ELECTROWRITE

A Newsletter Published by Dept. of Electrical Engineering, S.I.T

Vol. 1 , Issue 1 Inaugural Edition, 2015

Message From the Desk of Director, SIT

I am pleased to know that the **Electrical Engineering department** of **Siliguri Institute of Technology** is going to publish inaugural issue of its newsletter **"ELECTROWRITE"**today. I congratulate the students, faculty & staff members of the department under the leadership of Mr. Jayanta Bhushan Basu for taking the initiative in the right direction.

Electrical engineering is a vast ocean of knowledge which is being enriched everyday through introduction of new devices, materials, applications, technologies and concepts. The world civilization will stop if electrical engineers collectively fail to deliver for a minute. Millions of engineers, researchers and teachers are engaged in this branch of technology and expanding the horizon of knowledge everyday.

Message From the Desk of HOD , EE, SIT

"***Coming together is a beginning, keeping together is progress and working together is success***"

I am happy to write this foreword for the inaugural edition of the Newsletter "ELECTROWRITE" published by the department. As you continue reading this newsletter you will find interesting snippets of information about the department and some informative articles.

I Congratulate the Faculty In-charge and team for their great effort in publishing the first issue.

J.B.Basu

"Department of Electrical Engineering - A Legacy of Learning"

On behalf of Department of Electrical Engineering, S.I.T., We take immense pleasure to introduce **"ELECTROWRITE"** – the newsletter of the department.

A technical magazine which basically offers a platform to share the department's successes and keep up to date on what is happening in Electrical Engineering department. Also it focuses on the technical advancements and achievements in the field of Electrical Engineering.

We must convey our heartfelt thanks to the teachers and students of the department for their contribution and continuous support for making this effort a success. Special credit goes to our beloved student Arkajit Fouzder & Abhijit Das, 2nd Year , EE for designing the newsletter.

Special thanks to Our HOD (J .B. Basu), Mentor (D.Bhattacharya) & Co-ordinator (M.R. Chakraborty), Subhajit Roy, S Banerjee for encouraging us for coming up with this Newsletter.

We hope the issue is going to be very informative and interesting to the readers. We also expect that it will be able to enrich the readers by sharing facts and developments in Science and Technology in coming days also.

For continuous development constructive criticism plays a pivotal role. So any suggestions for betterment towards this will be highly appreciated. Please send suggestions and comments to newsletter.ee.sit@gmail.com .

Mrs. Shrabani Pal, Asst. Prof, EE Dept

Mrs. Mousumi Basu Das Asst.Prof., EE Dept.

Assistant Professor, EE

Assistant Professor, EE

Seminar Organized

1) "INDUSTRIAL MANUFACTURING, INSTALLATION, MARKETTING AND AFTER SALES, OVERALL INDUSTRIAL RESPONSIBILITY" ON 6TH April, 2015 ...by Mr. P.K. Mazumder, MD, DEUTSCHE MACHINEN, INDIA .PRIVATE LTD.

2) Recent Trends of Power Generation & Power System in India" and "Some Fundamental Aspects of Electrical Engineering" ON 27th July, 2015 ..by Dr. S. K. Bhattacharya (Dean, NSEC).

3)Economic Development & Energy Demand" on05th Aug, 2015 by Prof. H. Bhaumik, Ex Principal SIT & empanelled expert AICTE .

Industrial visit

Indian Oil Corporation Ltd, Bhaktinagar, NJP, Siliguri, for B.Tech, 2nd year students on 9th sept 2015.

Training conducted by Knowledge Lab for EE Dept

1)Application of PLC in Automation field from 28th Jan to 4th Feb, 2015.

2))Industrial Electrical Application from 28th Jan to 4th Feb, 2015

3)Industrial Control & automation using PLC & SCADA from 6th June to 16th June.

Days Celebrated

1) Farewell of 2011-2015 Batch, 21st , May 2015.

2) Fresher's Welcome for 2015-2019 Batch (Vitajte 1.0), 29th Aug 2015.

3) Teachers Day, 04th Sept., 2015

4) Engineers Day on 15th Sept., 2015

What will happen to life on Earth when our solar system dies

Formation of energy of Sun

Energy from the Sun is very important to the Earth. The Sun warms our planet, heating the surface, the oceans and the atmosphere. This energy to the atmosphere is one of the primary drivers of our weather. Our climate is also strongly affected by the amount of solar radiation received at Earth.

Just as the Solar System (including our planet) relies on the Sun as its source of energy, so does the fate of our Solar System hinge on the Sun's survival.

The Sun is right now a middle-aged star. It has existed for about 5 billion years, and will go on shining, pretty much unchanged, for about another **5 billion more**. At that time, it will go through major changes that will bring an end to the Solar System as we know it. To understand these changes, we must first understand where the Sun's energy comes from. At the core of the sun, gravitational attraction produces immense pressure and temperature, which can reach more than 27 million degrees F (15 million degrees C). Hydrogen atoms get compressed and fuse together, creating helium. This process is called nuclear fusion.

Nuclear fusion produces huge amounts of energy. The energy radiates outward to the sun's surface, atmosphere and beyond. From the **core**, energy moves to the radiative zone, where it bounces around for up to 1 million years before moving up to the convective zone, the upper layer of the sun's interior. The temperature here drops below 3.5 million degrees F (2 million degrees C). Large bubbles of hot plasma form a soup of ionized atoms and move upwards to the **potohsphere.**

The temperature in the **photosphere** is about 10,000 degrees F (5,500 degrees C). It is here that the sun's radiation is detected as **sunlight**. Sunspots on the photosphere are cooler and darker than the surrounding area. At the center of big sunspots the temperature can be as low as 7,300 degrees F (4,000 degrees C).

The **chromosphere**, the next layer of the sun's atmosphere is a bit cooler — about 7,800 degrees F (4,320 degrees C). Visible light from the chromosphere is usually too weak to be seen against the brighter photosphere, but during total solar eclipses, when the moon covers the photosphere, the chromosphere can be seen as a red rim around the sun.

Temperatures rise dramatically in the **corona,** which can also only be seen during an eclipse as plasma streams outward like points on a crown. The corona can get about 3.5 million degrees F (2 million degrees C). As the corona cools, losing heat and radiation, matter is blown off as the solar wind.

Power Of Nuclear Fusion

Like all stars, the Sun is made mostly of hydrogen. Because the Sun is so large and its gravity is so strong, the hydrogen atoms near the center of the Sun - at its core - are under extreme pressure, and are squeezed very close together. Sometimes, four of these atoms are squeezed so tightly together that they collide with enough force to stick together permanently, forming a new, larger, and more complex atom: helium. This process is called **nuclear fusion**, and when it happens, a small amount of energy is released in the form of heat and light. Due to the massive size of the sun, those small amounts of energy add up to an enormous amount Approximately 3.6×10^{38} protons (hydrogen nuclei) are converted into helium nuclei every second releasing energy at a rate of 3.86×10^{26} joules per second.

The core produces almost all of the Sun's heat via fusion: the rest of the star is heated by the outward transfer of heat from the core. The energy produced by fusion in the core, except a small part carried out by neutrinos, must travel through many successive layers to the solar photosphere before it escapes into space as sunlight or kinetic energy of particles.

The energy production per unit time (power) of fusion in the core varies with distance from the solar center. At the center of the Sun, fusion power is estimated by models to be about 276.5 watts/m^3.

Eventually, the Sun will burn all of the hydrogen in its core, and the fusion will stop. Once this happens, the core will shrink under its own gravity, until it becomes so dense that the helium atoms will begin to collide to form carbon (from three helium atoms) and oxygen (from four helium atoms). These collisions produce much more energy than the hydrogen fusion that powers the Sun today.

The extra energy will cause big changes in the Sun. The core will become much hotter, causing the Sun to swell to over one hundred times its present size, swallowing up the planets Mercury and Venus. Even though the core will be hotter, the surface will be cooler than it is today, changing in color from yellow to red. A star at this stage is called a **red giant**. Like a runaway

hot air balloon, the Sun's outer layers will reach escape velocity and peel off into space. As the Sun begins losing mass , the planet's orbits will widen because the Sun's gravitational pull will grow weaker. But Mercury and Venus will not get far enough away to avoid being gobbled by the ballooning red giant.

What is about here on Earth? When the Sun expands, the Earth will not be spared. Like Mercury and Venus, Earth will probably be absorbed by the expanding Sun. But even if it is not, it will be no place to live. The oceans will boil, and the atmosphere will be blown away. What is left will be a charred, unable to sustain life.

An unstable ending

Meanwhile, the helium-burning reaction in the Sun will produce **solar wind** much stronger than it is today. As it leaves the Sun's surface, it will carry with it some of the hydrogen in its outermost layers, forming a **planetary nebula**.

As more matter is carried away from the Sun, the solar wind will continue to strengthen. Eventually, it will blow away so much of the Sun's matter that there will no longer be enough pressure at the core to keep the helium fusion going. At that point, what's left of the Sun will contract under its own gravity, becoming a much smaller, very dense star called a **white dwarf**. The white dwarf will radiate off heat that is left over from the earlier nuclear fusion, but it will no longer generate any new energy.

HOUSTON –NASA recently published a frightening report, Sun will wake up very soon and Earth will suffer some deadly consequences including global failure of all satellite communications.

Solar storms will generate a great level of radiation that will affect the Earth's magnetic field.

This could prove to be a collapse for the humanity-trains and planes will stop, GPS- navigation will be affected, mobile and radio networks will disappear leading to the failure of all computers.

According to Scientists, Rings of fire, ready to escape from the surface of the Sun in the near future, are equal to a hundred hydrogen bombs in terms of power. If their destructive power reaches Earth, it will cause great economic losses, like 20 times greater than the damage from the famous Hurricane Katrina.

For information, solar flares are the most powerful of all manifestations of solar activity. The energy of a large solar flare reaches 1032erg, which is about 100 times greater than the thermal energy that could be obtained by burning all known oil and coal reserves on earth.

In 2002, NASA satellite recorded a giant flare on the Sun. It caused the formation of prominence whose diameter is 30 times greater than Earth's. Scientists said that we were lucky,there was no release of energy in the direction of our planet. Otherwise, the emission of such a force would have lead to significant distortions in the magnetic field. In November, 2003 there was another powerful flare that brought down a Japanese communications satellite Kodama.

However there's no need to panic, over the next 5 billion years Sun will burn the last of its hydrogen, bloat up as a red giant and consume Mercury and Venus.

In fact, we have less than a billion years to enjoy the surface of our planet before it becomes inhospitable. Because our Sun… is heating up.

D.Bhattacharya.
Mentor, EE

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Superconductors with High Superconducting Critical Temperature..

Among molecular superconductors, fullerenes are considered to have the highest known superconducting critical temperature (Tc). The international research team successfully demonstrated the molecular electronic structure's guiding influence for controlling superconductivity and also in helping achieve the maximum Tc.

Metals are commonly used for transmission of electricity. However, as they have electrical resistance, energy loss takes place in the form of heat. Superconductors have the ability to carry electricity without any loss of energy as they do not have any electrical resistance. Hence, it would be very fruitful to discover superconductors that have the ability to function at the highest possible temperature.

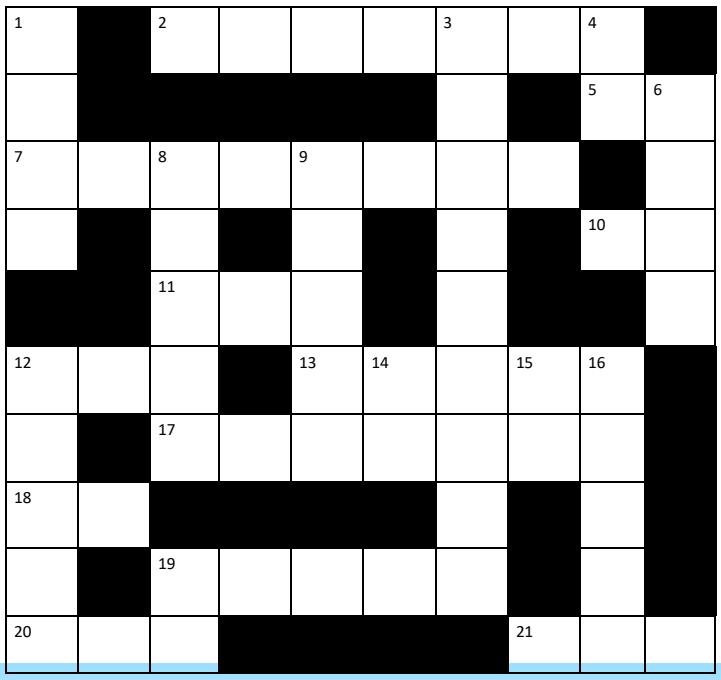
Superconductors usually have a simple structure, and they are built from atoms. However, recently, researchers have discovered some superconductors that are made up of molecules that are arranged in regular solid structure. The electronic ground state was magnetically ordered. This electronic ground state competes with superconductivity. Using external pressure, the C60 molecule arrangement in the solid can be tuned for switching on the zero-resistance superconducting state. The researchers then identified the molecular electronic structure's controlling role. They showed that the parent insulating state was connected to Jahn-Teller distortion of the molecular anions. These produced the magnetism from where the superconductivity comes forth.

In the current study, the researchers analyzed a new family of chemically-pressurized fullerene materials. They studied the relationship that existed between the superconducting pairing mechanism, the normal metallic state above Tc, and the parent insulator in these materials. The new study revealed the Jahn-Teller metal, which is a novel state of matter. It demonstrated that when the balance at the Fermi level between electrons' extended lattice and molecular characteristics was optimized, the highest possible temperature for superconductivity was achieved.

Sohini Dhar

2015 Graduate, EE Dept.

Amount of Current	Effect on a Human
1 to 4 milliamps	Can just be felt
5 to 9 milliamps	Increasing pain
10 to 20 milliamps	Cannot let go
21 to 50 milliamps	Severe pain, muscular contractions
Above 50 milliamps	May be fatal, destruction of tissue (burning), stop breathing



CROSS WORDS

UP-DOWN

1. Electron resides on this in case of AC current through conductor
3. This property of the resistor makes it different from a Transistor.
4. Thomas Edison developed electric power transmission in this format.
6. For an isolating transformer this thing is same in both windings.
8. It's an equipotential surface.
9. This German born mathematician formulated famous laws in electrostatics.
12. You don't want this to happen ; An abnormal phenomenon.
14. The first electricity system supplying incandescent lights was built in this country.
15. It's a chemical Element
16. It's the first electronic computer.
19. NTPC built its first Thermal power plant in this state.

ACROSS

2. If supply frequency is halved in a pure inductive circuit then current will be.
5. Measuring device for very high current
7. Heart of your car
10. Its true if one of you are true as well as all of you are true.
11. It's the unit which senses the information and sends the same to SCADA master system.
12. Name these unipolar transistors.
13. Thor's hammer can eventually bring these to electrical systems.
18. Type of radiation/light having wavelength < 400 nm.
19 For pure resistive circuit PF becomes.
20 For increased choice these are done on the outer (or hv) side of transformer
21. It's a 3 junction, 3 terminal device.

Solution of CROSS WORD will be publish in the next Issue

Behind the Technological

The metaphor for Internet – **CLOUD COMPUTING** has proved itself, to be a sound system of latest technological explosions, with a marketing of $100 billion a year, exploring the use of internet, instead of storing and accessing data using the hard drive.

We have **3D_PRINTED CARS**, just like the FATMAN explosion. A 2K15 discovery, from the Micro-industries which is expected to hit the roads next year, with a low-speed battery car, priced between $18,000 and $30, 000.

"**At local motors, we are hell bent on revolutionisin manufacturing." said John.B.Rogers,C.E.O, LOCAL MOTORS.**

OLA-CABS and UBER-Apps, found in every ANDROID OS, is based on latest technology of **GLONASS**. Vehicle tracking has been accomplished by installing a box into the vehicle, self-powered with a battery, which is **undoubtedly the predominant method of vehicle locating and tracking**.

" The fastest motor in the world " as discovered by Sir James, the first ever domestic appliance to incorporate a so-called digital switched reluctance motor with 104,000 revolutions-per-minute, turns ten times as fast as the commercial-aircrafts, five times as fast as the Formula1 engine.

Next, we have the "**WALKING HOUSE**," where 'home takes a whole new meaning' consisting of a basic module measuring 3.5 metres high by 3.5 metres wide and 3.72 metres long, the Walking House can cover a decidedly leisurely 60 metres an hour, on its six insect like legs, suggesting anyone feeling stressed could take the house for a walk.

Wouldn't you love a dollar for every time you heard the phrase 'paperless office' ? The answer is given. Yes, **PrePeat Rewritable Printer**, which uses rewritable plastic sheets made from PET Plastic. These sheets can be erased and reprinted about thousand times per sheet, designed by a Japanese company, **SANWA NEWTEC**, allowing you to reuse paper.

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Artificial Bee Colony (ABC)....

Arup Das, Asst. Prof., EE

The Artificial Bee Colony (ABC) algorithm is a swarm based meta-heuristic algorithm that was introduced by Karaboga in 2005 (for optimizing numerical problems. It was inspired by the intelligent foraging behavior of honey bees. It is the advanced process of Particle Swarm Optimization(PSO). The algorithm is specifically based on the model proposed by Tereshko and Loengarov (2005) for the foraging behaviour of honey bee colonies. The model consists of three essential components: employed and unemployed foraging bees, and food sources. The first two components, employed and unemployed foraging bees, search for rich food sources, which is the third component, close to their hive. The model also defines two leading modes of behavior which are necessary for self-organizing and collective intelligence: recruitment of foragers to rich food sources resulting in positive feedback and abandonment of poor sources by foragers causing negative feedback.

In ABC, a colony of artificial forager bees (agents) search for rich artificial food sources (good solutions for a given problem). To apply ABC, the considered optimization problem is first converted to the problem of finding the best parameter vector which minimizes an objective function. Then, the artificial bees randomly discover a population of initial solution vectors and then iteratively improve them by employing the strategies: moving towards better solutions by means of a neighbor search mechanism while abandoning poor solutions.

Nowadays In Electrical Engineering research field to solve complex problems ABC technique widely used. ABC is the most advanced process by which we get fewer errors in less computation time. Other computation process are also used in research field namely Honey Bee Colony process, Ant Colony Process, Bird Flocking Process, Fish Schooling Process, Gen String Process, Cell Mass System.

ENERGY STORAGE IN A SMART GRID

A smart grid is an electricity network that uses digital and other advanced technologies to monitor and manage the transfer of electricity from all generation sources to meet the varying electricity demands of end-users. Smart grids co-ordinate the needs and capabilities of all generators, grid operators, end-users and electricity market stakeholders to operate all parts of the system as efficiently as possible, minimising costs and environmental impacts while maximising system reliability, resilience and stability.[1]

Till about a few years ago, we thought that electricity cannot be stored and needs to be consumed as and when it is generated. Times are changing; today electricity can be stored in megawatt scale thanks to developments made in storage technologies and solutions. These electricity energy storage (EES) applications are increasingly becoming viable around the world. EES is expected to solve problems – such as excessive power fluctuation and undependable power supply – which are associated with the use of large amounts of renewable energy. [2]

Electrical Energy Storage (EES): -

EES is one of the key technologies in the areas covered by the IEC. EES techniques have shown unique capabilities in coping with some critical characteristics of electricity, for example hourly variations in demand and price.

EES has played three main roles. First, EES reduces electricity costs by storing electricity obtained at off-peak times when its price is lower, for use at peak times instead of electricity bought then at higher prices. Secondly, in order to improve the reliability of the power supply, EES systems support users when power network failures occur due to natural disasters. Their third role is to maintain and improve power quality, frequency and voltage.

Energy storage technologies encompass a large set of diverse technologies. They are broadly classified into mechanical, electrochemical, chemical, electrical and thermal energy storage systems as shown in the figure below. [3]

Electrical energy systems (EES) scenarios in India: -

India has aggressive targets for shifting to renewable energy, which at present is unscheduled, and stresses the energy systems. One of the important means to meet these challenges is use of energy storage technologies. With launch of Smart Grids and Electric Vehicles missions, and new programs for on-site solar energy and rural micro-grids, energy storage has become a crucial component of energy strategy for India. [4]

REFERENCES:-
[1]http://electrical-engineering-portal.com
[2] http://indiasmartgrid.org
[3]www.iec.ch/whitepaper/pdf/iecWP-energystorage-LR-en.pdf
[4]ttp://.indiaenvironmentportal.org.in/files/file/ISGF_IES%202047%20Documentation.pdf

… Ranjan Kumar, 2014 Graduate, EE

SMART POWER MANAGEMENT

Consistent high growth of the Indian economy and the development of smart cities have resulted in surging energy demand. Since independence, the Indian power system has grown from 1362 MW to 250 GW.Far-reaching goals of the modern Indian power system can be achieved by deployment of smart grids and smart cities. The hurdles for smart cities include stable, secure and affordable energy supply, while incorporating renewable and sustainable energy sources. The demand for renewable energy increases every day. **Ministry of New and renewable energy has plans to add capacity of 30000 MW in the 12th five year plan (2012-17).**For setting up smart cities, it is crucial to evaluate energy consumption relevance of social sectors, the scarcity of materials, population growth and ageing, etc. . Further, it is required to have the right energy policy infrastructure: smartgrids, multifunctional and flexible building networks and energy performanceanalyses. Therefore, a comprehensive integration of ICT is required in buildings,homes, smart power grids,hospitals,schools, etc. Through tech driven transparency and e-governance initiatives we can bring excellence and smartness in public services. Smart homes form an integral part of smart cities and when connected to cities public infrastructure, can bring out energy efficiency. Smart homes with rooftop solar panels and two-way energy meters form a core part of thisexercise. All this will come at a cost and people living in smart cities need to be more compliant for the city's community to derive the maximum benefits…

……..*Pranay Sengupta, 7th Sem,EE*

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India's Power Sector – the path it travelled……

J.B.Basu, HOD, EE

India is the world's fourth largest economy as well as the fourth largest energy consumer. As on August 2015 India's Generation Capacity is 2,75,912 MW with a per capita consumption touching 1000 kWh mark. With 1.2 billion people, India desperately needs energy to fuel its economic growth. Still 35.5% of the population live without access to electricity. India need to have an allout effort so that its energy demand can be met in the coming decade. Following tables indicates how the energy sector has grew post independence.

Energy generation

Financial Year	Generation Capacity (MW)	Length of T&D Lines (Ckt. kms.)	Per Capita Consumtion (kWh)
1947	1362	23238	16.3
1950	1713	29271	18.2
1956	2886	85427	30.9
1961	4653	157887	45.9
1966	9027	541704	73.9
1969	12957	886301	97.9
1974	16664	1546097	126.2
1979	26680	2145919	171.6
1985	42585	3211956	228.7
1990	63636	4407501	329.2
1997	85795	5141413	464.6
2002	105046	6030148	559.2
2007	132329	6939894	671.9
2012	199877	8726092	883.6
2014	245259	9534584	957.0
March 2015	271722	10558177	1010

Energy Consumption

Financial Year	Total Consumption (GWh)	Consumtion Across Different Sectors (% of Total Consumption)					
		Domestic	Commercial	Industrial	Traction	Agri	Misc.
1947	4182	10.11	4.26	70.78	6.62	2.99	5.24
1950	5610	9.36	5.51	72.32	5.49	2.89	4.44
1956	10150	9.20	5.38	74.03	3.99	3.11	4.29
1961	16804	8.88	5.05	74.67	2.70	4.96	3.75
1966	30455	7.73	5.42	74.19	3.47	6.21	2.97
1969	41392	7.69	5.14	72.31	3.01	8.37	3.48
1974	55557	8.36	5.38	68.02	2.76	11.36	4.13
1979	84005	9.02	5.15	64.81	2.60	14.32	4.10
1985	124569	12.45	5.57	59.02	2.31	16.83	3.83
1990	195098	15.16	4.89	51.45	2.09	22.58	3.83
1997	315294	17.53	5.56	44.17	2.09	26.65	4.01
2002	374670	21.27	6.44	42.57	2.16	21.80	5.75
2007	525672	21.12	7.65	45.89	2.05	18.84	4.45
2012	785194	21.79	8.33	44.87	1.81	17.95	5.25
2014	881562	22.95	8.80	43.17	1.75	18.19	5.14
March 2015	938823	23.53	8.77	42.10	1.79	18.45	5.37

Indian power sector is undergoing a significant change. For a sustainable economic growth a continuous power demand will be there in India. Government's focus on attaining "Power For All" has increased demand for capacity addition in the country. At the same time, a competitiveness is increasing on both market side as well as supply side. Key focus will be to increase usage of renewable energy sources for power generation in the coming future.

2011-2015 Graduate Batch

Editorial Team

Congratulations

Top performers' of Electrical Engineering Department

Sohini Dhar (2011-2015 batch)

Nikita Shreya (2012-2016 batch)

Soumalya hom Roy (2013-2017 batch)

Sanjoy Karmakar & Satarupa Mukherjee (2014-2018 batch)

Heartiest Congratulations to all the students EE Department that who have qualified in GATE, CAT, MAT..etc

Hurray!!!!

Intra College Basket Ball - Student Boys – (Runner)

Intra college Volley Ball - Student Boys & Faculty/Staff (Runner)

Congratulations

Mr. Freshers .. Sidharath Rai

Ms. Freshers.. Ankita Chakraborty