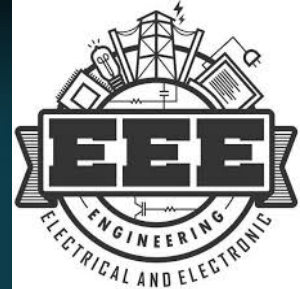




**JAWAHARLAL NEHRU TECHNOLOGICAL  
UNIVERSITY - KAKINADA  
( UNIVERSITY COLLEGE OF ENGINEERING )  
VIZIANAGARAM**



**DEPT. OF ELECTRICAL AND ELECTRONICS  
ENGINEERING**

**PRESENTS**

# **THE MEMOIR**

**CHRONICLES OF EEE**

**VOL - 5**

**SEPT-2019**

One of the best ways to eliminate waste and protect our environment is to practise

# the 3R's i.e. reduce, reuse and recycle.

Practising the 3R's helps in saving energy and preserving the natural resources of the planet for the future generations.

Keeping two separate dustbins for **degradable** and **non - degradable products**



- Purchasing reusable items over disposable ones, donating used items to the homeless, etc. go a long way in enabling waste management, controlling pollution and being environmentally aware citizens.



## PROTECT OUR ENVIRONMENT



Each year the United States use 85.5 million tons of paper of which we only recycle 22%, 19 million



# **MOTTO OF MAGAZINE**

We take immense pleasure to thank all the readers our magazine for your support to our effort. We, department of Electrical and Electronics Engineering proudly presents the fifth edition of our magazine **"THE MEMOIR-chronicles of EEE"**.

We would like to take this opportunity to thank our Principal, **Dr.G.Saraswathi** and all our faculty of Electrical and Electronics Engineering department and our fellow students for their support in developing our magazine.

**Smt. A.Padmaja**, our head of department, who was continuously catalysing students of various years to collaborate among themselves to get the best output. We would like to extend a special thanks to Dr.V.S. Vakula for her approachability and constant support, Smt. S. Rajitha for her coordination. We also thank all teaching staff for their support.

This edition is gathering of recent advancements in the field of electrical and electronics like Ancient and Future technologies, History of Electricity, World's first invention and so on. The general topics like Universe, current incidents, puzzles and inspiring minds were also included. The main moto is to make the readers aware of recent advancements and past technologies, in ELECTRICAL field and make them to know about the future world of technologies.

Once again, we would like to express our considerable appreciation to all authors of articles and their knowledge in carving **"THE MEMOIR-chronicles of EEE"**.

We welcome your valuable suggestion to improve the standard of our maga

THANK YOU  
-Magazine team



# **PRINCIPAL'S MESSAGE**



**Dr. G.Saraswathi**

**-It is a noble task on the part of the Department of Electrical and Electronics Engineering to once again make it with the frequent fifth edition of their technical magazine 'THE MEMOIR'.**

**I wish that this excellent work establishes to be a flint to fire the enthusiasm and excite their minds for many intrusive innovations among the students and inspire passion among the members of the faculty of Electrical and Electronics committee. My greeting to the editorial board to keep the good work.**

## **H.O.D'S MESSAGE**

**Smt.A.Padmaja**

**I am extremely delighted to note that the student community of Department of Electrical and Electronics Engineering, JNTUK- UCEV in bringing out fifth edition, 'THE MEMOIR'.**



**I wish them all the success I express my compliments to faculty, the editors and their dedicated committee for their valuable efforts in bringing out this magazine. I wish them all triumph.**

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## EDITED BY:

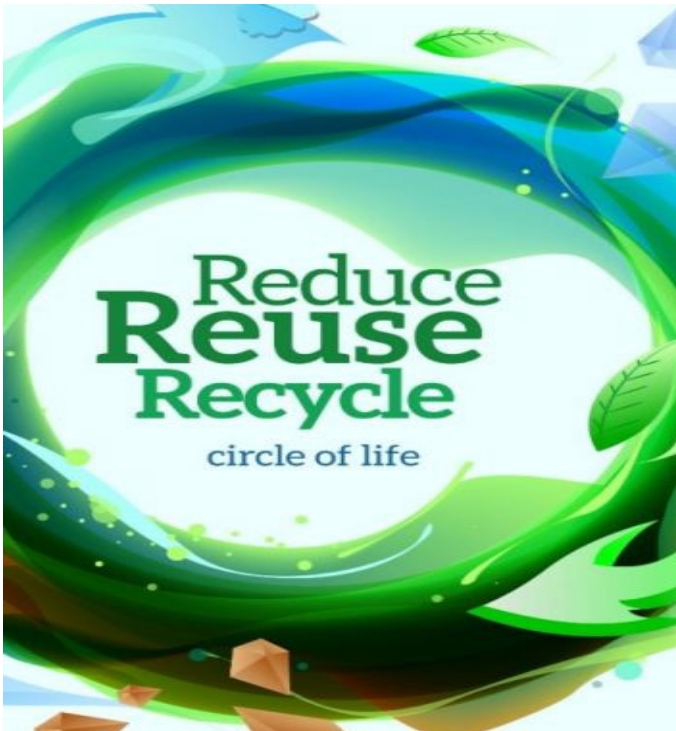
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# MESSAGE OF MAGAZINE



If you have heard of something called the “waste hierarchy,” then you may be wondering what that means. It is the order of priority of actions to be taken to reduce the amount of waste generated and to improve overall waste management processes and programs. The waste hierarchy consists of 3 R’s as follows:

**Reduce**  
**Reuse**  
**Recycle**

Commonly called the “**three R’s**” of waste management, this waste hierarchy is the guidance suggested for creating a sustainable life. You might be wondering how you can incorporate these principles into your daily life.

## Relax!

They are not that hard to implement. All you need is to bring a small change in your daily lifestyle to reduce waste so that less amount of it goes to the landfill that can reduce your carbon footprint.

***“It makes a big difference to recycle. It makes a big difference to use recycled products. It makes a big difference to reuse things, to not use the paper cup - and each time you do, that’s a victory.”***

**~ Emily Deschanel**

## **As per Missouri Department of Natural Resources,**

“The three R’s – reduce, reuse and recycle – all help to cut down on the amount of waste we throw away. They conserve natural resources, landfill space and energy. Plus, the three R’s save land and money that communities must use to dispose of waste in landfills. Siting a new landfill has become difficult and more expensive due to environmental regulations and public opposition.”

By refusing to buy items that you don’t need, reusing items more than once and disposing the items that are no longer in use at appropriate recycling centers, you can contribute towards a healthier planet.

**BY:  
MAGAZINE TEAM**



# About A Scientist



## GUSTAV KIRCHHOFF

“Experience is the collecting of what is similar in different particular perceptions “ -Gustav Kirchhoff

Gustav Robert Kirchhoff was a German mathematical physicist who contributed to the fundamental understanding of electrical circuits, spectroscopy and the emission of black body radiation by heated objects.

Kirchhoff was born on 12 March 1824 in Kongsberg, Prussia. His father, Friedrich Kirchhoff, a lawyer and Mother, Johnna Henriette Whittle. His family were Lutherans in the evangelical church of Prussia.

Kirchhoff is known for:-

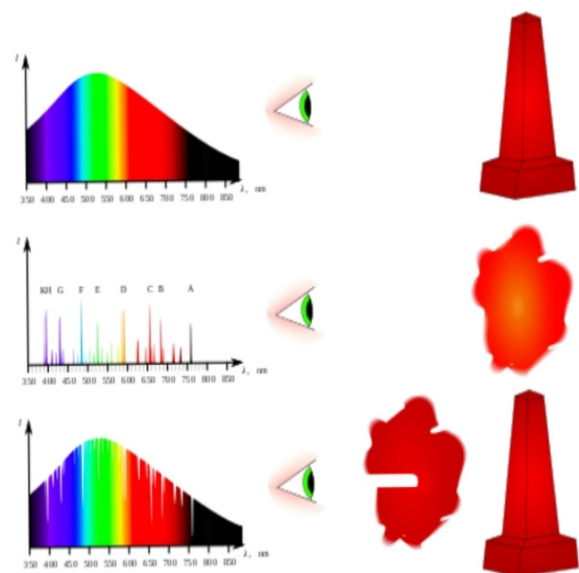
- 1) Kirchhoff's circuit laws
- 2) Kirchhoff's law of thermal radiation.
- 3) Kirchhoff's law of spectroscopy
- 4) Kirchhoff's law of thermo chemistry .

Kirchhoff formulated his circuit laws, which are religious in electrical engineering in 1845 while he was still a student.

He was called to the University of Heidelberg in 1854, where he collaborated in spectroscopic work with Robert Bunsen. In 1854 he found that an electrical signal in a resistanceless wire travels along the wire at a speed of light.

He proposed his law of thermal radiation in 1859 and gave a proof in 1861. In 1854 he became a professor at the University of Heidelberg. He and Robert Bunsen found the science of spectrum analysis by providing that every element gives out a characteristic wavelength when heated to inconvenience. They used this technique to discover caesium in 1860 and rubidium in 1861.

When he applied spectral analysis to the study of the sun, he discovered that when light is passed through a gas the gas absorbs those wavelengths and would have emitted if heated.



Visual depiction of Kirchhoff laws or spectroscopy



This discovery was important to the field of astronomy. His work improved on the previously established work of David Alter and Anders Jonas Ångström. He coined the term black body radiation in 1862. He is also remembered for important contributions to optics as well, as he solved Maxwell's equations in order to establish a solid basis and correct Huygens' principle. He accepted the first chair of theoretical physics created at the University of Berlin.

### **Kirchhoff's circuital laws:**

Kirchhoff's first law is that the algebraic sum of currents in a network of conductors meeting at a point or node is zero. Kirchhoff's second law is that the algebraic sum of voltages in a closed system is zero.

## **Kirchhoff's laws of spectroscopy :**

1) A low density gas excited to emit light will do so at specific wave lengths and this produces an emission spectrum.  
2) If light composing a continuous spectrum passes through a cool low density gas the result will be an absorption spectrum. His best known work is the volume "Vorlesungen über mathematische Physik" (lectures on mathematical physics) published in 1876. "

Boltzmann described Kirchhoff at the height of his powers, as being not easily drawn out but of a cheerful and obliging disposition. A disability from an accident, which compelled him to use crutches,

wheelchair did not alter his cheerfulness, and he was completely bored till the long illness of his last year's came.



Gustav Kirchhoff (left) and Robert Bunsen (right)

Awards:

1. Rumford medal in 1862
2. Davy medal in 1877
3. Matteucci medal in 1877
4. Jansen medal in 1887.
5. The Bunsen Kirchhoff award for spectroscopy is named after him and his colleague Robert Bunsen.
6. He died on 17 October in 1887 aged 63 and his final resting place was in St. Matthäus Kirchhoff cemetery in Berlin.

--COURTESY: <https://www.famousscientists.org/>

**BY:**  
**J. Pratyusha,**  
**M. Srujana,**  
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## Inspiring Minds



### MUNIBA MAZARI

Muniba Mazari Baloch was born on 3rd march 1987 in a very conservative family in Pakistan. She is known as “THE IRON LADY OF PAKISTAN”. She is a Pakistani activist, anchor, artist, model, singer and motivational speaker. She became the National Ambassador for UN Women Pakistan after being one of the best Inspirational Women in the world.

Muniba went to the Army Public School, and later attended the college in her hometown. When she was 18 years old, her father wanted her to get married. She was married to Khurram Shahzad, a former Pakistan Air Force pilot in 2006. And unfortunately, it was never a happy marriage for her. After two years i.e., on 27th February 2008, Muniba and her husband met with an accident. Her man- aged to jump out and saved himself.

But she stayed inside the car and sustained a lot of major injuries, including broken bones in her arm, ribcage, shoulder blade, collarbone and spine. Her lungs and liver were also deeply cut. Moreover, her entire lower body was paralysed and another half was fractured. She was left bed-ridden for two years. She was at the verge of despair. One day doctor came and said, “Well I heard that you wanted to be an artist, but I’m sorry. Your wrist and arm are so deformed that you won’t be able to hold the pen again. Because of your spine injury, you won’t be able to walk again.”

She took a deep breath and said to herself, “It’s alright”. The other next day doctor came and said, “As your spine injury is so bad and the fixation that you have in your back, you won’t be able to give birth to a child again.” That day she was totally devastated. She thought that she is going to be incomplete woman in the rest of her life. Her father did not support her and her mother stayed with her to look after her, which eventually resulted in her parents’ divorce.

She wanted to add colors to her life. She started to paint on her hospital bed. In 2011, four years after accident, Muniba adopted a baby boy whose name is Nael. She wanted to come out of the shell called ‘Fear’ and she didn’t want to give up. She wanted to appear more in public. She was chosen by international hairdressing salon, Toni & Guy, to become the first-ever wheelchair-bound model in Asia. Her first campaign for them was called Women of Substance.





When the whole world calls her DISABLED, she calls herself DIFFERENTLY ABLED. When others call it WEAKNESS, she calls it STRENGTH. She believes that words have the power to heal so wherever she goes, she only uses positive words.

Muniba Mazari has gained fame in multiple areas, as an artist, activist, anchor, model, singer and motivational speaker. Most of her career, however, has been built on painting and motivational speaking. She also started to work at her son's school for a startup project called 'Dheeray Bolo', which involved teaching Urdu at various schools. The managing director of Pakistan Television learnt about her TED talk, and asked her to work at PTV. She also worked for Clown Town in September, 2014, which allowed her to work with children and the elderly. She talks about

the problems faced by women the show. Apart from this, Muniba was chosen as Pond's Miracle woman.

.In June 2019, Muniba was appointed by the Prime Minister of Pakistan, Imran Khan, to be a part of Pakistan's first ever National Youth Council. She became the National Goodwill Ambassador for UN women, Pakistan. She talks about inclusion, diversity, gender equality which is a must. She was featured in BBC 100 inspirational women for 2015.

“No matter how much I say I couldn't find a HERO in my life, so I became ONE”, she said in a talk show. She thinks that three people changed her life and she also said that she gets inspiration from them every day. First is Waleed Khan who was seriously injured in terrorist attacks in the school. He also says, “The terrorists wanted me not to study, I am going to study.

I will become a doctor one day and this is my way of taking revenge from those terrorists”. She admires him a lot. And the other two members are her mother, who stood with her all the time and her son who is a real-life hero for her. Some of her notable works as a speaker include:

- Entrepreneurs' Organization Network, Pakistan
- Motivational speech at Army Public School, Peshawar and Combined Military Hospital, Peshawar.
- Motivational speech at Bank Alfalah Training Centre, Lahore



- Invited as a guest to Women Entrepreneurship Day at the National University of Science and Technology Business School.

Her first International exhibition was held in Dubai – entitled And I Chose to Live -at the Pakistan Association Dubai. She has displayed her art in several other exhibitions, as well as for charity.

She received many awards and honors for being the most influential personalities all over the world. Some of them are:

- 500 most influential muslims of the world.
- First Pakistani UN Good Will Ambassador for UN Women.
- Pakistan’s wheelchair-bound actor and anchor.

Forbes 30 under 30 - 2016

MUNIBA MAZARI, she is an inspiration to many people. She has made her mission to spread awareness about child violence and abuse, gender discrimination and to push for children’s education. Despite the immense pain she has en-

duced because of the accident, she considers her pain “beautiful” since it allows her to connect with others also in pain. “Everyone lacks the acceptance. When you accept the way you are, the world recognizes you. We are perfectly imperfect and that’s perfectly alright. I don’t know how my story will end, but nowhere in my text you’ll ever read ‘I gave up!’ “

-MUNIBA MAZARI



*“We are all keen to gain but how many of us are willing to lose? Always remember there are no major gains without major losses!”*

- Muniba Mazari

--COURTESY:www.unwomen.org

**BY:**

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# History Of Electricity

The electricity comes from nature. The electricity used to reduce the work duration and makes human works simple.

- Now, electricity is the essential thing in human life. Human gives same Priority to electricity like food, air, water and shelter .

- Ancient Egyptian(2750 BCE) Were aware of Shock from electric fish and also found the electric shock from cat fishes.

- English Scientist WILLIAM GILBERT, (Father of Electricity and Magnetism) made a Careful study about electricity and magnetism distinguishing the Lode-stone effect from Static electricity produced by the rubbing Amber.

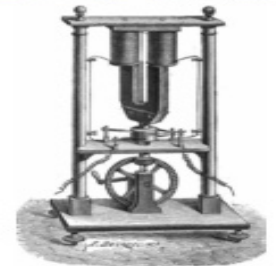
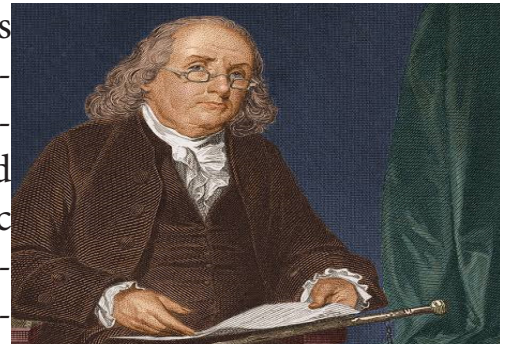
- Most of the people give credit to Benjamin Franklin For discovering Electricity. In 1752, Benjamin conducted this experiment with Kite, key and storm. This simply proved that lightning and tiny electric sparks are of same kind .



Scientists had mainly experimented with static electricity. Benjamin took

a big step ahead. He came up with the idea that electricity had POSITIVE and NEGATIVE elements that electricity flowed between these elements.

In 1821, The first electric motor was invented by MICHAEL FARADAY by using his induction Principles. In 1832, HIPPOLYTE PIXII invented the First 'Dynamo', An electrical generator which is capable of delivering Power for industry using Faraday's Principles.



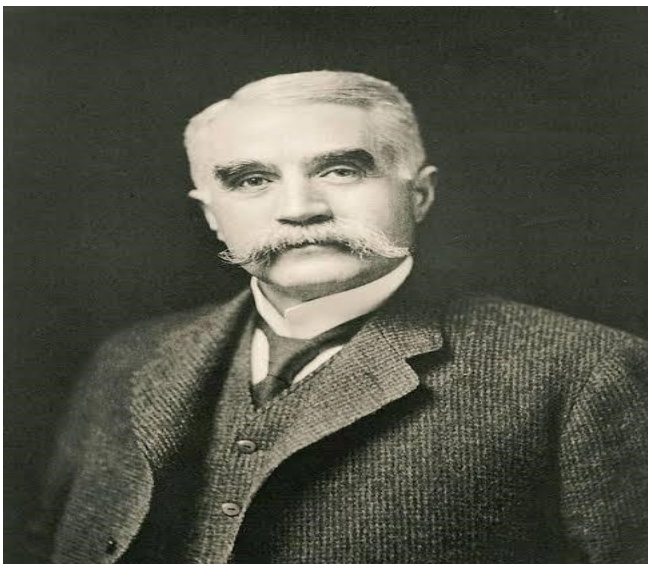


• ALESSANDRO VOLTA discovered the voltaic pile in 1800, made from alternating layers of Copper and Zinc. This voltaic pile is a more reliable source than the electrostatic machines previously used.

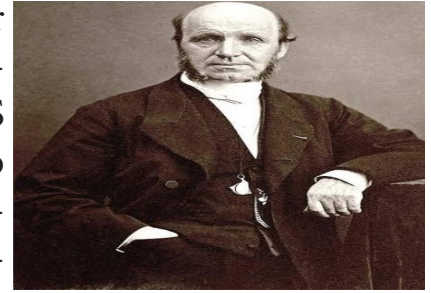


• In 1809, HUMPHRY DEVY invented the first carbon arc lamp by using an arc effect. He was provided high voltage between the electrodes (2000 Batteries) and 100 mm gap between electrodes.

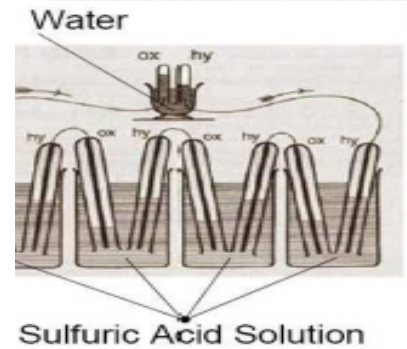
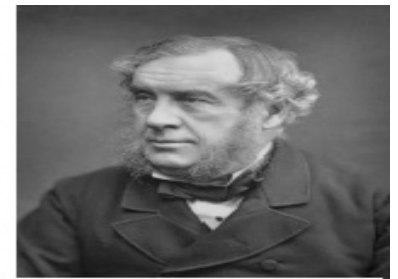
• In 1832, WILLIAM STURGEON, designed a DC motor by using Faraday's laws. But it was not efficient.



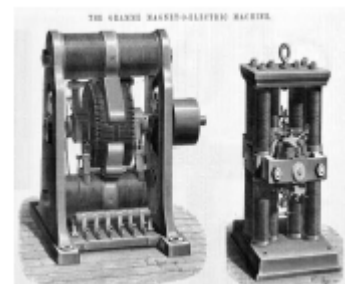
In the same year French scientist CHARLES F. BRUSH, who invented the design of DC generator. He knew that quantity of output was AC, but there was no usage of AC supply, further he converted AC to DC using Commutators. He also discovered the Arc lamp.



In 1839-42, the first step to produce the electrical energy from a chemical process. It was implemented by Sir WILLIAM ROBERT GROVE, who implemented the first fuel cell to produce electricity by combining Hydrogen and oxygen.



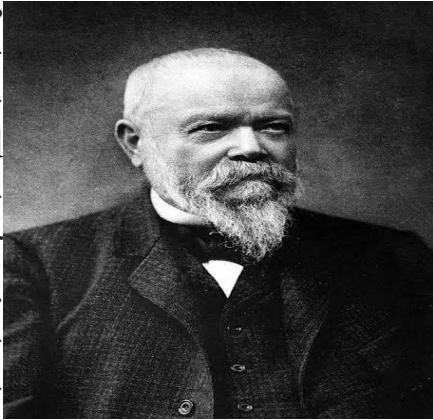
In 1855, GUILLAUME DUCHENNE, used the first Alternating Power for the first time. ZENODE GRAMME, who changed the practical design of DC motor (change the structure of previously designed motor) in 1871.





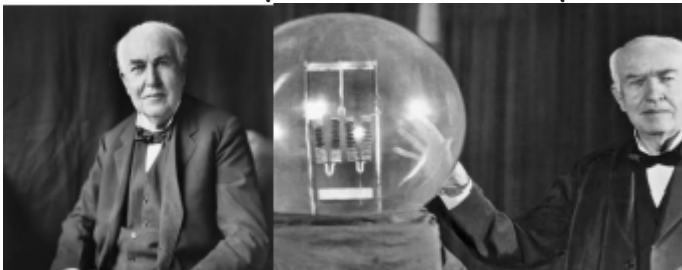
• In 1873, HIPPOLYTE FONTAIN , transmitted the dc power with conductors of 2km distance. Before 1873 there was no transmission of power for longer Distances.

In 1874, ALEXANDER LODYGIN , designed the incandescent bulb for the first time.



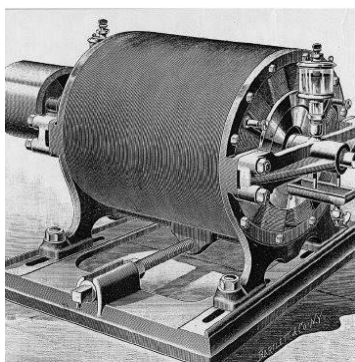
In 1879, THOMAS A. EDISON

invented the Practical design of incandescent bulb with More life time i.e used the bulb continuously about 40 hrs. By 1880

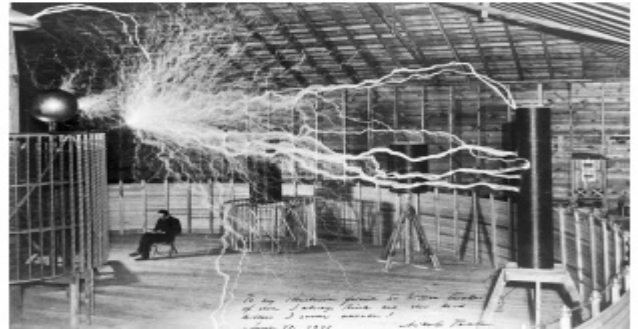
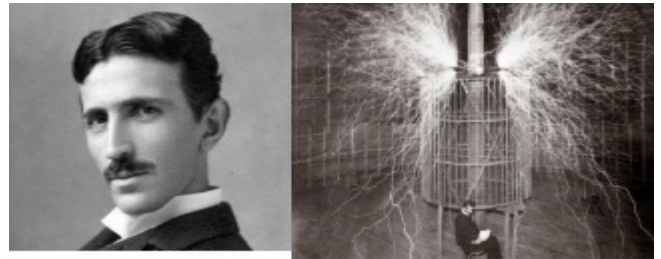


his invention could be used for 1800 hrs. California electric Light company in San Francisco was the first electric company to sell electricity to the consumers.

• In 1883, NIKOLA TESLA invented the ‘Tesla Coil’ Transformer that changes the voltage and current levels it’s easier to transfer the power with less amount of losses. Tesla fought against edison to prove that AC power is better than DC power. Also he try to dis-



cover wireless power Transmission through air medium. Tesla invented polyphase(3-phase) motor by using AC supply.



Steam turbine generator, capable of generating Huse power, was invented by Sir Charles Algernon Parsons.

- In 1888, Charles brush , who discover the first windmill power plant
- In 1903,First successful Gas turbine
- In 1923,the photovoltaic cell was discovered
- In 1953,the first nuclear power plant or dered in England.
- In 1954, the power generation takes place by nuclear power plant in Russia.



--COURTESY: <https://www.instituteforenergyresearch.org/>

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# Ancient Technology

## ANCIENT ELECTRICITY IN INDIA

### Shloka:

Samsthapyamrnmayampatramtamrapatram  
Susamskrtaam | Chadayetsikhigrivenacardrabhi-  
hkasthapamsubhih ||

संस्थाप्य मृण्मयं पात्रं ताम्रपत्रं सुसंस्कृतम् ।  
छादयेत् शिखिग्रीवेन चार्द्राभिः काष्ठपांसुभिः ॥

### Meaning:

After placing earthen vessel as well as the copper vessel securely, close (the vessels) with copper sulphate and sawdust,

### Shloka:

Dastalostonidhatatvahparadacchaditastatah  
Utpadayatitanmitramsamyogastamra-  
dastayoh

### Meaning:

Lumps of gems generate electricity by the union of copper and zinc.

### Shloka:

Samyogajjayate tejo yanmitramitikatthyate | Evamsatanamkumbhanamsamyogah  
Karyakrtsmrtah |

संयोगाज्जायते तेजो यन्मित्रमिति कथ्यते ।

एवं शतानां कुम्भानां संयोगः कार्यकृत्स्मृतः ।

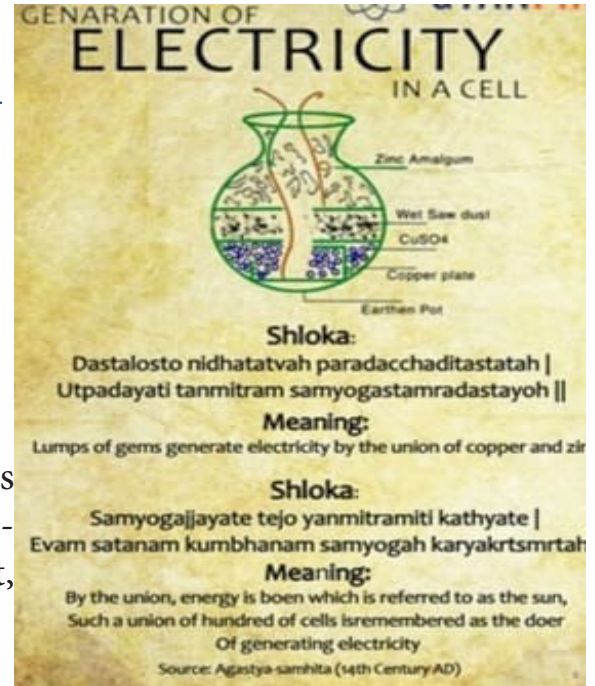
### Meaning:

Earthen pot, which is well cleaned, pretty, fit for storing ghee and capable of holding water (watertight) should always be taken.

### Shloka:

Susammrsta ca subhagaghrtayonihpayodhara  
| Mrtkumbhisarvadagrahya...

सुसंमृष्टा च सुभगा घृतयोनिः पयोधरा ।  
मृत्कुम्भी सर्वदा ग्राह्या...



## Meaning

By the union, energy is born which is referred to as the sun. Such a union of hundreds of cells is remembered as the doer (of generating electricity).

## Etymology:

sikhi-grivah = Peacock neck coloured = Copper.

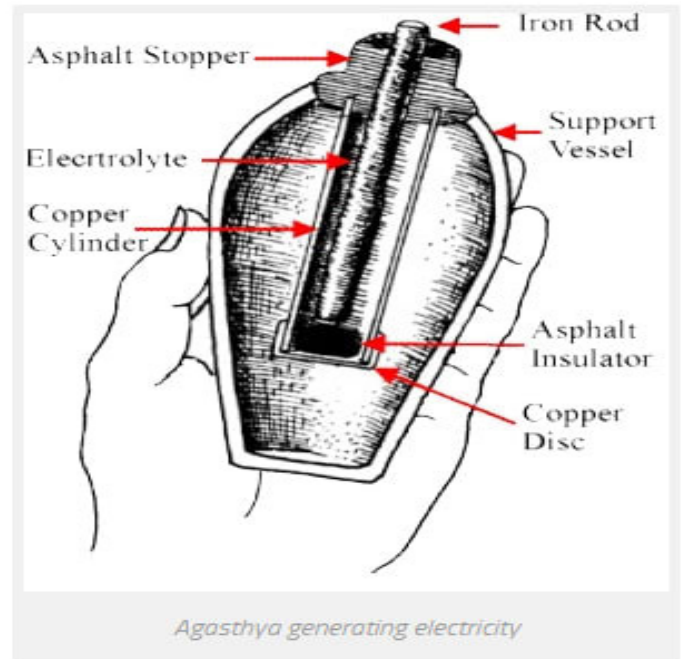
## Ancient theory :

Agasthya-samhita was an ancient book written by Rishi Agasthya around 7000 years ago. Agasthya explains the methodology involved in the construction of electric battery. He also describes that water can be split into oxygen and hydrogen. Agasthya's battery had the following components

- Copper plate
- Earthen pot
- Copper sulphate
- Wet saw dust
- Zinc amalgam

An earthen pot is taken and covered with a clean copper plate. On the copper plate is the copper sulphate above which moist saw dust is placed. And on top of all these zinc amalgam sheet is placed on the energy known as Mitra – Varuna. Here Mitra means the cathode and varuna means anode. In order to intensify the power of electricity a hundred of such jars known as ShataKumbha are connected in series. When the reaction takes place water is split into Pranavayu (Oxygen) and Udanavayu (Hydrogen). The floating hydrogen is air tight cloth and can be further used in aerodynamic applications. In Ancient period there were about six kinds of technologies in-

involved in producing electricity.



courtesy:agnitantra

1. Tadit- The friction from silk or leather is used to produce current
  2. Vidyut- Produced from clouds or streams
  3. Saudamini- current from friction between gems or glass
  4. Shatakumbhi- produced from series connection of a hundred cells
  5. Hradini- produced from strong cells
  6. Ashani- current produced from magnetic rod
- Sources proved that, the making of dry cell was defiantly a contribution by the great ancient sage Agasthya. Source: Agasthya-samhita (14th century AD)

## Modern theory

Modern day dry cell is based on the principle of converting chemical energy to electrical energy. Dry





cell contains an electrolyte chemical in the form of thick paste. A zinc casing which serves as anode has the electrolyte and the carbon electrode which serves as a

### **Working:**

There is chemical reaction taking place in every portion of the dry cell. There is reduction reaction taking place at the cathode and oxidation reaction at the anode. The chemical reactions in the dry cell are as follows:-

- Reduction reaction between ammonium chloride and Manganese dioxide
- The oxidation reaction in zinc cylinder anode
- The final end reaction which generates power is a combination of all the chemical reactions.

*COURTESY: <https://www.themysteriousindia.net/>*

**By**

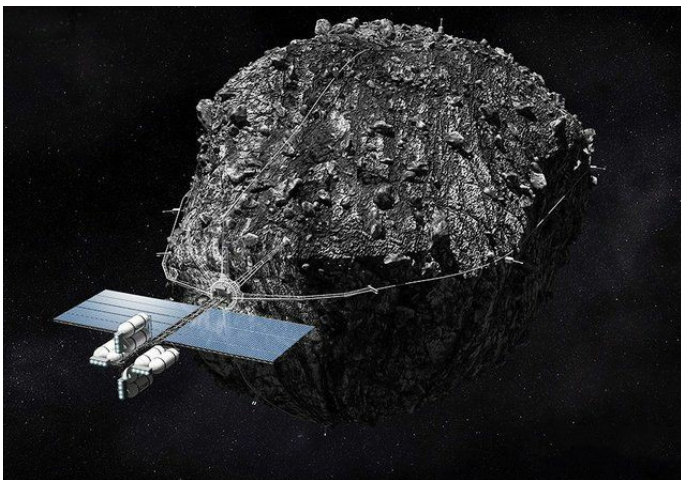
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**K. Ajay I BTECH EEE**

# Future Technology

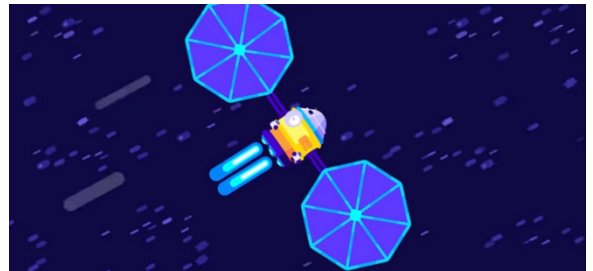
## ASTEROID MINING

Asteroid mining is the extraction of raw materials from asteroids & other minor planets, including near earth objects. Generally, the mining industry is responsible for air & water pollution and the destruction of entire landscapes. Dangerous chemicals like cyanide, sulphuric acid harming the Biodiversity, workers & locals. Besides the mining industries on earth, there is an alternative method of mining which can't harm anyone and that is called "**ASTEROID MINING**".



Asteroids are millions of trillions of tons of rocks, metals and ice leftover from the cloud that became the planet 4.5 billion years ago. Even small metallic asteroids may contain trillions worth of precious metals. But asteroid mining is too expensive to replace mining on earth. Primarily we have to choose an asteroid, move it to a place where it's easy to process and then take it apart to turn into useful products. But all of this collides with fundamental problems humans yet to solve. Going to space is expensive as it costs high in rocket

fuel for each kilogram just to reach a low earth orbit. Going further out into deep space costs very high. So one solution is to switch from classical rockets to ELECTRICAL SPACESHIPS. Scientists already used electrical rocket engines for many of the space probes on science missions.

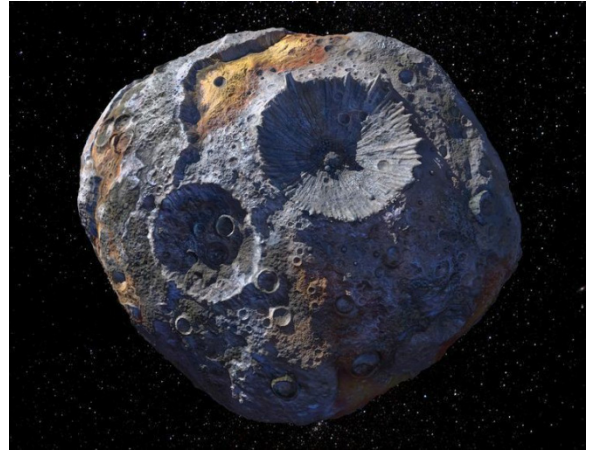


While electrical engines require only a tiny amount of fuel to go very far. This means we don't need to spend a lot of money on fuel. So, after reaching nearer to asteroid through space ship, the first thing that needs to be done is to secure the asteroid and stop it from spinning by vaporizing material with a Laser or stopping the rotation with thrusters. Once we have a stable asteroid, we need to push that in the right direction at exactly at the right moment then the ship fires its thrusters and nudges the asteroid into a trajectory that takes near our 'Moon'. The Moon is useful because we can borrow its gravitational pull to put the asteroid in a stable orbit around the Earth which saves even more fuel. The space mining and processing equipment has to be installed in orbit by carefully moving toward the asteroid. The processor works very differently than on earth. Giant mirrors focus and heat up asteroid rock to boil out the gases.



Grinders break up the dried rocks into gravel and dust and centrifuges separate dens from light elements. Even if we only extract 0.01% of the mass in precious metals safely back to the earth, this is several times more than we'd get from earth. As our infrastructure and experience grows, our missions get more and more sophisticated. Parts and fuel produced on asteroids don't have to be launched from the earth at all.

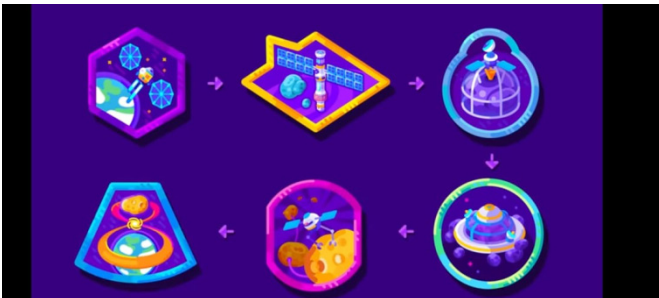
## #Interesting Fact



One of the most massive asteroids is in the asteroid belt. It's made of gold, platinum, nickel..... Its value is estimated at \$7 quintillion. Enough to give everyone \$96 billion.....!

--COURTESY:  
[www.inanutshell.com](http://www.inanutshell.com)

**BY:**  
**N.Tejaswi,**  
**SD.N.Niranjani,**  
**K.K.D.Manohar,**  
**2nd B.Tech EEE**



The first mining operation makes the second one easier and so on. While the space industry grows and precious materials become cheaper eventually we could stop mining in the earth. Even the idea of toxic mining down here might become something weird and anachronistic like having an open fire in your living room. Landscapes ravaged by pollution will heal while the technological wonders were used to get cheaper and less toxic to make. None of this is science fiction We don't need fancy materials or new physics to make asteroid mining happen. We could start building this future today. All we need an initial path..



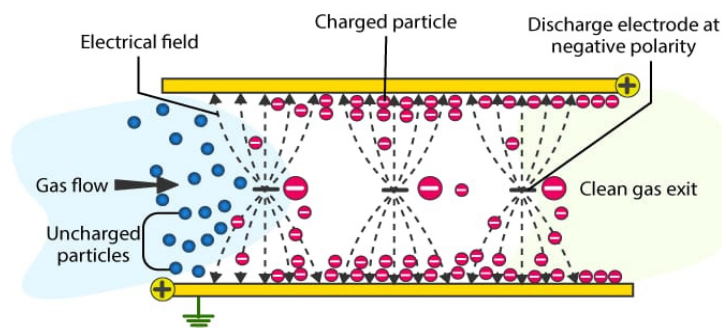
# World's First Invention



## World's First Electrostatics Precipitator

Electrostatic precipitator is electrical equipment, first introduced by Dr.F.G.cottel in 1906 and was first economically used in 1937.

### WORKING PRINCIPLE OF ELECTROSTATIC PRECIPITATOR



Now a days, the most power generating stations burn fossil fuel such as coal or oil to generate electricity. Hence flue gases produced due to combustion of solid pulverized fuel in the furnace contain plenty of dust particles. When a chimney releases these flue gases in the atmosphere without filtering these dust particles, the atmosphere may get polluted. Hence, these dust particles need to be removed from the flue gases as much as possible before these flue gases get discharged to the atmosphere. By removing the dust particles from flue gases, we can control the air pollution. Electrostatic precipitator does this work for a furnace system. We install this device in the way of flue gases from the furnace to the chimney so that the device can filter the flue gases before they enter the chimney to atmosphere.

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--COURTESY: [www.britannica.com](http://www.britannica.com)

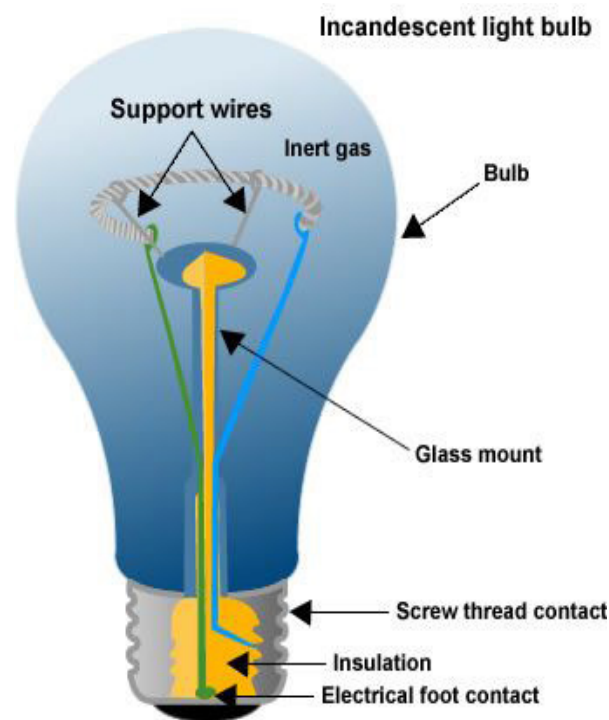
# HOW IS IT MADE ?

## Incandescent light bulb

This section as well as the following one (The Manufacturing Process) will focus on incandescent light bulbs. As mentioned earlier, many different materials were used for the filament until tungsten became the metal of choice during the early part of the twentieth century. Although extremely fragile tungsten filaments can withstand temperatures as high as 4500 degrees Fahrenheit (2480 degrees Celsius) and above. The development of the tungsten filaments is considered the greatest advancement in light bulb technology because these filaments could be produced cheaply and last longer than any of the previous materials. The connecting or lead-in wires are typically made of nickel-iron wire. This wire is dipped into a borax solution to make the wire more adherent to glass. The bulb itself is made of glass and contains a mixture of gases, usually argon and nitrogen, which increase the life of the filament. Air is pumped out of the bulb and replaced with the gases. A standardized base holds the entire assembly in place. The base, known as the “Edison screw base,” was originally made of brass and insulated with plaster of paris and, later, porcelain. Today, aluminum is used on the outside and glass is used to insulate the inside of the base, producing a stronger base.

### The Manufacturing Process

The uses of light bulbs range from street lights to automobile headlights to flashlights. For each use, the individual bulb differs in size and wattage, which deter-



mine the amount of light the bulb gives off (lu-mens). However, all incandescent light bulbs have the three basic parts—the filament, the bulb and the base. Originally produced by hand, the light bulb manufacture is now almost entirely automated.

### Filament

The filament is manufactured through a process known as drawing, in which tungsten is mixed with a binder material and pulled through a die—a shaped orifice—into a fine wire. Next, the wire is wound around a metal bar called a mandrel in order to mold it into its proper coiled shape, and then it is heated in an process known as annealing. This process softens the wire and makes its structure more uniform. The mandrel is then dissolved in acid. The coiled filament is attached to the lead-in wires. The lead-in wires have hooks at their ends which are either pressed over the end of

the filament or, in larger bulbs, spot-welded.

### Glass bulb

The glass bulbs or casings are produced using a ribbon machine. After heating in a furnace, a continuous ribbon of glass moves along a conveyor belt. Precisely aligned air nozzles blow the glass through holes in the conveyor belt into molds, creating the casings. A ribbon machine moving at top speed can produce more than 50,000 bulbs per hour. After the casings are blown, they are cooled and then cut off of the ribbon machine. Next, the inside of the bulb is coated with silica to remove the glare caused by a glowing, uncovered filament. The company emblem and bulb wattage are then stamped onto the outside top of each casing.

### Base

The base of the bulb is also constructed using molds. It is made with indenta-

tions in the shape of a screw so that it can easily fit into the socket of a light fixture.

### Assembly

Once the filament, base, and bulb are made, they are fitted together by machines. First, the filament is mounted to the stem assembly, with its ends clamped to the two lead-in wires. Next, the air inside the bulb is evacuated, and the casing is filled with an argon and nitrogen mixture. These gases ensure a longer-life for the filament. The tungsten will eventually evaporate and break. As it evaporates, it leaves a dark deposit on the bulb known as bulb-wall blackening. Finally, the base and the bulb are sealed. After testing, bulbs are placed in their packages and shipped to consumers.

--COURTESY:  
Alfred ICU youtube channel.

**By.**  
**K.Jayanth Kumar III**  
**B.TECH**

## STUDENT ARTICLES

### HARNESSING ELECTRICITY FROM LIGHTNING

Benjamin Franklin was really lucky

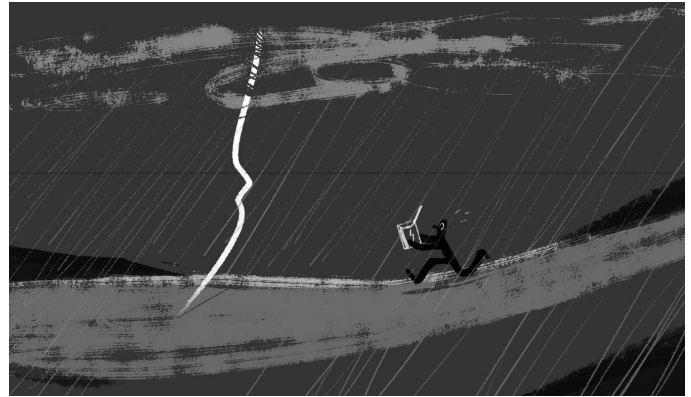
his kite wasn't struck by lightning, otherwise million joules of energy that an average lightning strike contain, is enough to fry the founding father in his boots in 1772, when Franklin demonstrated the connection between the electricity and lightning with his kite experiment. Every second about 100 lightning strikes occurs and only about 25 percent of them are ground





strikes which could be possibly harnessed and can fetch about 490,000,000,000 KWh/Yr if all available strikes are harnessed successfully without any losses. In 2017, world's electricity consumption amounted to 22.3 trillion KWH which is 45 times of electrical energy that can be captured from strikes. This harnessed energy will power the world for just 8 days. This figure seems less but not that much we are thinking, considering cost and effort it required. To capture lightning strikes all that we needed is very tall tower similar to Eiffel tower. These towers should be constructed around a mile apart in grid formation covering entire globe. But the only thing suffering all is lightning strikes are sporadic and last for only milli seconds. Until now there is no equipment that can withstand million-volt surge without breaking into pieces, no charge storage devices that can capture and store this heavy instantaneous energy. For this we need heavy-duty conduction rods, ultra-heavy-duty electric circuits and super storage capacitors. But some evidences rendered hope, researchers at University of Central Florida created a prototype super-capacitor battery that takes up a fraction of

space of lithium-ion cells, charges more quickly and can recharge over 30,000 times while still working like new. Department of Energy's Oakridge National Laboratory's integrated approach towards layered materials, found to enhance power storage capacity- in the gaps between layers.



Many others are in their way forward in designing, super capacitors that can have large and rapid storage capability, surge handling equipment that won't burst in to pieces while collecting strikes, and ultra-heavy-duty conducting rods that can conduct the strikes to its handling place.

Harnessing of electricity hasn't done till now but it does mean, it's impossible. When it is made possible, that may not bring much changes in our electricity bills but takes the world a step forward from where it is right now.

--COURTESY:

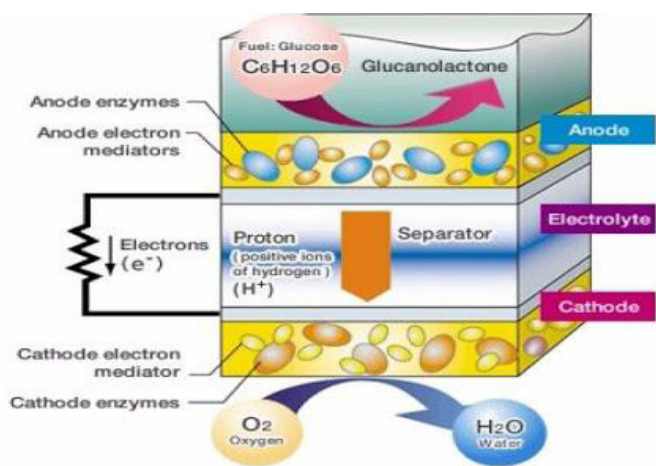
<https://www.researchgate.net/>

**By:**

**A.GNANESWARI,  
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## BIO BATTERY

A bio-battery is an energy storing device that is powered by organic compounds, usually being glucose, such as the glucose in human blood. When enzymes in human bodies break down glucose, several electrons and protons are released. Therefore, by using enzymes to break down glucose, bio-batteries directly receive energy from glucose. These batteries then store this energy for later use. This concept is almost identical to how both plants and many animals obtain energy. Although the batteries are still being tested before being commercially sold, several research teams and engineers are working to further advance the development of these batteries.



Courtesy:<https://www.elprocus.com/>

### Working Principle:

The working of the Bio battery is shown below the diagram. This system uses the flow of electrons as well as protons for generating electricity. The proton movement can be occurred due to the moving force

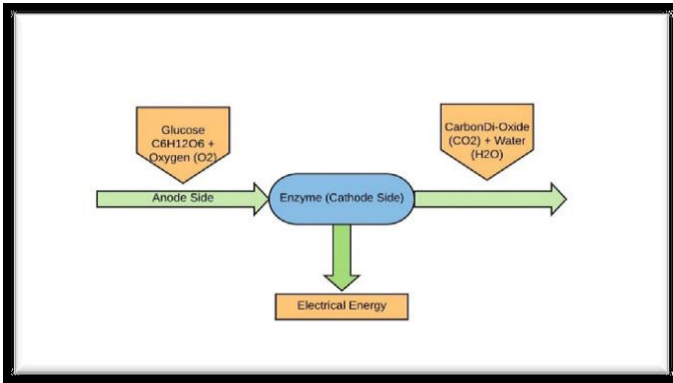
which is known as current. The electrons flow can be from anode to cathode whereas current flow can be from cathode to anode.

- In the above figure, glucose is used at the anode side whereas enzyme is used at the cathode side
- Glucose gets broken down into electrons and protons
- The flow of protons can be travel to cathode side via a separator and the flow electrons can be travel to cathode side via a mediator.
- Enzymes are utilized at cathode side which generates water by both protons as well as electrons traveled from the anode side. Here, the reaction of Oxygen reduction is being used here.
- Above reactions will generate electrons as well as protons in the system. Finally, electric energy will be generated.

### Types of Bio-Batteries:

Bio-batteries are classified into several types like Enzymatic Bio-Battery, Microbial Bio-Battery, body fluid based bio-batteries, cellulose-based bio-batteries, etc. But Enzymatic Bio-Battery, Microbial Bio-Battery are the commonly used batteries.

- 1) Enzymatic Bio-Battery- biochemical agents (Enzymes) are utilized for a breakdown of a substrate.
- 2) Microbial Bio-Battery-Microorganisms such as Escherichia coli, electric bacteria, are utilized for a breakdown of a substrate.



### Applications:

The applications of Bio battery include the following.

- Bio-batteries are used in medical implants like pacemakers, insulin pumps, etc.
- It can be used as a charger for electron-

ic devices like cell phones, tabs, power banks, etc.

- Bio-batteries can be used for toys as well as on the greeting cards
- Bio-batteries are used in the defense field in the remote sensing devices, spying devices, as well as surveillance.

COURTESY: <https://www.elprocus.com/>

**By,**  
**-V.Tejaswi**  
**III B.Tech,EEE**

## NATURAL RESOURCES

Earth's natural resources include air, minerals, plants, soil, water, and wildlife. Conservation is the care and protection of these resources so that they can persist for future generations.

Why Conserve Natural Resources?

Human beings depend upon the natural resources for their development activities. If the resources are not used wisely, it would create an imbalance in the envi-

ronment. Thus would head us in opposition to an eco-friendly atmosphere. The need for conservation arises from the significance of natural resources. It is as follows-

- We use it for drinking, producing electricity, irrigation, in various industries and for a number of activities. Its scarcity would cause loss of vegetation, adverse effect on flora and fauna, erosion of soil, etc.
- Plants and animals provide a wide range of industrial and biological materials. Also, it assists in the manufacturing of medicine and for various other uses.
- It takes millions of years for the formation of natural resources.
- Fossil fuels are of great importance. A lot of energy is produced from coal, oil and natural gas all of which are fossil fuels.





- Forest provides paper, furniture, timber, medicine, gum, etc. Also, it maintains a balance in the ecosystem. Moreover, it prevents soil erosion and protects wildlife.
- Land resources support natural vegetation, wildlife, transport. The land also provides us food, cloth, shelter, and other basic needs.



1. Methods of conservation of energy:  
Use of alternative sources of power such as solar and wind energy.
2. Plant trees to prevent soil erosion.
3. Treatment of industrial wastes and sewages before they are released in the water bodies.
4. Using biogas and bio-fuels instead of fossil fuels.
5. Industries can ensure they make production efficient to reduce wastage.
6. Reduce, Reuse, Recycle — Three great ways YOU can eliminate waste and protect your environment!

~Energy saving is the last hope of human survival & utilize the nonconventional resources in the right way as far as possible~

COURTESY:  
[www.electrical4u.com](http://www.electrical4u.com)

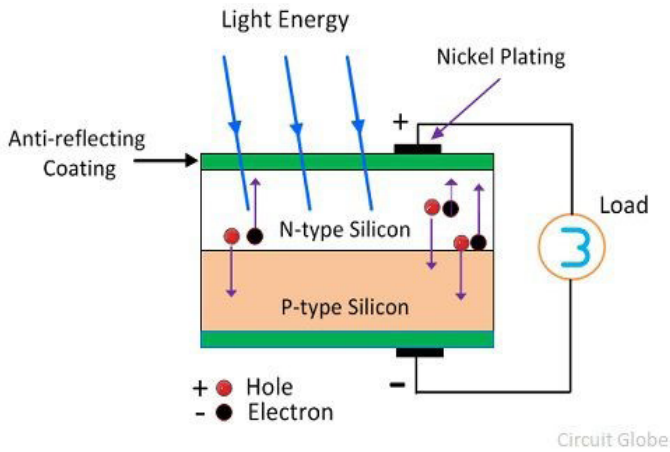
**By:**  
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**K.GANESH, 2nd B.Tech**

## PHOTOVOLTAIC SYSTEMS

### INTRODUCTION:

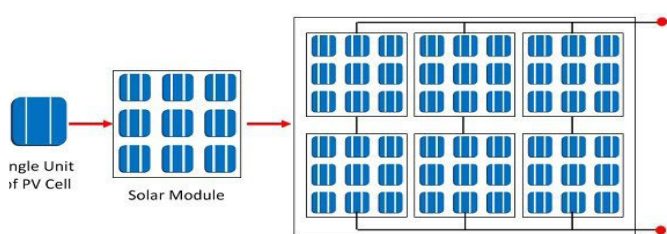
Over the last 2 decades the contribution of solar energy to world's total energy supply has been grown significantly. Energy from the sun is freely available on earth.

Pv cell is a semi conductor device that converts solar energy to light energy and works on "PHOTOELECTRIC EFFECT", Process of producing electricity from light.



**CONSTRUCTION:-**

Silicon is most widely used in making PV cell, made of sand which is second most abundant element on earth. Pv cell consists of a pn junction diode. The surface of p type material is extremely thin so that light can penetrate easily to junction. The metal rings are placed around p-type and n-type material which acts as their positive and negative output terminals . In series combination of pv cell the out-



put voltage and efficiency increases.

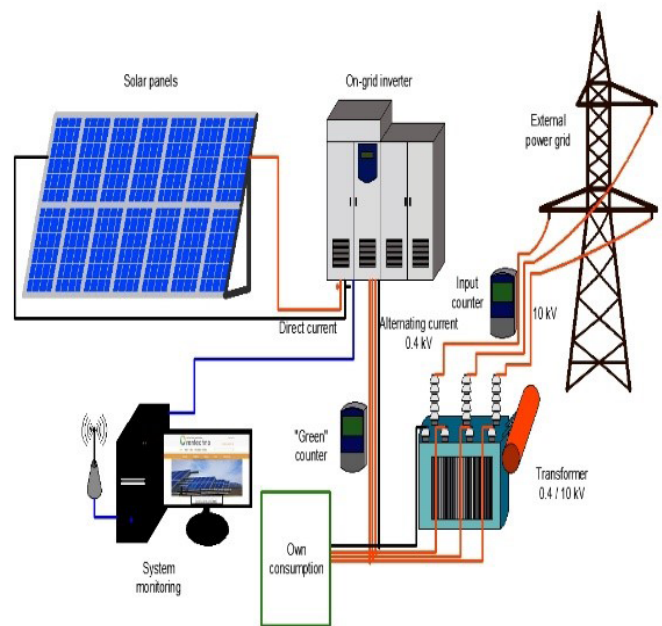
**WORKING:-**

When the light strikes the pn junction ,light strikes the p region of pv cell though the p region is very thin. it penetrates through the p region and reaches up to the depletion region.This photon energy is sufficient to produce electron hole pairs in the depletion

region. Concentration of electrons in n region and holes in p region becomes so high that a potential difference develop between them. Due to this current develops and flows through the load . The layer of EVA sheeting on both sides of solar panel is to protect them from shocks vibration and humidity. Solar panels classified on appearance, internal crystalline lattice structure. They are :-  
 1. polycrystalline  
 2. monocrystalline (costly and highly efficient)

**CONCLUSION:-**

Because of their capital cost and weather conditions dependent they are not



widely used. So generally they are connected to electrical grid system in the same way as the other conventional power plant.

*"the future is green energy, sustainable ,renewable energy"*

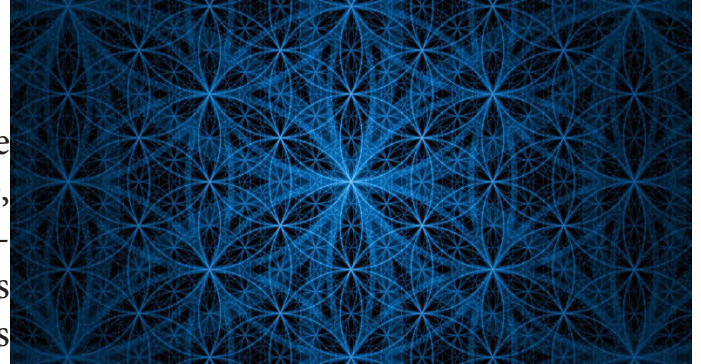
COURTESY:  
<https://www.solarschools.net/>

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# THE UNIVERSE

## THE CONCEPT OF TIME

### THE CONCEPT OF TIME:



Theory of relativity established time as a physical thing: it is part of space-time, the gravitational field produced by massive objects. The presence of mass wraps space-time, with the result the time passes more slowly close to a massive body such

as earth. Consider a space time as a 3D fabric, more the mass more is the depression, more the depression lesser the time runs. Like we know the direction of travelling how to know the direction of time? Stephen Hawking talks about the three arrows of time.

- Thermodynamic Arrow
- Cosmological Arrow
- Psychological Arrow

### **Thermodynamic Arrow:**

- Direction in which entropy (disorder) moves. Time should move from less entropy to more entropy.
- Murphy's Law: Things get worst with time.
- Ex: A vase is broken; if you reassemble it and glue it like it originally was. Is it in the same state earlier it was in?

### **Cosmological Arrow:**

- According to theories universe is expanding.
- Time moves forward because universe is expanding.

### **Psychological Arrow:**

- The direction you believe that the time is flowing in.
- Why can you remember the past but not the future?

### GRANDFATHER PARADOX:

The grandfather paradox is a paradox of time travel in which inconsistencies emerge through changing past.

- The name comes from the paradox's common description; a person travels to the past and kills his own grandpa before the conception of their father or mother, which prevents the time traveler's existence.





featured on iFunny.com

**Solution:**

- According to eternal inflation theory, inflation never stops, and has been going on for an infinite length of time.
- It says there is multiverse (existence of parallel universes).
- There are multiple parallel universes; when you go back in time and change something from your past nothing changes in your universe but it makes a difference in the parallel universe.

**Time Dilation:**

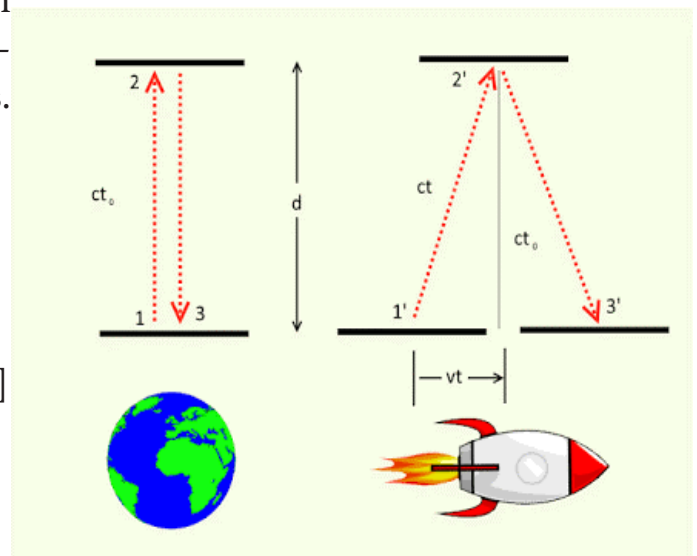
Time dilation is a difference in the elapsed time measured by two clocks, either due to them having a velocity relative to each other, or by there being a gravitational potential difference between their locations.

“Moving clock runs slow”

If the rocket has lattice of clocks then the clock which is leading will lag by  $\{D \times v / c^2\}$

“Leading clocks lag”

$T_{rest} = \gamma \times [T_{moving} + (v/c^2) \times X_{moving}]$   
 Where  $\gamma$  is Lorentz factor  $\gamma = 1/\sqrt{(v^2/c^2)}$   
 {here c is speed of light}



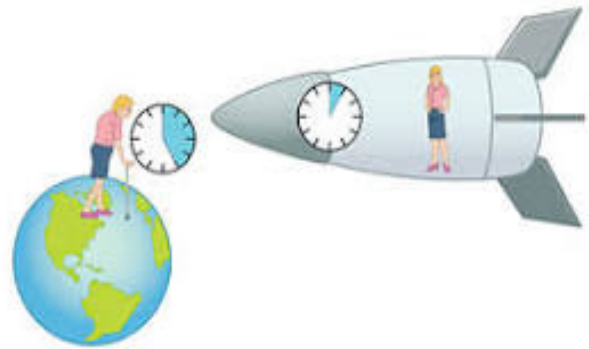
{v is speed of rocket and x is distance from rocket’s observer and event}

**THE REAL LIFE EXAMPLE: Muons**

These are unstable particles created when cosmic rays interact with the upper atmosphere. Average life time of muon is 2.2  $\mu$ sec and average velocity of muon is 0.998 times speed of light. According to this it has to travel 660mts. So we cannot see them. But we are observing them because of time dilation relative to us and length contraction relative to muon. Lorentz factor becomes 15 and runs 15 times slowly, so it covers more distance. Therefore we can see them. Muon see surface rushing over at same velocity and length contracted.

## THE TWIN PARADOX:

- Twins of age 20. One (Rohan) travels to other star with speed 0.8 times of speed of light and comes back to earth, while the other stays behind (Mohan).
- Mohan records the entire event to take 30 years; hence when Rohan is back on earth the age of Mohan is 50.
- But since Mohan is calculating only the dilated time; time taken by Rohan for the same is only 18 years; hence age of Rohan when he comes back to earth is only 38 years.
- Paradox: "Twins but their ages are different!"



COURTESY:

<https://www.sciencedaily.com/>

**BY:**  
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**V.SAITEJA,**  
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## BLACK HOLE

### BLACK HOLE

The black hole is a region in space where the pulling force of gravity is so strong that, even light is not able to escape through it. The strong gravity occurs because matter has been pressed into a tiny space. Humans can't see a black hole with naked eye. The reason black holes are so black is because they consume everything around them, including light.

### FORMATION OF BLACK HOLE

Anything that ventures too close to a black hole- be it star, planet or space craft- will be stretched and compressed like a putty in a theoretical process aptly known as spaghettification. The most commonly known way a black hole forms is by stellar death. As stars reach the ends of their lives, most will inflate, lose mass, and then cool to form white dwarf. But the largest of these fiery bodies, those at least 10 to 20 times as

massive as our own sun, are destined to become either super-dense neutron stars or so called stellar-mass black holes. No matter their starting size, black holes can grow throughout their lives, slurping gas and dust from any objects that creep too close.

### PARTS OF BLACK HOLE

There are two basic parts to a black hole.

1. Eventhorizon
2. Singularity

The event horizon is the "point of no return" around the black hole. It is not a physical surface but a sphere surrounding the black hole that marks where the escape velocity is equal to speed of light. It's radius is Schwarzschild radius. Once matter is inside it, that will fall to the center with such strong gravity, that matter squishes to just a point- a tiny, tiny volume with a great density. That point is called Singularity. It is vanishingly small, so it has es-

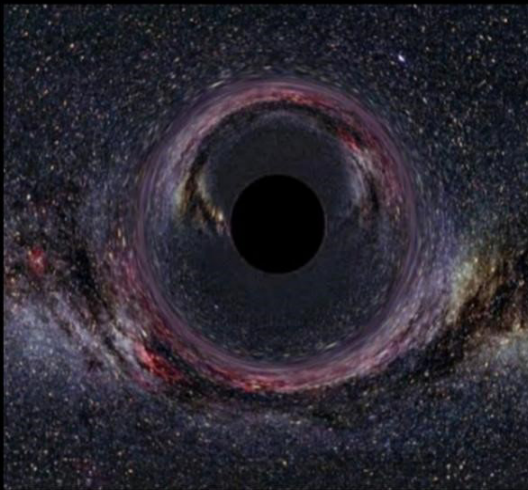
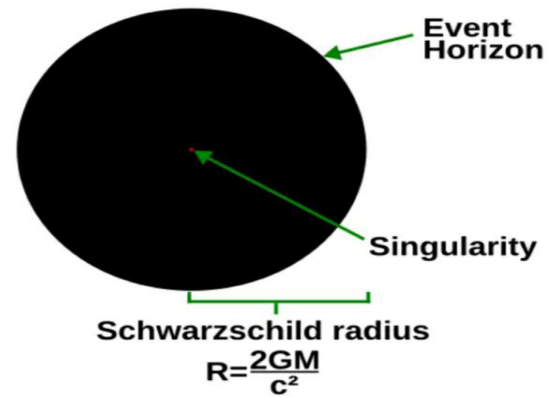
essentially an infinite density. It's likely that the laws of physics break down at the singularity.

### TYPES OF BLACK HOLES

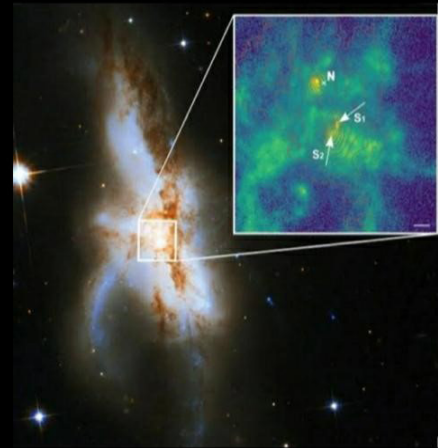
There are two types of black holes

1. Stellar-mass black holes
2. Super massive black holes

The black holes which have masses about 5-20 times that of sun are called stellar-mass black holes. These are formed when a massive star runs out of fuel and collapses. They are found scattered throughout the galaxy in the same places where we find stars, since they began their lives as stars. The black holes with masses million to billion times that of sun are called super massive black holes. These are found at center of nearly every large galaxy. Recent studies have shown that the size of the black hole is correlated with the size of galaxy, so that there must be some connection between the formation of black hole and formation of the galaxy.



stellar mass  
black hole



super-massive  
black hole

### ENDING OF BLACK HOLES

Black holes have a finite life time due to emission of Hawking radiation. However, for most known astrophysical black holes, the time it would take to completely evaporate and disappear is far longer than the current age of universe. For example, a black hole with a mass of the sun would take  $2 \times 10^{67}$  years to evaporate, whereas the age of the universe is only  $13.8 \times 10^9$  years. Thus, it will take more than  $10^{57}$  times the current age of the universe for that black hole to evaporate.



## WHAT HAPPENS IF MAN FALL INTO BLACK HOLE



If man fall into black hole, then he will be able to see both the universe beginning and ending due to time dilation. At the black hole space becomes more curvy until, at the centre, it becomes infinitely curved. At the instant man entered the black hole, he would split in two. In one, he would be instantly incinerated and in the other he would plunge on into the other utterly unharmed.

*COURTESY:*

*<https://www.nasa.gov/>*

**By**

**S. Likhitha, I B.TECH EEE**

# COMPLETE GUIDE TO CRACK A RECUIRTMENT INDIAN RAILWAYS

Indian Railway is 4th largest network in the world with a route length of 68,155 KMS with 18 divisional zone. Do you want to crack any railway recruitment and become a railway employee? Are you searching for tips and tricks for preparation of Railway exams? Wow! You are at right place. Read this article completely, you will be aware of Indian railway exams and get an idea how to crack railway exams to become Railway employee.....



## Things you must know before you start your preparation for railway exams:

- **Read complete official notification of the exam:**

By reading complete notification, we have an idea about some particulars like Qualification, eligibility, no. of vacancies according to zones, age relaxation, cutoff marks, syllabus and PET etc...

- **How to apply:**

We can apply for Indian Railways in [www.indianrailwayrecruitment.in](http://www.indianrailwayrecruitment.in) website.

- **About Syllabus:**

For all railway exams, common syllabus is

1. Aptitude & Reasoning
2. General awareness
3. General science
4. English
5. Current Affairs

- **Preferred Books:**

1. For Aptitude and Reasoning – R. S Agarwal, Arihant, Upkar Publishers.
2. General Awareness – Arihant, Ritesh sri vasthav, Lucent Publications.
3. General Sciences – Lucent Publications, Arihant.
4. English grammar – Wren and Martin
5. Current Affairs – Shine India, Pratiyogita darpan, Daily Newspaper.

- **Tips and tricks for preparation of Railway exam:**

1. Time Management: We must prepare a study time table and must follow it regularly.
2. Notes Preparation: Prepare a note of all subject topics for further use also, then we have a clarity while doing revision.
3. Revision: Revise number of times

with tricks and shortcuts to remember permanently.

4. Solving a greater number of solved papers and sampled papers: By solving a greater number of solved paper and sample papers, we can get an idea about question format in all topics and we can know that how much time we are taken to solve bits.

5. Newspaper Reading: By reading newspaper daily we can learn and know about current affairs and also static G. K.

### **How to become a Railway employee: -**

You should have 5R's to become a Railway employee.

- Robust: We should have robust/strong goal or aim to read become Railway employee.
- Read: Read all the latest information of Railway recruitment. Prepare each and every topic in the syllabus of exam.
- Remember: Remember Do not distract your mind to other matters. Concentrate only for your aim.
- Revise: Revise more previous year question papers, sampled papers and solved papers to score more marks in exam.
- Relevant: Should have minimum knowledge about relevant posts in Indian Railways such as IRES, NTPC, RRB-JE, Group-D, ALP, Technicians etc. All posts have common syllabus for exam.

*Hope all Railway aspirants will achieve their aim to become a part of Indian Railways.*

COURTESY:  
[www.indianrailways.com](http://www.indianrailways.com)

## **DEFENCE RESEARCH AND DEVELOPMENT ORGANIZATION(DRDO)**

### **What is DRDO?**

The Defence Research and Development Organisation (DRDO) is an agency under the department of defence research and development in Ministry of Defence of Government of India, charged with the military's research and development, head quartered at DRDO Bhavan, New Delhi.

### **Introduction about DRDO:**

DRDO is the R&D wing of ministry of defence of Government of India, with a vision to empower India with cutting edge defence technologies, equipping our armed forces with state-of-the-art weapon system and equipment requirements laid down by three services. DRDO's pursuit of pro-

duction and development of strategic systems and platforms such as Agni and Prithvi Series of missiles, Akash, Air defence system, a wide range of radars and electronic warfare





systems etc. Today, DRDO is a network of more than 50 laboratories which are deeply engaged in developing defence technologies of various disciplines like aeronautics, combat vehicles, engineering systems, missiles, naval systems, life sciences etc...

### How to get a job in DRDO:

The manpower in DRDO is classified into 3 categories:

1. Defence Research and Development Services (DRDS).
2. Defence Research and Technical Services (DRTS).
3. Administration and Allied Services.

### To get into DRDS:

- Minimum qualification is B.E / B.TECH.
- Entry through GATE score every year.
- Designation is Scientist B

### To get into DRTS:

- A Wing of DRDO called CEPTAM takes care of this cadre by conducting exam and interviews/trade/skill test.

### Qualification:

1. For Technician A post, should have ITI certificate.

2. For Senior Technician Assistant B post, should have Engineering Diploma/ B.Sc.

To get into Administration and Allied Services:

- CEPTAM takes the responsibility of recruiting.
- The qualification for posts in this cadre, range from 10th to Graduation.
- Types of posts in this cadre are Drivers, Account department, Administration, Cooks, Typists, Clerical posts etc.

How to prepare for DRDO Examinations:

DRDO is India's one of the reputed organizations, it invites applications in various disciplines: Mechanical, Electrical, Chemical, Computers, Infor-

mation technology, Electronics. Test will consist of common syllabus such as:

1. General knowledge
2. Aptitude
3. Verbal English
4. Reasoning
5. Current affairs

6. Also, technical where technical is the most significant weapon to crack the test.

- So, improve your general knowledge, read news papers and watch news and refer books which have updated information.
- Practice aptitude questions in time limits and learn tricks and shortcuts.
- Aware about your field hard on technical is necessary. Do a greater number of bits on theory also mathematical topics?
- See previous year DRDO papers, which you can easily download from internet.
- Hope all DRDO Aspirants will achieve their aim to become a part of DRDO.

COURTESY: [www.drdo.gov.in](http://www.drdo.gov.in)

**BY:**

**B. Kousalya,**

**M.Satya Rajeswari,**

**2nd B.Tech EEE**

# INTERVIEW TIPS

Congrats! You've made it to the interview stage, which means your resume was good enough and your cover letter impressed someone enough to reach out to you. That's feat in itself, so pat your back. Acing an interview is an art and it requires diligent preparation, along with the ability to be ease in the interview room. So, before you bravely March in to the interviews office, check out these interview tips that will help you to snag that job.



1. **Research the company:** If you have interview with new organization, start by finding more about it. This will help you to plan answer that will align with organization goals and values.
2. **Analyse Job description:** Be sure to note the key focus areas of the role you applied for be eager and enthusiastic but not desperate.
3. **Brush up basics:** Along with impressive personality, you need excellent subject knowledge that would brush up your subject fundamentals.
4. **Prepare for Potential Interview questions:** Make a list of Potential questions such as "Tell me about yourself", "Why should we hire you?" and prepare for them in advance.
5. **Dress for Success:** Successful job interview depends on the way you present yourself. Dress in a manner appropriate to the job and look professional.

6. **Maintain good Body language:** Sit upright and keep a smile on your face. Keep. Eye contact so you look honest. Don't nod too much, so many nods and you start to look like you truly don't care.



7. **Calm your nerves:** The key to interview success is to keep your anxiety under control, so the level of stress is manageable. Thorough preparation and practice before the interview can lower your stress.

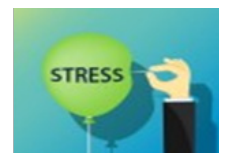
COURTESY: [www.thebalancercareer.com](http://www.thebalancercareer.com)

8 **Be punctual:** Reach well in time to appear professional. This might help you relieve your stress and get habituated to the place.

9. **Make a good first impression:** Enter the room confidently, shake hands with firm grip, be courteous, polite and friendly to everyone you meet.

10. **Be Attentive:** Listen carefully to everything the interviewer is saying. Do not get distracted. Stay focussed.

11. **Speak clearly:** Maintain clarity of speech all the time to project confidence and clarity of thoughts. Try to be honest. Do not mumble. If you didn't understand the question, ask the interviewer to repeat it.



12. Stay motivated: Reply honestly and enthusiastically. A positive attitude can leave a good impression.

13. Express gratitude: No matter how your interview goes, always take a moment to thank the interviewers for their time and for consideration. A positive attitude and polite behaviour impresses people.



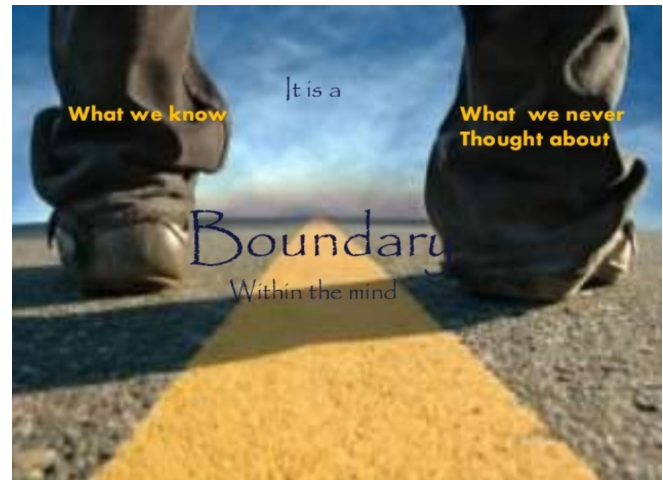
The interview is all about you and how will you represent yourself. So be confident and follow the above tips and stay motivated.ed.

By,  
**MUBARAKA BEGUM**  
**SRI VALLI NAKKA,**  
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## THINK OUT OF BOX

A simplified analogy is “the box” in the commonly used phrase “thinking outside the box”.

- What is encompassed by the words “inside the box” is analogous with the current, and often unnoticed, assumptions about a situation.
- A simplified definition for paradigm is a habit of reasoning or a conceptual Framework.



### It is not our mind

Out of the box doesn't mean out of your mind



• Famous quote by Albert Einstein goes as follows, “Creativity is seeing what everyone else has seen, and thinking what no one else has thought.”

- Creativity is one of the most desired skills in today's workforce.
- You must have often heard people

saying that you need to think out of the box.

- But what exactly is this thinking out of the box? Well, thinking out of the box means coming up with ideas that are unique and have never been proposed before in the situation.
- If you are of the belief that, ‘that's easy’ well then, you are in for a hard reality check.





- 1) Can you carry water in a sieve?
- 2) Throw one, gather handful. What is that?
- 3) Every day, the number of lily pads in the pond doubles .If on the 30th July the pond is completely full, which day was it half full?
- 4) The day before yesterday, Mary was 7 years old. Next year she will turn into 10.How is this possible?
- 5) The two guards watch as king kills the queen. The guards then shake hands and leave the room. What just happened?
- 6) Why it is against the law for a man living in Delhi to be buried in Mumbai?
- 7) A cowboy rode into town on Friday, spent one night in town and left on Friday. How do you account for this?
- 8) What five letter word would become shorter when you add two letters to it?
- 9) A is the father of B. But B is not the son of A. How is that possible?
- 10) A train pulls into a station but none of the waiting passengers move.
- 11) Bruce wins the race, but the one million prize is given to Max instead.
- 12) How many golf balls can fit in a school?

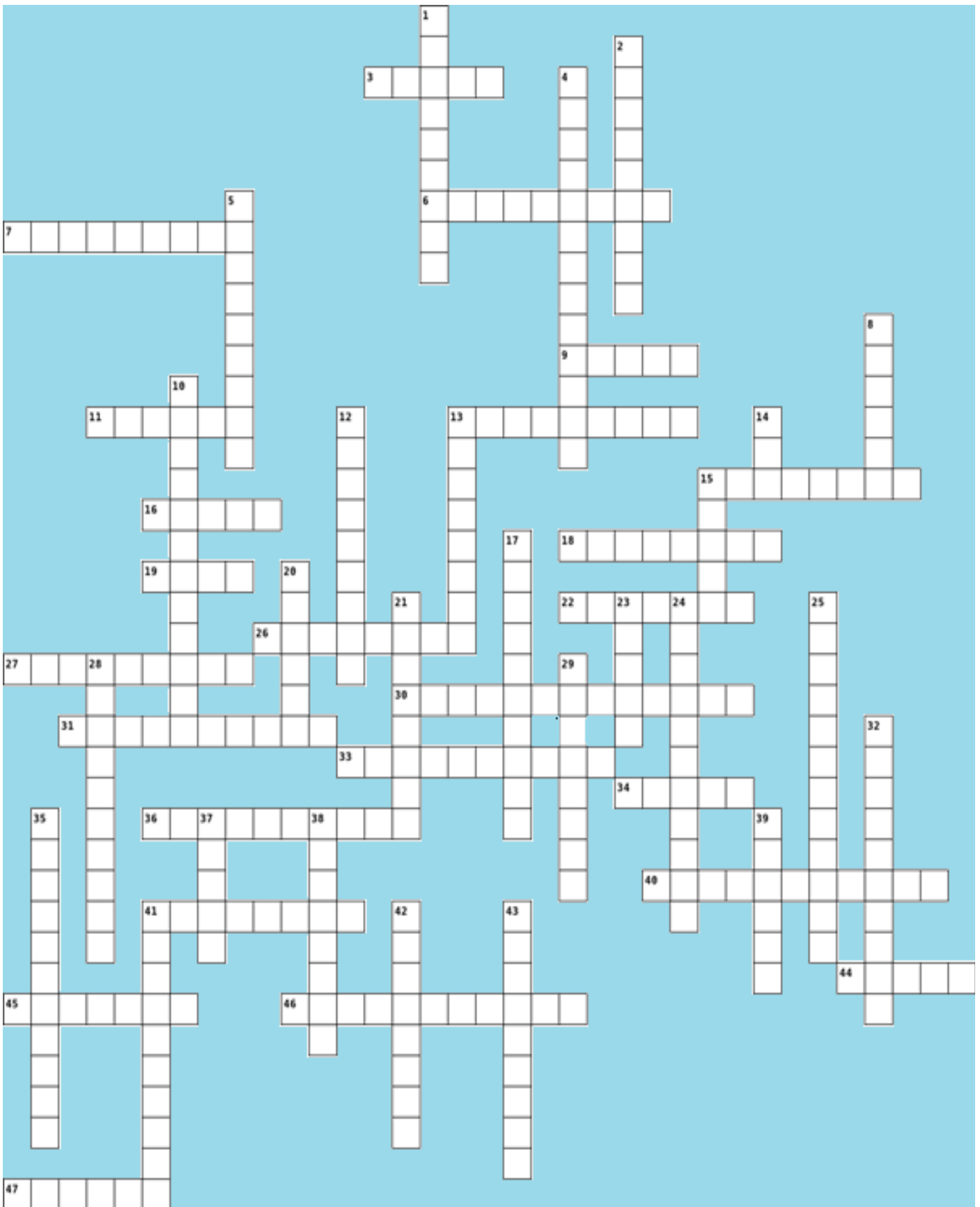
## **ANSWERS**

- 1) Yes, when it is frozen.
- 2) Grain.
- 3) On the 29th day because everyday it doubles.
- 4) Today is 1st Jan and Mary birthday is on the 31st Dec, so she turned 8 yesterday. She will turn 9 this year and hence 10 next year.
- 5) The monk's guards are playing chess and one beats the other.
- 6) Because he is still living.
- 7) Horse is named Friday.
- 8) Short
- 9) B is the daughter of A.
- 10) It is the model train set.
- 11) Bruce is a horse, Max is the owner.
- 12) Two because two O letters in the word school.

*www.coolcsdemos.com wikipedia*

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# THE ELECTRICAL CROSSWORD PUZZLE



**Across**

3. A device that produces coherent electromagnetic waves through amplification by stimulated emission.
6. It is an electrical resonant transformer circuit. It is used to produce high-voltage, low-current, high frequency alternating-current electricity.
7. It is the difference between the electric signal having highest frequency and the signal having lowest frequency.
9. The technical word used for the wire.
11. A device that makes direct current electric power using electromagnetism.
13. It is used to describe a circuit which produces an increased version of its input signal.
15. It is the moving part of an electrical machine in which a voltage is induced by a magnetic field.
16. It is equal to one coulomb per volt.
18. Open circuit test on transformer measures.
19. It is used as a technical word for consuming electrical energy such as light, electric motor etc.
22. It is the CGS unit of magnetic field strength.
26. It is a device used to measure and regulate the speed of a machine such as an engine.
27. In electronics it is a contact made to a point halfway along a winding.
30. It is a magnet in which a magnetic field is produced by electric current.
31. It is a silicon semiconductor device which allows the current in both the forward and reverse directions and it is widely used for voltage regulation.
33. It is the state reached when an increase in applied external magnetic field

cannot increase the magnetization of the material further.

34. It is the electrical component that conducts the current in one direction.
36. It is the device which measures current, voltage and resistance.
40. It is the specific electric resistance.
41. It is the process of returning part of the signal output from a circuit back to the input of that circuit.
44. It is the amount of energy transferred per unit time.
45. It is the quantity of electricity transported in one second by a current of one ampere.
46. It is the ratio of real power to the apparent power flowing in the circuit.
47. It is the vector that represents a sinusoidally varying current.

**Down**

1. Any material where electric current does not flow freely.
2. A device which stores electric charge.
4. A device which stores energy in a magnetic field.
5. It is the solid state semiconductor device with four layers alternating p and n type materials.
8. It is an audio signalling device, which may be electromechanical or piezoelectric.
10. It is an electromechanical instrument which measures small currents.
12. It is the device for measuring the power of incident electromagnetic radiation.
13. It is a mechanical device used to convert electricity into kinetic energy in either a single linear or rotary motion.
14. \_\_\_\_\_ law says the relationship between the voltage and current when temperature is constant.
15. It is an electrode through which the



conventional current enters into a polarized electrical device.

17. It is a rotary electrical switch in certain types of electric motors and electrical generators that periodically reverses the current direction.

20. It is another name for earth which is the reference point in electric circuits.

21. It is a device which converts direct current (DC) to alternating current (AC).

23. It is a switch which controls circuits electromechanically, its operation is to make or break the contact with the help of signals.

24. It is the most efficient electrical machine.

25. It is the branch with combination of electrical and mechanical.

28. It is the component which senses the temperature of a physical system.

29. It is the term refers to a specific arrangement of active and reactive components.

32. It is a semiconductor device with three connections, capable of amplification in addition to rectification.

35. Any substance which, in solution, is dissociated into ions and is thus made capable of conducting electric current.

37. It is a SI unit of luminous flux.

38. A tiny particle which rotates around

the nucleus of an atom.

39. It is a metallic strip of copper, conductor or group of conductors which is used for electrical power distribution as junction or node.

41. It is a ratio of the direct current of equal power relative to the given alternating current.

42. A 130MW generator is usually \_\_\_\_\_ cooled.

43. It is an electrical device that converts an alternating current into a direct one by allowing a current to flow through it in one direction only.

## Across

## Down

3. maser  
6. teslacoil  
7. bandwidth  
9. cable  
11. dynamo  
13. amplifier  
15. Armature  
16. farad  
18. coreloss  
19. load  
22. oersted  
26. governor  
27. centertap  
30. electromagnet  
31. zenerdiode  
33. saturation  
34. Diode  
36. multimeter  
40. resistivity  
41. feedback  
44. power  
45. coulomb  
46. powerfactor  
47. phasor

1. insulator  
2. capacitor  
4. inductioncoil  
5. thyristor  
8. buzzer  
10. galvanometer  
12. bolometer  
13. actuator  
14. ohm  
15. anode  
17. commutator  
20. ground  
21. inverter  
23. relay  
24. transformer  
25. mechatronics  
28. thermostat  
29. topology  
32. transistor  
35. electrolyte  
37. lumen  
38. Electron  
39. busbar  
41. formfactor  
42. hydrogen  
43. rectifier

**By:**  
**G.VISHNU VARDHAN,**  
**K.LAKSHMAN,**  
**2nd B.Tech EEE**

# STUDENT'S ACHIEVEMENTS

## **B. Sai Kiran :**

- Representing JNTUK university rifle/pistol shooting team in All India University national level tournament held at Amritsar, Punjab 2017-18.
- Representing JNTUK university rifle/pistol shooting team in All India University national level tournament held at Chandigarh, Haryana 2018-19.

## **Ch. Narsu Naidu:**

- Representing JNTUK university rifle/pistol shooting team in All India University national level tournament held at Amritsar, Punjab 17-18.

## **K. Praveen Chandu:**

- central zone during the year 2016-17 Runners in state level volley ball seniors state meet

## **S. Naga Varma:**

- Representing JNTUK University kho-kho team in south zone inter university national level tournament. During the year of 2017-18.
- Representing JNTUK University kho-kho team in south zone inter university national level tournament. During the year of 2018-19.

## **P.Gowtham Jai Bheem:**

- Winners in eenadu tournament cricket champion ship 2018

## **D.Durga Prasad:**

- Winners in eenadu tournament cricket champion ship 2018

## **I.Chandra Rohith:**

- Representing JNTUK university handball tournament held at Chennai during the year 2017-18.

## **M. Srinu:**

- 9th place in district level cricket champion ship. Representing JNTU Kakinada in university level kabaddi team during 2018-19

## **S.Vivek:**

- 7th place in National level power lifting champion ship.

## **P.Lavanya:**

- 2nd place in National competition of table tennis 2017.

## **M. Anil Kumar:**

- Winners in eenadu tournament cricket champion ship 2018.

## **B.Mahesh :**

- Bronze medal in 1500 meters running in JNTU Kakinada central zone during the year 2018-19

.....AND MANY MORE