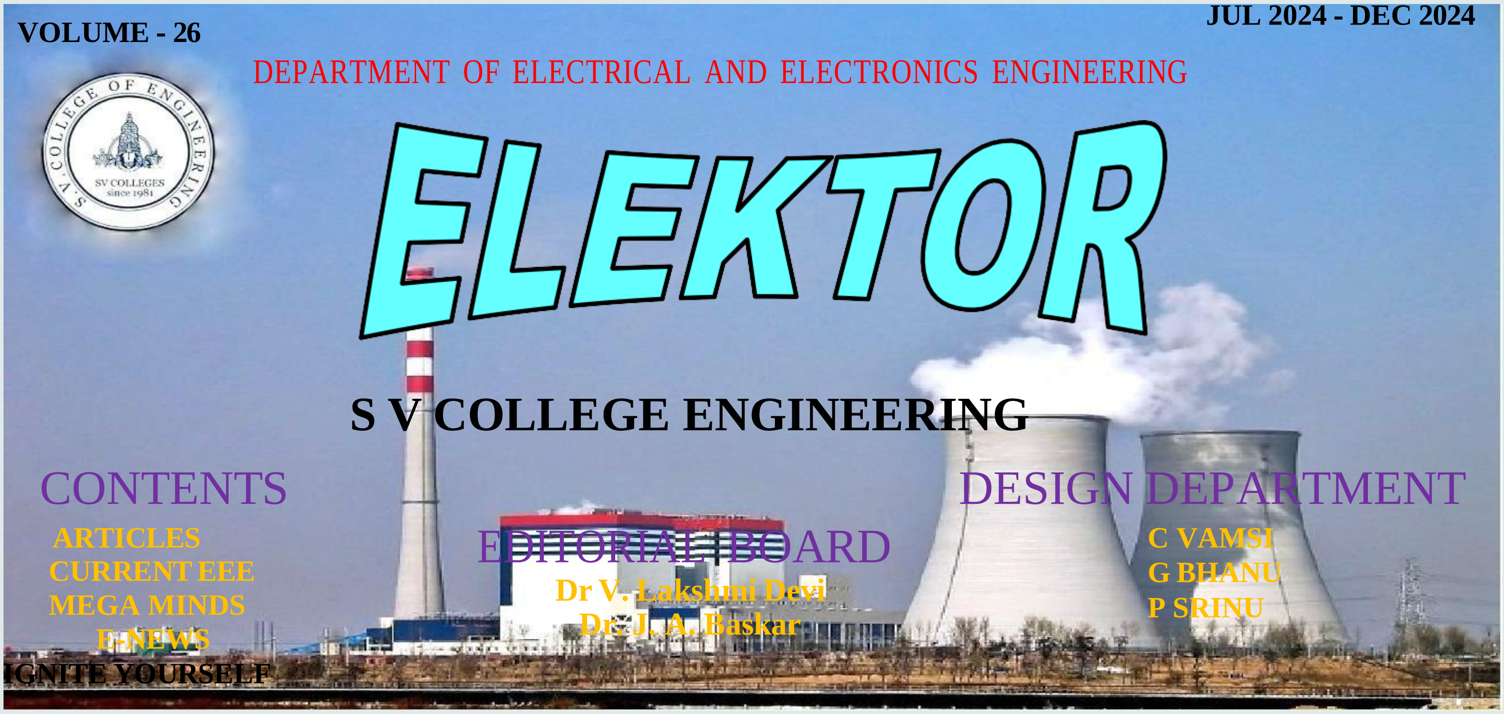

Vision of the Department

To prepare the learners globally competent, dynamic and multi talented young leaders with skill set & knowledge in Electrical and Electronics Engineering field with a focus on higher education, professional practice, research and technical consultancy competence ethical con- cern.

Mission of the Department

- To prepare the learners professionally deft and intellectually adept in the field of Electrical and Electronics Engineering with an excellent infrastructure, core values and qualified & experienced teaching faculty.
- To inculcate skill, knowledge and behavior to cater the dynamic requirements in the field of Electrical and Electronics Engineering.
- To motivate and prepare the learners for career guidance, placements and higher education with a focus on MoUs with premier institutes and industries.

About the Department

The Electrical & Electronics Engineering department was started with UG programme in 2007 with an intake of 60. The department has well talented, qualified, experienced & dynam- ic faculty along with skilled technical supporting staff who spearhead the process of achieving the vision of the department. The department has well equipped labs & infrastructure. It is continuously striving to impart quality education and competitive spirit among students for academic excellence.

Strengths of the Department

1. In every semester Department of EEE conducts minimum of two workshops and there guest lecturers in the recent trends in Electrical Engineering to bridge the gap between Aca- demics & Industries, and the students will be guided to do their Major & Minor projects on the same topics.
2. Every faculty member of the department attends a minimum of one faculty development program in every academic year. And most of the faculty members register for NPTEL online courses.
3. Department publishes a newsletter in every six months, which includes the activities that were done in the past two months; fortnight wall magazines based on recent advancements in the field of electrical engineering prepared by students

Message from Principal

I am delighted to convey my best wishes to the Department of Electrical and Electronics Engineering on the release of its technical magazine. This initiative is a commendable platform that encourages students and faculty to express their ideas, research, and innovations in the ever-evolving field of electrical and electronics engineering.

The EEE department has consistently demonstrated excellence in academics, research, and co-curricular activities. This magazine is a testament to the department's commitment to nurturing creativity, technical knowledge, and analytical thinking among students. It reflects the hard work, vision, and dedication of the entire team.

I congratulate the editorial board, faculty, and all the contributors for their efforts in making this publication a success. I am confident that this magazine will not only inform and inspire but also motivate readers to push the boundaries of learning and innovation.

Wishing the EEE department continued growth, success, and recognition in all its future endeavours.

With warm regards,

Dr. N. Sudhakar Reddy, Principal

Message from HOD

It brings me great joy to see your enthusiasm and talent reflected in the pages of this technical magazine. As your Head of Department, I take pride in watching you grow—not just as engineers, but as thinkers, innovators, and problem-solvers.

This magazine is a true representation of your dedication to learning beyond textbooks. The articles, projects, and ideas showcased here prove that the future of engineering is in capable hands.

Always remember: learning is a lifelong journey. Keep asking questions, keep building, and never be afraid to fail-that's where true innovation begins.

I congratulate all contributors, the editorial team, and the faculty mentors. Keep up the great work!

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Happy Reading.

Dr. V. Lakshmi Devi, HOD, Dept. of EEE

Message from Faculty Advisor

It gives us great pleasure to bring the technical magazine Blaze, the department magazine of EEE. The name and fame of an institute depends on the caliber and achievements of the students and teachers. The role of a teacher is to be a facilitator in nurturing the skills and talents of students. We would like to place on record our gratitude and heartfelt thanks to all those who have contributed to make this effort a success. We truly hope that the pages that follow will make an interesting read.

Dr. J. A . Baskar, EEE

ARTIFICIAL LEAVES THAT GENERATE CLEAN ENERGY

Inspired by photosynthesis, researchers have created **artificial leaves** that use sunlight to convert water and carbon dioxide into **hydrogen fuel**. These ultra-thin, flexible leaves float on water and mimic natural leaf structures to harvest solar energy. Ideal for remote or off-grid areas, they offer a portable and sustainable way to produce energy with zero emissions.

Scientists have developed artificial leaves that mimic photosynthesis to produce clean energy. These synthetic leaves use sunlight to convert carbon dioxide and water into hydrogen fuel, which can be stored and used later. The leaves consist of lightweight materials like perovskite and cobalt catalysts that float on water and absorb solar energy with high efficiency.

Researchers believe this technology could be deployed in lakes and ponds, especially in rural areas where conventional solar panels are impractical. One square meter of these leaves can generate up to 250 milliliters of hydrogen per hour, which could be stored in fuel cells to power electronics or even homes in the future.

TIDAL POWER PLANTS: HARNESSING THE OCEAN'S MOVEMENT

Tidal energy plants work by placing turbines underwater where rising and falling tides generate rotational energy. Unlike solar or wind, **tidal energy is predictable** and consistent. New floating turbine designs allow for flexible deployment in rivers and estuaries, potentially transforming coastal regions into **clean power hubs**. lights.

Tidal energy systems capture the kinetic energy of ocean tides and convert it into electricity using underwater turbines. Unlike solar or wind energy, tidal power is highly predictable, making it ideal for stable electricity supply. New designs involve floating tidal platforms that anchor to the sea floor, allowing easier installation and maintenance. For example, the MeyGen project in Scotland is one of the world's largest tidal energy facilities and produces up to 398 megawatts of clean energy. These systems can function in estuaries and coastal areas and have minimal impact on marine life when equipped with slow-moving, fish-friendly turbines.

SOLAR-POWERED ELECTRIC VEHICLES:

Startups are developing electric cars with **solar panels integrated into their body**. These vehicles can charge while parked or driving in daylight, extending range and reducing dependency on charging stations. Models like Aptera and Lightyear One can travel over 700 km on a single charge thanks to solar boosts.

Automakers and startups are developing electric vehicles (EVs) with integrated solar panels to extend range and reduce dependency on charging stations. Cars like the Lightyear 0 and Aptera utilize lightweight materials and aerodynamic designs to maximize solar intake. On a sunny day, these vehicles can gain up to 70 km of additional range, enough for daily city driving without plugging in. Solar panels are usually embedded in the roof, hood, and trunk. Combined with regenerative braking and advanced battery systems, these vehicles represent a significant step toward net-zero transportation.

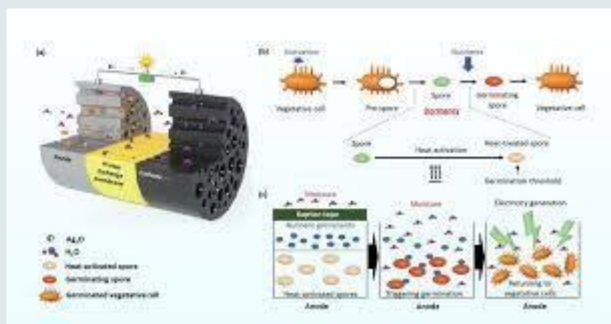
BUILDINGS WITH ENERGY-STORING WALLS

Scientists are creating **bricks and concrete blocks** that double as **batteries**. These materials use carbon nanofibers and special gels to store electricity generated from solar panels on rooftops. Such **energy-storing walls** can power lighting and small appliances, turning buildings into standalone energy systems. -

Engineers have created bricks and concrete panels capable of storing and discharging electricity. These smart building materials incorporate carbon nanotubes or conductive polymers, enabling them to function like supercapacitors. A house built with such materials could store energy generated from rooftop solar panels and use it during peak hours. This integration reduces the need for bulky batteries and enhances energy independence. The technology is still in the experimental phase, but pilot projects have shown that one standard wall can power LED lighting for up to 6 hours.

.MICROBIOLOGICA BATTERIES USING BACTERIA

Bioengineers have found that certain bacteria can generate electricity as they digest waste. These **microbial fuel cells** can be used in water treatment plants to clean water and generate electricity simultaneously. It's a sustainable way to produce energy while solving waste management issues.



Microbial fuel cells (MFCs) generate electricity using bacteria that feed on organic matter. These systems are particularly promising for wastewater treatment plants, where the microbes break down sewage while producing energy. MFCs can also be used in small-scale remote sensors and marine buoys. The bacteria transfer electrons to electrodes during digestion, creating a flow of current. While the power output is currently low, ongoing research aims to improve efficiency and scalability. In these systems, bacteria break down organic matter—such as wastewater, food waste, or agricultural byproducts—and release electrons as a part of their respiration process. These electrons are captured at the anode, flow through an external circuit, and reach the cathode, thus producing an electric current. The bacteria essentially act as tiny bio-generators.

A.MOUNISHA(22BFA02009

CYBERSECURITY MEASURES FOR SMART GRIDS

Abstract:

As smart grids become more interconnected, they are vulnerable to cyberattacks. Measures include encrypted communication protocols, intrusion detection systems, and machine-learning-based anomaly detection. Ensuring secure firmware updates and network

Smart Stick-on Sensors for the Smart Grid

Abstract:

Rapid increase in electric power demand, in- troduction of RPS mandates, and a push to- wards electrification in the transportation sec- tor is expected to increase power system stresses and disturbances. To tackle these power system issues and maintain high system reliability, it is essential to have information about the condition of assets present on the grid. Presently, due to the absence of low cost flexible grid wide monitoring

solutions, com- plete information of the system is not achieva- ble. This paper deals with the development of a new class of sensors called the smart ―stick- on‖ sensors. These are low cost, self-powered, universal sensors that provide a flexible moni- toring solution for grid assets. These sensors can be mass deployed due to low cost, need low maintenance as they are self-powered, and can be used for monitoring a variety of grid assets. This paper also presents the

segmentation is critical for grid integrity.

details on the network architecture, interoperability and integration, and different design aspects of the stick-on sensor, such as novel energy harvesting techniques, power management, wide operating range, and reliability. It is en- visioned that the smart stick-on sensors shall be an enabling technology for monitoring a variety of grid assets and prove to be an es- sential element of the Smart Grid.

ELECTRICAL SAFETY ENHANCEMENTS USING ARC FAULT CIRCUIT NTERRUPTERS (AFCIs)

Abstract:

AFCIs detect and mitigate arc faults caused by damaged wires or poor connections. They disconnect the circuit before overheating or fire hazards occur. Modern AFCIs are integrated with smart home systems and provide diagnostic data for maintenance teams. AFCIs are advanced circuit breakers designed to detect dangerous **arc faults**—unintended electrical discharges caused by damaged wires, loose connections, or deteriorating insulation. These arcs can generate intense heat and are a leading cause of electrical fires. Unlike standard circuit breakers, which only respond to overloads and short circuits, AFCIs continuously monitor the electrical current and distinguish between normal and hazardous arcing patterns. When a harmful arc is detected, the AFCI quickly shuts off the circuit, preventing fire before it can start. Their integration into modern electrical systems enhances overall safety, especially in areas with high fire risks such as bedrooms, living rooms, and old wiring installations.

ULTRAFAST ELECTRIC VEHICLE CHARGERS WITH SILICON CARBIDE TECHNOLOGY

Abstract:

Silicon carbide (SiC) semiconductors enable compact and high-efficiency fast chargers for electric vehicles (EVs). These chargers operate at higher voltages (800V+) and reduce thermal losses. SiC-based inverters improve power conversion and reduce charging time by 50%. Integration with smart grids and renewable sources ensures sustainable mobility infrastructure. These chargers operate at higher frequencies and with greater power density, making them more compact and energy-efficient. SiC-based chargers also produce less heat, resulting in improved thermal management and longer component lifespan. This technology is especially important for high-power DC fast charging stations, which are essential for the widespread adoption of EVs by addressing range anxiety and charging convenience. As the EV market grows, ultrafast chargers with silicon carbide technology are playing a key role in building the next generation of sustainable and scalable electric mobility infrastructure. When used in EV chargers, SiC components enable **ultrafast charging**, reducing the time needed to charge an EV battery from hours to just minutes

FLEXIBLE SOLAR CELLS FOR WEARABLE AND PORTABLE ELECTRONICS

Abstract:

Flexible solar panels use organic photovoltaic (OPV) materials or perovskites to generate electricity on bendable surfaces. These lightweight cells can be integrated into clothing, backpacks, or drones. Research focuses on improving efficiency and durability while enabling mass production using roll-to-roll techniques. Applications span outdoor gear, military, and IoT wearables.

Photovoltaic devices have become ideal alternatives to common energy sources due to their excellent mechanical robustness and high power conversion efficiency, which can meet the human requirements for green, inexpensive and portable electricity sources. Moreover, due to the rapid development of wearable devices, telecommunication, transportation, advanced sensors, *etc.*, the need for green and accessible power sources for these state-of-the-art devices accompanied with appropriate mechanical stability has become a new challenge. In this regard, flexible–wearable photovoltaic platforms can be easily adapted to any device/substrate and can supply diverse electronic devices with their required energy *via* harvesting energy from sunlight. Similarly, photovoltaic platforms can be integrated into hybrid platforms and can be used in diverse applications. Herein, we summarize the recent approaches to developing flexible–wearable solar cells as energy sources for supplying self-powered wearable devices. In this regard, first, recent advances in transparent flexible electrodes and their diversities are reported; then, recently developed flexible solar cells and important factors for designing these platforms are summarized. Further, flexible solar cells are categorized into five different sections (*i.e.*, perovskite, dye-sensitized, organic, fiber-shaped and textile solar cells) and their mechanisms, working principles and design criteria along with their recent advances have been discussed. Finally, novel applications of wearable sensors/devices are summarized and reported to highlight the functionality of these practical platforms.

I AKASH (22BFA02048)

Mega Minds

Heinrich Hertz (1857–1894):

He was the first to prove the existence of **electromagnetic waves**, confirming Maxwell's theories. The unit of frequency, **hertz (Hz)**, honors his contributions to radio waves and modern communication. While studying at the Gelehrtenschule des Johanneums in Hamburg, Hertz showed an aptitude for sciences as well as languages, learning Arabic. He studied sciences and engineering in the German cities

Alessandro Volta (1745-1827) :

Alessandro Volta was a physicist, chemist and a pio- neer of electrical science. He is most famous for his invention of the first electric battery, which people then called the "voltaic pile" in 1800. Using his invention, sci- entists were able to produce steady flows of electric current for the first time. In 1778 – Volta discovered that the *electrical potential* (we now often call this the *voltage*) in a capacitor is directly proportional to electrical charge. In 1794 –potential would be called the *volt* to recognize Volta's great contributions to electrical science.

Alessandro Volta (1745-1827)

C. V. Raman (1888-1970)

One of the most prominent Indian scientists in histo- ry, C.V. Raman was the first Indian person to win the Nobel Prize in science for his il-lustrious 1930 discovery, now commonly known as the "Raman Effect". It is immensely surprising that Raman used equipment worth merely Rs.200 to make this discovery. The Raman Effect is now examined with the help of equipment worth almost millions of rupees. The

„ Raman Effect" is considered very significant in ana- lyzing the molecular structure of chemical com- pounds. After a decade of its discovery, the structure of about 2000 compounds had been studied. Thanks to the invention of the laser, the „Raman Effect" has proved to be a very useful tool for scientists. The **Raman Effect**—his discovery of the inelastic scattering of light by molecules—relates to how electromagnetic waves (which include visible light) interact with matter. This understanding is foundational in optics, spectroscopy, and photonics, areas closely linked to electrical engineering disciplines like communications, sensors, and laser technology.

E.PADMA PRIYA 22BFA02034

E-NEWS

New Fuel Cell Technology Generates Electricity- Bloom Energy

Source: University of California - Santa Barbara **Summary:** The Bloom Energy Server produces clean, reliable, and affordable electricity on-site and generates power 24 hours a day, seven days a week. The system utilizes a unique fuel cell technology, which converts fuel into electricity via an electro-chemical process, without any combustion or harmful, smog-forming particulates. The system is extremely efficient, cutting carbon emissions by almost 30 percent, nearly eliminating nitrogen oxide and sulfur dioxide pollution, and producing electricity using 99.99 percent less water than an average power plant.

Self-Charging Smartwatches Using Body Heat

Source: École Polytechnique Fédérale de Lausanne (EPFL)

Summary: A thermoelectric generator developed by EPFL can convert body heat into power for smartwatches and fitness trackers. This allows **perpetual, battery-free operation**, especially beneficial in remote areas or for military use..

Underwater Wireless Charging for Ocean Sensors

Source: University of Washington

Summary: A new wireless charging method based on magnetic resonance is enabling **submerged sensors** to recharge without cables. This improves the longevity and functionality of ocean monitoring systems and underwater robots used in marine research and oil exploration.

TV as thin as a sheet of paper? Printable flexible electronics just be- came easier with stable electrodes

Source: Georgia Institute of Technology

Summary: Researchers have introduced what appears to be a universal technique to reduce the work function of a conductor. Their use in printable electronics can pave the way for lower cost and more flexible devices. Imagine owning a television with the thickness and weight of a sheet of paper. It will be possible, someday, thanks to the growing indus- try of printed electronics. The process, which al- lows manufacturers to literally print or roll materi- als onto surfaces to produce an electronically func- tional device, is already used in organic solar cells and organic light-emitting diodes (OLEDs) that form the displays of cellphones.

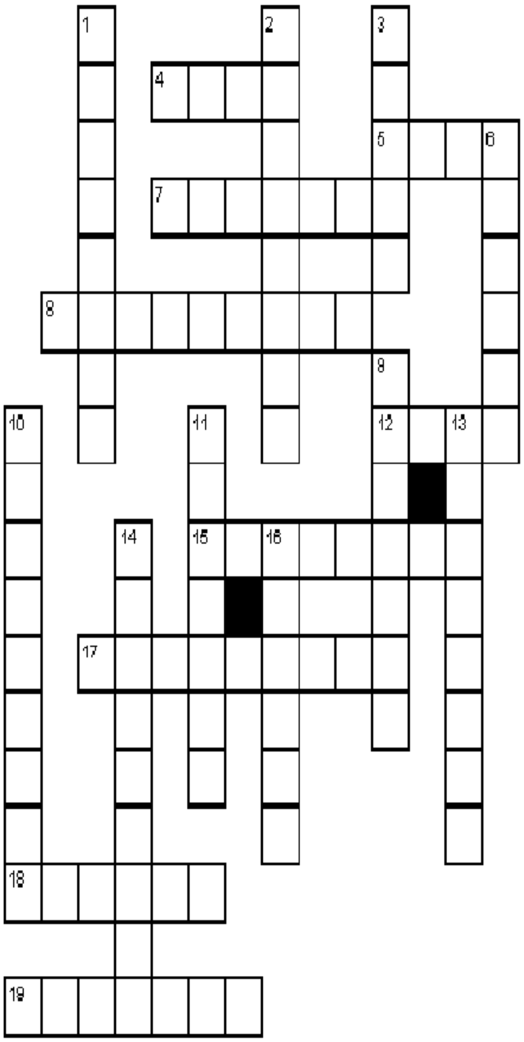
Artificially structured metamaterials may boost wireless power transfer

Source: American Institute of Physics (AIP)

Summary: More than one hundred years after the pioneering inventor Nikola Tesla first became fascinated with wireless energy transfer, the spread of mobile electronic devices has sparked renewed interest in the ability to power up without plugging in. Now research- ers have proposed a way to enhance the efficiency of wireless power transfer systems by incorporating a lens made from a new class of artificial materials .

G.GOWRI 22BFA02034

CROSS WORDS ON CIRCUITS



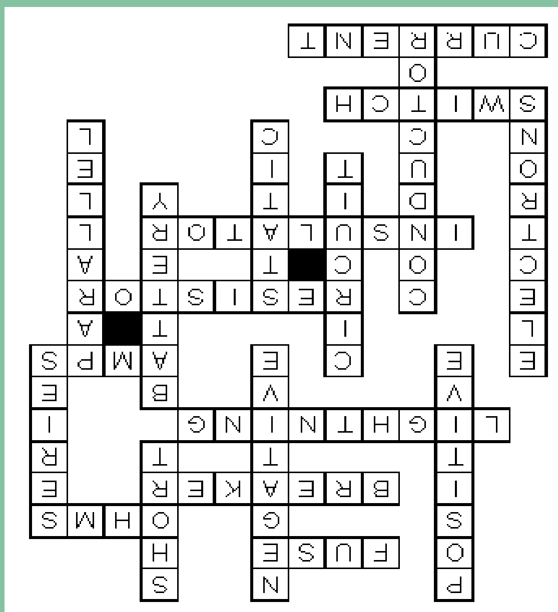
Across:

4. A safety device that break a circuit when too much current is flowing. (4)
5. The unit that resistance is measured in. (4)
7. A switch that open a circuit when too much current is flowing. (7)
8. An electric discharge from the sky to the ground during a storm. (9)
12. The unit that current is measured in (for short). (4)
15. A device that resists the flow of electricity in a circuit. (8)
17. A material that doesn't conduct electricity well. (9)
18. A device that will open or close a circuit. (6)
19. The flow of electrons through a material is called electric ___________. (7)

Down

1. The charge on a proton. (8)
2. The charge on an electron. (8)
3. A type of circuit where current by passes most resistance and large, dangerous currents flow (5)
6. A circuit with only one path through which electrons flow. (6)
9. A voltage supply used in flashlights and many toys. (7)
10. Electricity is the movement of ___________ through a conductor. (9)
11. A path through which electric current flows. (7)
13. A circuit with more than one path through which electrons can flow. (8)
14. A material that conducts electricity will. (9)
16. Kind of electricity resulting from a build up of charged particles. (6)

Why Human body feel Electric shock ?? and in an Electric train during running , We didnt feel any Shock ? Why



G.UDAY KIRAN
22BFA02034