you can expect the capabilities of LED style bulbs to grow.

**Conclusion:** Incandescent bulbs still make up a majority of the light bulbs in homes today, but as more people become energy and environmentally conscious, both the CFL and the LED bulbs are well suited alternatives. Over the long term an LED style bulb will save you the most money although the initial cost may seem high. The good news is that LED bulbs last for 10 years or more. The CFL bulb will save you nearly as much as an LED style Bulb with a fraction of the investment. Consider the placement and how you will be using each of your bulbs and a combination of the two alternatives will be rewarding over the long haul, not just in your pocket book but also for the planet.

If every home in India replaced just one incandescent light bulb with an ENERGY STAR qualified CFL, in one year it would save enough energy to light more than 5 million homes. That would prevent the release of greenhouse gas emissions equal to that of about 800,000 cars. Saving electricity reduces CO2 emissions, sulfur oxide and high-level nuclear waste.

***Contributed by Prof. Ashish A. Dongre***

## "REDUCING GREENHOUSE GASSES EMISSIONS BY FOSTERING THE DEPLOYMENT OF ALTERNATIVE RAW MATERIALS AND ENERGY SOURCES IN THE CLEANER CEMENT MANUFACTURING PROCESS"

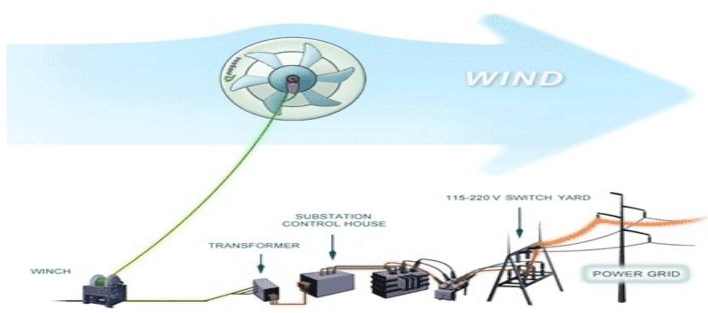
The cement production industry worldwide is one of the largest $CO_2$ emitting industrial sectors. It accounts for a considerable amount of total global greenhouse gas (GHG) emissions. Due to the increasing awareness of global warming, more energy efficient cement production is increasingly being emphasized. One of the priorities is to reduce the energy demand and innovate the production process to move towards the cleaner production as: Energy efficiency improvements; Waste heat recovery; Reduction of clinker/cement ratio and use of alternative raw materials; Substitution of fossil fuels with alternative energy sources. When the GHG emissions at source opportunities are close to being exhausted, the other mitigations options should be considered such as: $CO_2$ capture and storage. This is however in most cases not the final solution from the point of Life cycle assessment (LCA). In recent years various mitigation measures are gaining on the importance and the cement industry is more and more shifting to cleaner production. Among the others, there are two measures, which can reduce the GHG emissions considerably: the use of alternative raw materials and alternative fuels. The challenge for the cement industry is to use alternative raw materials especially those originating from other industries where they are considered as by-products or even waste. Some of these by-products include: Bottom ash from municipal solid waste incinerators; Fly ash from coal power plants; Gypsum from the desulfurization plants used in power plants. Another important measure is the energy efficiency improvement in existing cement plants. There are various approaches for controlling and improving the energy efficiency within existing cement manufacturing units, however, mathematical modeling, simulation, optimization and Process Integration are increasingly gaining in importance. The mathematical modeling approach uses the numerical simulations for the investigation of the thermo-chemical processes occurring inside of the manufacturing unit. The results gained are being used to enhance the efficiency of cement production. They improve the understanding of the flow characteristics and transport phenomena taking place inside the cement combustion unit. The objective of this paper is to review the current status of the cleaner cement manufacturing, the cement industry's shifting to alternative raw materials and alternative energy sources, and the modeling of the thermo-chemical processes inside the cement combustion units. Additionally, some critical issues, which up to now have not been adequately resolved, are outlined.

***Contributed by Prof. Anshu Chaudhary***

## The Wind Kite Generation

It's an expert estimation that the total energy stored in wind is 100 times higher than actually needed by humans on this earth. The catch is that we have to learn and devise ways to trap this wind power blowing across the planet earth. Experts tell us one more thing that most of the wind energy is available at high altitude and we can't manufacture turbines of that height. So we have to think of new ways to trap that wind power blowing at a significant height. So scientist comes up with the idea of kite generation. In Kite Generation, they are installing kites that sprout from funnel like structures. They are mounted on giant poles. When wind blows these kites come out of funnels.

For short, use kites that spring from funnels on the end of giant poles when the wind blows. For each kite, winches release a pair of high-resistance cables to control direction and angle. These kites are light and ultra-resistant. These kites are similar to those used for kite surfing – light and ultra-resistant, capable of flying up to a height of 2,000 meters. They also have a control system on autopilot. This control system manipulates the flight pattern so that maximum power can be generated be it night or day and can have radar system that can redirect kites within seconds in case they detect flying objects or birds.




***Contributed By Prof. Sachin Wadhankar***