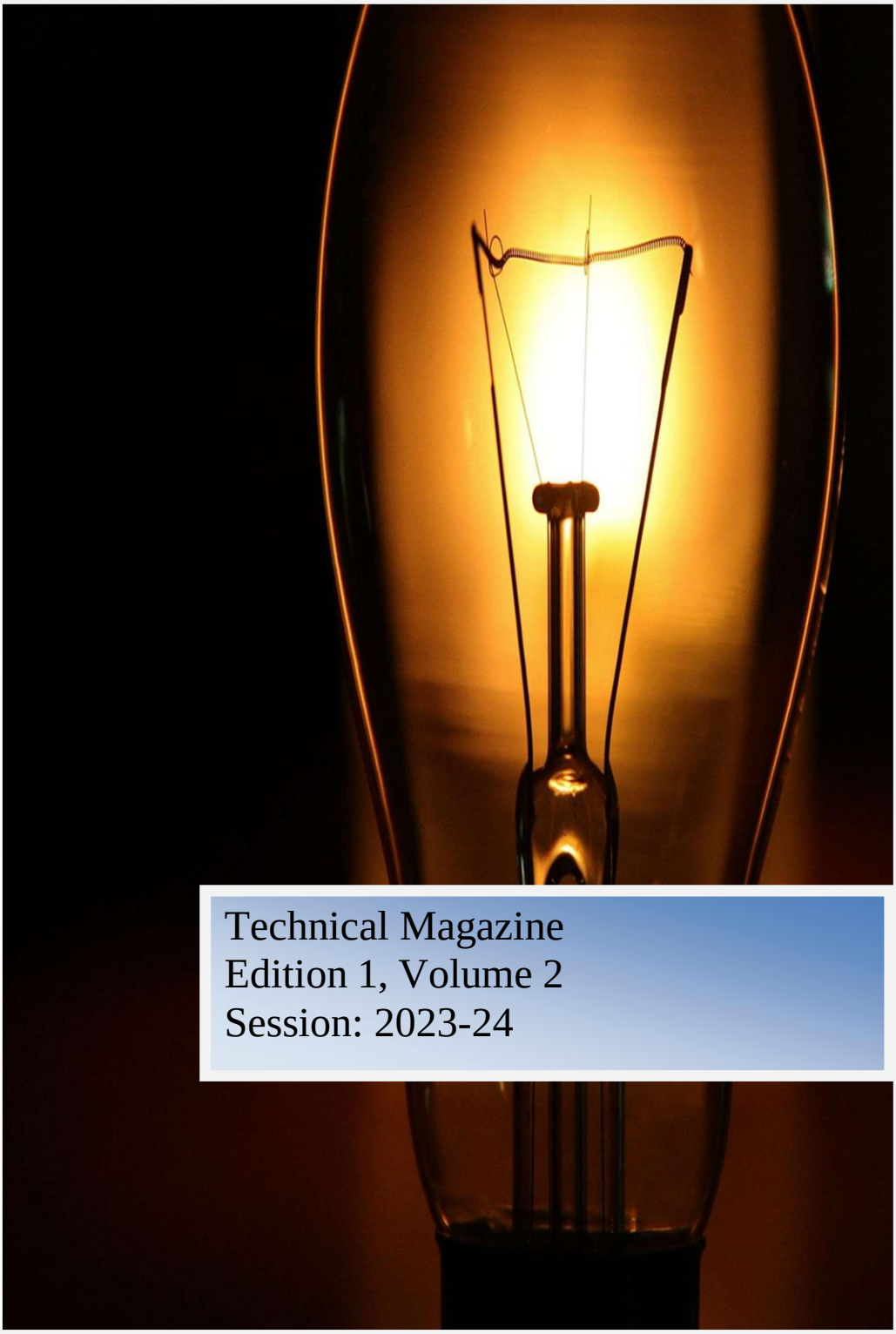
TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

SPARK



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TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

VISION OF THE INSTITUTE

To emerge as Learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

MISSION OF THE INSTITUTE

[M1] To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.

[M2] To provide facilities and services to meet the challenges of Industry and Society.

[M3] To facilitate socially responsive research, innovation and entrepreneurship.

[M4] To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

VISION OF THE DEPARTMENT

To emerge as a learning hub and centre of excellence in the domain of Electrical Engineering.

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MISSION OF THE DEPARTMENT

[M1] To disseminate knowledge replete with quality education in the field of Electrical Engineering in meticulous and methodical manner.

[M2] To provide platform to address societal issues as well as challenges faced by industries.

[M3] To develop research culture and inculcate innovative and entrepreneurial skills.

[M4] To ensure overall development of students and staff by instilling knowledge and professional ethics as part of lifelong learning.

TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

ABOUT TGPCET

Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET) was established in the year 2007 by Vidarbha Bahu-uddeshiya Shikshan Sanstha (VBSS), a registered society. It is a self financed Private Engineering College, which is affiliated to Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU) Nagpur and is approved by All India Council for Technical Education, New Delhi. Also college is approved by Directorate of Technical Education (DTE), Mumbai, Maharashtra State. The Institute is Accredited with A+ (3.32 CGPA) by NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC). An Autonomous Institute affiliated to RTM Nagpur

ABOUT DEPARTMENT

The Department Of Electrical Engineering provides in depth education & prepares its students for all the possible future career & developments in technology. Department has a fine blend of experienced as well as young dynamic enthusiastic personalities as faculty for providing quality education at both B.E.(Electrical) and M.Tech.(Integrated Power System). It aims to promote research and teaching activity based on advanced and novel teaching methods. The specious infrastructure, well equipped laboratories, meritorious students and academically qualified and enthusiastic faculty being the salient features of the Department.

DEPARTMENT OF ELECTRICAL ENGINEERING

MASSAGE FROM HOD DESK

Dr. Pratik Ghutke
HoD , EE

Welcome to the Department of Electrical Engineering of Tulsiramji Gaikwad-Patil College of Engineering and Technology Nagpur. We started our journey in the year of 2011. Over the last 12 years, we have grown our Expertise & competence in the core Electrical Engineering curriculum. The primary focus of our curriculum is to impart technical know-how to students, promote their problem solving skills & innovation of new technologies. The students are encouraged to undertake various research projects. We have state of the art research facilities in the constitution with industry to support our academic programs. Our department has a distinguished record in both teaching & research. Faculty members have excellent academic credentials & are highly regarded. Our department looks forward to contributing to solving the technological challenges of the society with active participation from all sections of the society. The goal of this newsletter is to keep you updated with developments in Electrical Engineering Department of TGPCET. This department is continuously undergoing transformation. New initiatives have been launched related to academics, student affairs', and research and extracurricular activities. The students & faculty members of the department are sincerely participating in various activities organized at institute or at other places. It is elevating to see the sound performance of students. I offer best wishes for future activities. At last, I thank to the editors of SPARK for their sincere efforts & I offer my best wishes to the readers of this newsletter.

Editorial Board

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EDITORIAL MESSAGE

It is an occasion of immense pleasure for the Department of Electrical Engineering to publish the second volume of "Technical Magazine" in the year 2023.

The Editorial board of department of EE wants to thanks all the faculty members and students who have made this activity a success by providing a technical stuff for the second volume.

This magazine focuses on the recent trends evolved in the field of electrical engineering, Cutting-Edge technologies in the relevant field, Case studies, Research & Development, Industry trends, Innovations, Educational articals, Sustainability & Environmental impacts, Challenges & Solutions & wants to provide advanced knowledge and awareness among the students about the same.

The Editorial board also wants to thanks the Management of the Institute and Head of the department for inspiring us to go forward in publishing this magazine and we hope that this kind of support will be provided from all of the involved persons, for the next session.

Prof. Ashvini Admane
Assistant Professor,
Electrical Engineering

CONTENTS

RECENT INVENTIONS IN THE ELECTRICAL ENGINEERING

1. MEDICAL

Notable recent innovations in medical electrical engineering have come in robotics and augmented and virtual reality.

ROBOTICS:

One of the most significant new inventions in medical electronic engineering involves robotic surgery. In minimally invasive procedures, robotic tools are useful because they offer precision, flexibility and extreme control. The result is that surgeons can use automated capabilities to perform surgeries that would otherwise be needlessly complex or impossible altogether. Robotic surgical technology is not likely to replace human surgeons instead, it will assist and enhance their work.

VIRTUAL AND AUGMENTED REALITY:

The development of virtual and augmented reality (VR/AR) is one of the most influential trends in electrical engineering. In medicine, VR/AR is helpful for providing convalescent patients with an immersive way to participate in rehabilitation exercises. VR/AR is also invaluable in training tools for medical students. Students can engage with augmented or virtual scenarios to become familiar with new procedures or see 3D representations of difficult-to-visualize human anatomy.

2. CONSUMER

Many recent innovations in consumer electrical engineering have to do with wearable devices and electric vehicle capabilities.

WEARABLE DEVICES:

In wearable consumer devices, wireless technology has been making exciting advances. Smart-watches and similar wearable devices help users monitor their health and athletic performance. Wireless technology often Bluetooth Low Energy means these devices can be smaller and more convenient to use because they run onsmaller, longer-lasting batteries.

Innovations in wearable devices also have lifesaving potential in industrial applications. Some wearable devices can vibrate to notify engineers if they get too close to high-voltage equipment, and they can provide valuable data without requiring a smartphone for access. Wearable devices also increasingly have the technology to facilitate authentication if someone approaches sensitive equipment without the right wearable device, the machine will not grant access. These innovations dramatically increase electrical engineers workplace safety.

ELECTRIC VEHICLES:

Electric vehicles have steadily been gaining in popularity, and they are almost certainly the vehicles of the future because of their energy efficiency and reduced carbon emissions. Tesla, for instance, recently rose to $100 billion in market valuation. It is the first publicly traded carmaker in the United States to do so and shows no sign of slowing down anytime soon.

Heavy investments in electric vehicle technology mean consumers have seen and can anticipate the emergence of various innovative improvements, including more powerful, longer-lasting batteries; enhanced charging technology; genuinely functional autonomous driving; and solar-powered vehicles. There's even the possibility of electric airplanes.

WIRELESS CHARGING:

One area of technology that holds particular promise for expanding the electric vehicle market is wireless charging. Wireless charging has some current applications for personal devices like laptops, smartphones and ear-buds, and it will likely eventually become standard for electric vehicles as well. An electric car owner will be able to park on a charging spot without the hassle of plugging in the car. Wireless charging docks will also be smaller, so they'll likely become easier and more cost-effective to build.

3. INDUSTRIAL

In the industrial field, a few different innovative technologies are emerging as game-changers. Here is some of the latest technology in electrical engineering for industry:

AUGMENTED REALITY:

Advances in augmented reality are taking place substantially for industrial use 65% of VR/AR companies report that they are working on industrial applications, while only 37% are working on consumer products. VR is useful in industrial facilities because it allows companies to simulate dangerous industrial scenarios without putting their employees through the actual risks. AR is useful because it superimposes data on a real visual to give engineers and technicians real-time information about the industrial systems they're working with and helps them take more informed approaches to repairs and maintenance.

SMART GRID:

More and more commercial and industrial consumers can generate their own power and even sell their surplus. This development has changed electrical delivery infrastructure, in part with the advent of smart grids.

Smart grids contain smart devices throughout their infrastructure, including in homes, offices and industrial facilities. These smart devices collect and supply data that allows industrial facilities to analyse trends and make more informed, efficient and cost-effective choices about their electricity use. The devices can predict surges in usage and prepare for the higher demand, and they detect outages at once and notify the personnel who can rectify them. Perhaps most importantly, the smart grid allows for communication between the Power Company, distributors and end-users and helps boost efficiency and lower costs by facilitating a quick resolution of any issue.

GRAPHENE SUPERCAPACITORS:

Super-capacitors store energy and have higher capacitance values and lower voltage limits than traditional capacitors and can function somewhat like rechargeable batteries. Graphene super-capacitors are super-capacitors that use graphene in place of activated carbon in their electrodes.

A super-capacitor, which can often store almost as much energy as a lithium-ion battery, offers the advantages of increased energy storage. Super-capacitors allow for the power density of capacitors. They can deliver a lot of energy in quick bursts while also providing high energy storage capabilities and charging incredibly rapidly. Graphene helps enhance super-capacitors because it is exceptionally conductive, so graphene super-capacitors are ideal for high-frequency applications, whereas traditional super-capacitors are not. Graphene allows for structuring and scaling down, so it has applications in computer processing units (CPUs) and integrated circuits where standard capacitor materials do not.

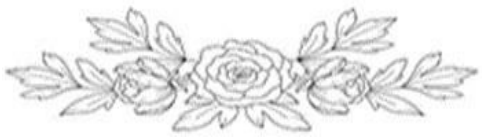
Graphene super-capacitors may also be able to combine with carbon nanotubules to help connect the geometrically unique graphene structures into a comprehensive network. This combination might reduce costs and boost capacitance and performance.

ARTIFICIAL INTELLIGENCE:

Artificial intelligence (AI) can help make electrical engineers' jobs much easier in an industrial setting. They allow for several significant improvements in engineering work, including:

- Constructing AI and machine learning platforms for more complex and capable equipment.
- Crafting complicated algorithms for data analysis.
- Developing new codes or enhancing current code.
- Processing images.

AI image processing, in particular, opens substantial new doors in engineering for industrial applications. Image processing with AI is easier because AI allows for more sophisticated algorithms. They can perform tasks like detecting structural irregularities in equipment and sending feedback to alert facility managers to the necessity of repairs, thereby promoting safety in the workplace.



Electrical Engineer's Case Studies

Case Study 1 – Surge Protection Failure:

Problem: A technology company is experiencing frequent damage to their electronic equipment. The equipment is being damaged by voltage surges on the power grid, resulting in costly repairs and lost productivity.

Solution: The electrical engineer identified that the surge protection devices in place were not sufficient to protect the equipment. The engineer designed and implemented a new surge protection system that included a combination of surge arresters, surge suppressors, and voltage regulators to effectively protect the equipment from voltage surges. The engineer also provided training to the maintenance team on how to properly maintain the new surge protection system.

Case Study 2 – Arc Flash Hazard:

Problem: A manufacturing plant is experiencing an increased number of electrical accidents, including arc flash incidents. The accidents are causing injuries to employees and costly equipment damage.

Solution: The electrical engineer conducted a thorough assessment of the electrical system to identify potential arc flash hazards. The engineer then implemented a program to mitigate the hazards, including the installation of arc flash protection devices, the implementation of safe work procedures, and employee training on electrical safety. The engineer also set up a regular maintenance schedule for the electrical equipment to minimize the risk of arc flash incidents.

Case Study 3 – Energy Efficiency Retrofit:

Problem: A commercial building is experiencing high energy costs, due to outdated and inefficient electrical systems.

Solution: The electrical engineer conducted an energy audit of the building to identify opportunities for energy efficiency improvements. The engineer then designed and implemented an energy efficiency retrofit, including the installation of energy-efficient lighting, HVAC controls, and power monitoring systems.

CONCLUSTION OF CASE STUDIES:

These unique case studies show how electrical engineers can use their skills and knowledge to design, implement, and maintain advanced electrical systems that improve efficiency, reliability, and safety.

LATEST RESEARCH IN ELECTRICAL ENGINEERING

New Organic Transistor Enables Higher Density Circuit Integration for High-Performance Mobile Devices

Introduction:

A new organic anti-ambipolar transistor has been developed that is capable of performing any one of the five logic gate operations by adjusting the input voltages to its dual gates. It could be used to develop electrically reconfigurable logic circuits, which may be key to the development of high-performance mobile devices. Construction of multiple logic circuits using only a single transistor. The National Institute for Materials Science (NIMS) and the Tokyo University of Science have succeeded in developing an organic anti-ambipolar transistor capable of performing any one of the five logic gate operations (AND, OR, NAND, NOR, or XOR) by adjusting the input voltages to its dual gates. This lightweight transistor with multiple logic gate capability may be used to develop electrically reconfigurable logic circuits potentially key to the development of high-performance mobile devices. As the internet of things (IoT) becomes a reality, the volume of data that will need to be processed is expected to skyrocket. This will require lightweight, high-performance, mobile data processing devices. Organic integrated circuits with organic transistors are a potentially game-changing technology in the development of such devices. However, the integration density of these circuits has remained very low due to incompatibility with existing micro-fabrication technologies.

Conclusion:

To address this issue, this research group developed an organic dual-gate anti-ambipolar transistor capable of performing two-input logic gate operations by designing it to reduce its drain current when the gate voltage exceeds a certain threshold.

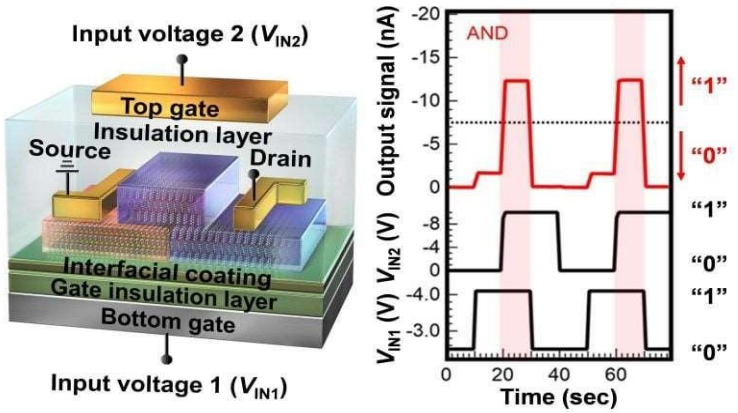
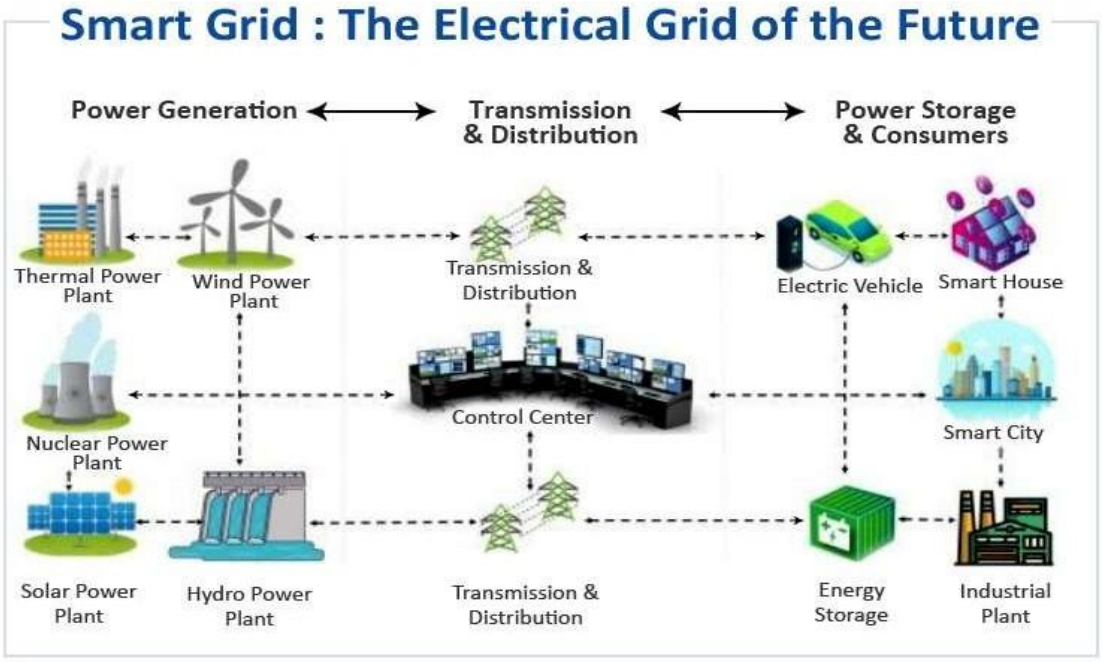


Fig. Organic dual-gate anti-ambipolar transistor designed to perform an AND logic gate operation

EDUCATIONAL STUFF

1. SMART GRID:

Smart Grid is an Electrical Grid with Automation, Communication and IT systems that can monitor power flows from points of generation to points of consumption (even down to appliances level) and control the power flow or curtail the load to match generation in real time or near real time. Smart Grids can be achieved by implementing efficient transmission & distribution systems, system operations, consumer integration and renewable integration. Smart grid solutions helps to monitor, measure and control power flows in real time that can contribute to identification of losses and thereby appropriate technical and managerial actions can be taken to arrest the losses. Smart grid solutions can contribute to reduction of T&D losses, Peak load management, improved quality of Service, increased reliability, better asset management, renewable integration, better accessibility to electricity etc. and also lead to self-healing grids.



Features of Smart Grid:

Smart grid has several positive features that give direct benefit to consumers:

- Real time monitoring.
- Automated outage management and faster restoration.
- Dynamic pricing mechanisms.
- Incentivize consumers to alter usage during different times of day based on pricing signals.
- Better energy management.
- In-house displays.
- Web portals and mobile apps.
- Track and manage energy usage.
- Opportunities to reduce and conserve electricity etc.

Smart Grid will also facilitate distributed generation, especially the roof top solar generation, by allowing movement and measurement of energy in both directions using control systems and net metering that will help “prosumers” i.e. the consumers who both produce and consume electricity, to safely connect to the grid.

Benefits of Smart Grid Deployments:

Several groups of the society are provided with multiple benefits through the Smart Grid implementations. Such include utility, customers and the regulators while some of the benefits include:

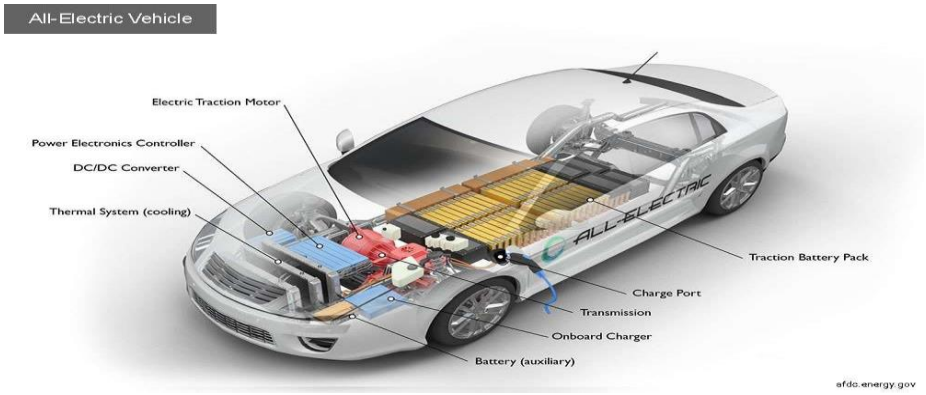
- Reduction of T&D losses.
- Peak load management, improved QoS and reliability.
- Reduction in power purchase cost.
- Better asset management.
- Increased grid visibility and self-healing grids.
- Renewable integration and accessibility to electricity.
- Increased options such as ToU tariff, DR programs, net metering.
- Satisfied customers and financially sound utilities etc.

Conclusion:

Smart grid technology revolutionizes energy management with the help of different advance digital technologies and automation.

2. EV (ELECTRIC VEHICLE):

An electric vehicle (EV) is one that operates on an electric motor, instead of an internal-combustion engine that generates power by burning a mix of fuel and gases. Therefore, such as vehicle is seen as a possible replacement for current-generation automobile, in order to address the issue of rising pollution, global warming, depleting natural resources, etc. Though the concept of electric vehicles has been around for a long time, it has drawn a considerable amount of interest in the past decade amid a rising carbon footprint and other environmental impacts of fuel-based vehicles**.**



Key Components of an All-Electric Car:

- **Battery (all-electric auxiliary):** In an electric drive vehicle, the auxiliary battery provides electricity to power vehicle accessories.

- **Charge port:** The charge port allows the vehicle to connect to an external power supply in order to charge the traction battery pack.

- **DC/DC converter:** This device converts higher-voltage DC power from the traction battery pack to the lower-voltage DC power needed to run vehicle accessories and recharge the auxiliary battery.

- **Electric traction motor:** Using power from the traction battery pack, this motor drives the vehicle's wheels. Some vehicles use motor generators that perform both the drive and regeneration functions.

- **On-board charger:** Takes the incoming AC electricity supplied via the charge port and converts it to DC power for charging the traction battery. It also communicates with the charging equipment and monitors battery characteristics such as voltage, current, temperature, and state of charge while charging the pack.

- **Power electronics controller:** This unit manages the flow of electrical energy delivered by the traction battery, controlling the speed of the electric traction motor and the torque it produces.

- **Thermal system (cooling):** This system maintains a proper operating temperature range of the engine, electric motor, power electronics, and other components.

- **Traction battery pack:** Stores electricity for use by the electric traction motor.

- **Transmission (electric):** The transmission transfers mechanical power from the electric traction motor to drive the wheels.

Conclusion:

Electric vehicles (EVs) have a considerable role in the realization of transportation electrification, with advantages of reducing fossil fuel consumption, climate change mitigation, and increasing power grid flexibility.

STUDENT ARTICLE CORNER

SMART CITY

Prajit D. Meshram
3rd Sem, B.Tech
Electrical Engineering

Introduction:

A smart city can be described as a city that allows real-world urban data to be collected and analyzed by the use of software systems, server substructure, network infrastructure, and client devices. Implements solutions, with the support of instrumentation and interconnection of sensors, actuators, and mobile devices. Can combine service production and an intelligent environment, exploits accessible information in its activities and decision making and adopts information flows between the municipality and the urban or business community. The city may be considered as a service organization with citizens as the customers, it provides services to its citizens. There is a demand for smarter, effective, efficient and more sustainable cities, pushing the collective intelligence of cities onward, which can improve the ability to forecast and manage urban flows, and integrate the dimensions of the physical, digital and institutional spaces of a regional agglomeration. Urban development and improvement of the city has been turning towards technology. Smart cities use different information and communication technologies (ICT). Solutions characteristically includes various aspects of a city ecosystem such as smart infrastructure, smart operation, smart service and smart industry, smart education systems, or smart security systems. The concept of a smart city integrates the dimensions of the physical, institutional and digital spaces of an agglomeration. This approach introduces aspects such as interconnection, feedback, self-organization, and adaptation in order to provide understanding of the almost organic growth, operation, and evolution of cities. Cities are now transforming from digital cities to smart cities, digital or intelligent cities that are more technology oriented equivalents of smart city concepts.

Conclusion:

A city becomes “smart” when it is instrumented, interconnected, adaptive, autonomous, learning, self-repairing, and robust. Parts of its infrastructure and facilities are digitally connected and optimized by using ICT to deliver services to their citizens and other stakeholders.

STAND-ALONE PV SYSTEM

Ruchita Ganesh Bante
5th Sem, B.Tech
Electrical Engineering

Introduction:

A stand-alone photovoltaic (PV) system is an electrical system consisting of and array of one or more PV modules, conductors, electrical components, and one or more loads. But a small-scale off grid solar system does not have to be attached to a roof top or building structures for domestic applications. Many off grid solar systems are used to power camper vans, RV's, boats, tents, camping and any other remote location. An off-grid or Stand Alone PV System is made up of a number of individual photovoltaic modules (or panels) usually of 12 volts with power outputs of between 50 and 100+ watts each. These PV modules are then combined into a single array to give the desired power output. A simple *stand-alone PV system* is an automatic solar system that produces electrical power to charge banks of batteries during the day for use at night when the suns energy is unavailable. A stand-alone small scale PV system employs rechargeable batteries to store the electrical energy supplied by a PV panels or array.

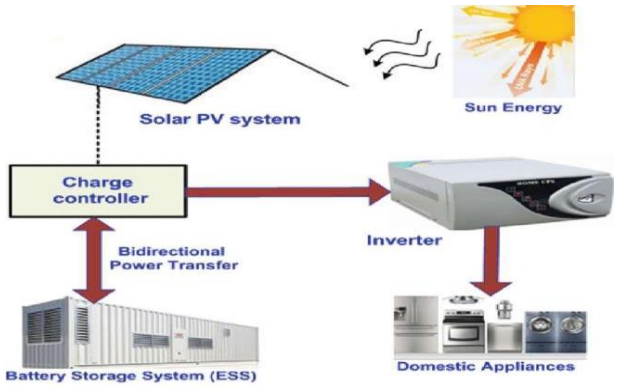


Fig. Stand-alone PV system

Conclusion:

Stand-alone PV systems are Ideal for remote rural areas and applications where other power sources are either impractical or are unavailable to provide power for lighting, appliances and other uses. In these cases, it is more cost effective to install a single stand-alone PV system than pay the costs of having the local electricity company extend their power lines and cables directly to the home as part of a grid connected PV system.

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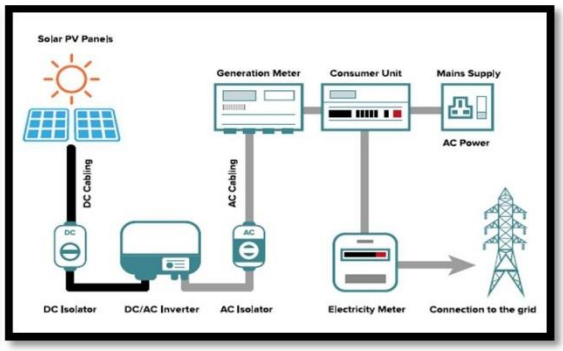
FACULTY ARTICLE CORNER

Future of Solar Energy in India: A Review

By Dr. P. V. Thakre (Head, Department of Electrical Engineering, TGPCET, Nagpur)



India has witnessed rapid increase in its renewable energy capacity. Solar energy in India has grown about 18 times in the last seven and a half years. Today, the Indian renewable sector ranks 4th on the list of the world's most attractive renewable energy sectors. Solar and wind energy are the most abundant sources of renewable power in the country. Both solar and wind energy have immense potential – nothing could have been a better example of the bright future of the solar industry in India than the many schemes that our Prime Minister Shri. Narendra Modi Launched on 30th July 2022. Solar energy in India has vast potential. The future looks very bright because sunlight will never exhaust. Solar energy in India has had a noticeable impact on the energy scenario in the past few years. If we effectively use this energy resource, we can quickly meet the energy requirements of the entire country. Solar energy in India has also benefited millions of people across the country. With its distributed applications, many Indian homes have met their power requirements by installing rooftop solar panels.

There are many other benefits of using solar energy in India, such as –

- Reduction of life-threatening diseases such as cancer and tumors that are a result of pollution caused by coal and other fossil fuels.
- Women in rural India – where women from India can use solar energy for cooking.
- More employment at the rural level.
- An enhancement in the standard of living.
- Increase in financial opportunities.

As stated previously, solar energy in India has massive potential. In fact, most parts of the country receive about 4-7 kWh per sq. meter of sunlight daily. The government has also introduced many interesting schemes to encourage the manufacture of solar cells and modules in India.

There are innumerable benefits that solar energy in India offers:

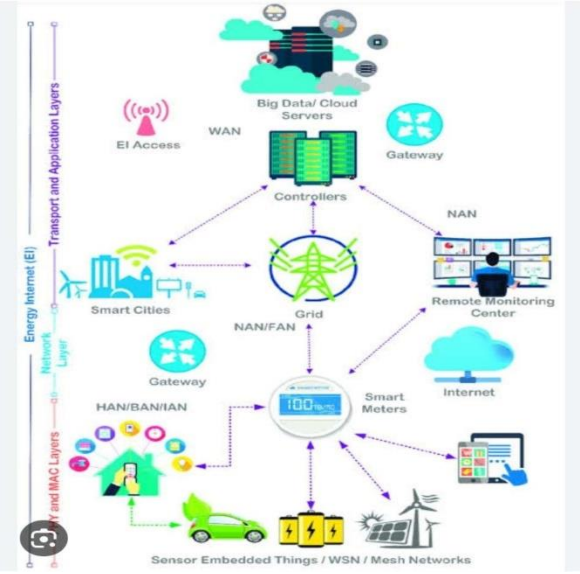
- Solar energy is environmentally-friendly. It doesn't release any air toxic gases like CO_2 during usage. Thus, solar energy in India is a blessing to the environment. Pollution that's still going strong at alarming rates will drastically drop once more and more people will start using solar energy.

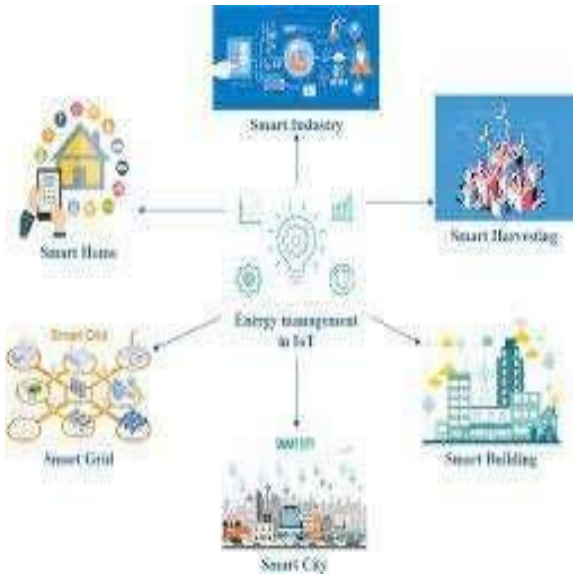
- Many rural areas in India can use solar energy for various applications. It can be used for cooking, drying, heating, charging devices, and a lot more.
- Solar energy in India also offers various benefits to the urban population. Rooftop solar panels have been utilizing solar power in the best way.
- Solar energy is one of the best alternatives to non-renewable sources of energy.
- Another great advantage is that solar energy is inexhaustible and, thus, abundant.

Revolutionizing Electrical Engineering with IoT

By Mr. Ganesh Wakte (Assistant Professor, EE, TGPCET, Nagpur)

The integration of the Internet of Things (IoT) in the realm of electrical engineering marks a transformative leap in how we interact with and manage electrical systems. At its core, IoT enables seamless connectivity between devices, facilitating data exchange and automation, leading to unprecedented advancements in various industries.





In the field of electrical engineering, IoT's significance is profound. It revolutionizes traditional power systems by introducing smart grids that optimize energy distribution, monitor consumption patterns, and enhance overall efficiency. By embedding sensors in electrical equipment, IoT enables real-time monitoring of performance, predictive maintenance, and rapid fault detection, thereby reducing downtime and ensuring continuous operations. One of the key aspects of IoT in electrical engineering is its role in building automation. IoT-powered systems control lighting, HVAC, and other electrical systems in buildings, creating smart environments that adapt to user preferences while minimizing energy consumption. This not only enhances comfort but also significantly reduces energy waste, contributing to a more sustainable future. Moreover, IoT-based concepts have redefined safety measures in electrical engineering. With interconnected sensors and actuators, potential hazards can be identified promptly, allowing for immediate intervention to prevent accidents. Additionally, remote monitoring and control capabilities provided by IoT ensure enhanced safety for engineers working in hazardous environments. The implementation of IoT in electrical engineering also extends to the concept of smart cities. By interconnecting various electrical systems, IoT facilitates efficient resource management, intelligent traffic control, and optimized energy usage, resulting in urban environments that are more sustainable, secure, and responsive to the needs of their inhabitants. However, as IoT becomes increasingly pervasive in electrical engineering, challenges such as cyber security threats, standardization issues, and data privacy concerns must be addressed rigorously to ensure the reliability and integrity of these systems.

Conclusion:

The incorporation of IoT-based concepts in electrical engineering represents a paradigm shift that transcends conventional methodologies. It not only enhances efficiency, safety, and sustainability but also paves the way for a future where interconnected electrical systems empower innovation and progress in unprecedented ways.

FACULTY RESEARCH CORNER

Brayton-Moser passivity-based controller for an on-board integrated electric vehicle battery charger

By, Dr. Shipra K. (Associate Professor, EE, TGPCET, Nagpur)

Abstract:
This paper explores the Brayton Moser passivity-based controller design for an on-board integrated battery charger system. The proposed controller is based on energy concept theory which ensures asymptotic stability against load variability. To design proposed controller, first, average dynamic equations of the proposed system have been developed through energy-based formulation namely Brayton Moser. In order to obtain robust controller and correspondingly robust charger against dynamics and external disturbances, a PI controller is integrated with the proposed controller. The proposed system is employed for electric vehicles battery charger which is charged by using CC/CV technique and their effectiveness has been evaluated through Simulink toolbox of MATLAB 2014. Furthermore, the benchmark PI controller is preferred for comparison and discussion. Additionally, the effectiveness of the system is verified via OP-5142 real time simulator.

Result & Discussion:
The proposed integrated charger system with the BM-PBC control strategy is verified through MATLAB/ Simulink. To eliminate the steady state errors as the output voltage may have steady state errors because of the presence of noise and modeling errors, a PI controller is added in parallel to the closed-loop system.

Conclusion:
The main contribution of this paper is the introduction of the Brayton-Moser formulation for the development of the mathematical model of the integrated EVs battery charger. Another contribution is to develop control law integration of PI controller with the PBC in the BM framework to achieve refinement in the stability and robustness of the closed loop system. We have achieved.

Advanced Smokeless Stove towards Green Environment and For Sustainable Development of Rural Women

By Dr. Pratik C. Ghutke (Asst. Professor, Electrical Engineering, TGPCET, Nagpur)

Abstract:

Maximum family members in India are using traditional stoves to prepare their three meals per day. Generally, raw wood, cow dung and rice husk are the main fuels for running traditional stoves. Due to improper design of conventional stoves, incomplete combustion of fuel occurs which creates air pollution. The World Health Organization (WHO) estimates that about 4 million people die prematurely each year from diseases caused by indoor air pollution caused by inefficient eating practices. The survey also found that 60% to 70% of rural women are suffering from throat cancer and most of them are respiratory system problem. Accordingly, the AYUSH Department of the Government of India found that most of the deaths during the Corona period were due to failure of the respiratory system. To solve the problem of air pollution from traditional home stoves. We have developed a smokeless stove that uses wood as primary fuel and superheated steam as secondary fuel. Due to supply of hot steam, the built in stove is used for household and community purposes. The main objective of this work is to establish complete combustion of fuel, provide a smoke free environment and thereby reduce health hazards in rural households, especially among women.

Conclusion:

As a matter of fact, there has been an improved stove based on design and built-up criteria experimentally. From the observation the stove has been configured with superheated steam which acts as secondary fuel, and air withdrawn from either a blower or fan installed for generating forced draught. Glass wool being an insulated material implemented here. The vital facts extracted from the above effort have been summarized underneath; i) Fuel in particular biomass consumption can be diminished by adopting the abovementioned modified cooking measures and so called as a fuel-efficient stove. ii) Being introduced as a secondary fuel, superheated steam diminishes exhaust smoke and correspondingly raises the biomass content fuel calorific value. iii) Lungs related ailments could be checked upon installation of this modified cooking stove.

WORKSHOP ORGANIZED IN THE DEPARTMENT

TWO DAYS WORKSHOP ON "ADVANCES IN SOLAR PHOTO VOLTAIC TECHNOLOGIES"

Two Days Workshop on "Advances in Solar Photo Voltaic Technologies" has successfully organized on 7th and 8th July 2023. The Guest speakers for the sessions were Dr. Prashant V. Thakre, HOD, EE Department, Mr. Sameer Pathak, Suntronics renewables pvt. Ltd. Nagpur, Mr. Vipin Chaudhari, Unique Techno Solution, Jalgaon and Mr. Ashish Pahurkar, Add. Executive Engg. KTPS Nagpur. They delivered the sessions on basics of solar photo voltaic technologies and put up lime light on future aspects of solar technology. They guided the students about overall working and different sections of solar system.

In this student have developed concept of solar system and understood the methodology of erection, commissioning, power generation through solar photovoltaic system and the applications of solar systems. They also visited the solar site and developed practical concept.

DEPARTMENTAL ACTIVITIES

"PARENTS-TEACHER MEET"

Parents Teacher Meet" for B.Tech. 4th semester students was arranged on 12th July 2023 at Electrical Engineering Department-seminar Hall to discuss about Department activities, student progress and performance. Total 20 parents attended this meeting.

"CONSTITUTION-DAY CELEBRATION"

Tulsiramji Gaikwad–Patil College of Engineering and Technology, Nagpur in collaboration with the National Service Scheme (NSS) & Department of Electrical Engineering, celebrated Constitution Day on 28th November 2023 at 03.00pm. Program started with auspicious Lamp lightning Ceremony. Dr. Prashant Thakre, HOD Electrical Engineering stated that on the occasion of Constitution day we are organizing Quiz for students to spread awareness about Constitution of India. He also urged students to get enlightened from the Guest

Lecture. Guest speaker Mr. Rajesh Jadhav in his speech explained the correlation of constitution with current Geopolitics, War situation in the world and role of youth in proper interpretation of Constitution of India.

GLIMSES OF CONSTITUTION-DAY

RESERCH AND DEVELOPMENT PUBLICATIONS

SR. NO	NAME OF FACUILTY	PUBLICATION	Indexing
1	Prof. Radharaman Shaha	**BMOTSM: design of a hybrid bioinspired model to determine optimal turbine sizing for capacity maximization in environment-and-economy aware Deployments.** VOL. 42, NO. 1, 1–16, 2023 ISSN: 14786451	SCI
		GRMWBO: design of a general-purpose repowering model for wind farms via bioinspired optimization. https://doi.org/10.1007/s43538-023-00150-4 ISSN: 03700046	(Scopus Indexed)
		Improvement of transient stability in a system using a unified power flow controller by artificial neural network. Vol 3, Issue 7, ISSN 2582-7421.	Peer Reviewed
2	Dr. Pratik Ghutke	**Matlab modelling and simulation of reconfigurable solar converter: a single-stage power conversion pv-battery system.** Vol. 12 Issue 4, p30-36. 7p.	Peer Reviewed

		Development of Vertical Axis Wind Turbine for application of Highways. **Vol. 4, Issue 05, e-ISSN: 2582-5208.**	**Peer Reviewed**
		Review on Modelling and Simulation of Hybrid Electric Vehicle Based On MATLAB/Simulink. **Vol, 07 Issue: 06 | June – 2023, ISSN: 2582-3930**	**Peer Reviewed**
		Modelling and Simulation of Hybrid Electric Vehicle Based On MATLAB/Simulink. **Vol. 11, Issue VI, June 2023, ISSN: 2321-9653.**	**Peer Reviewed**
3	**Prof. Vaishali Malekar**	**Transmission line Three-Phase Fault Analysis Using Matlab/Simulink.** **Vol. 10, Issue VII, ISSN: 2321-9653**	**Peer Reviewed**
4	**Prof. Sneha Tibude**	**Comparative analysis Different Topologies of Grid-tied Transformer less Inverters for Photovoltaic System.** **Vol. 11, issue 7, e-ISSN: 2278 –8875**	**Peer Reviewed**

PLACEMENTS

Kalyani Hinge, Kalyani Patle and Tejas Nagmote from VIII Sem, Electrical Engineering have been placed in SUNTRONIC RENEWABLES PVT LTD.


Kalyani Hinge (EE)


Kalyani Patle (EE)


Tejas Nagmote (EE)

Congratulations

Tushar H Kumbhalkar
Dhiraj G Bisen
Aditya S Patre
Hiresh Y Patle
Vaibhav V Thakare
Hina A Ghode
Karishma Naitam
Janvi L Rangari
Akansha Thool
Dipak M Nimje
Suraj V Pisalkar
Saurabh S Yerkhede
Prachi Raut
Rohini R Yenpreddiwar
Poonam N Rathod
Payal Thote
Nilima N Gawalkar
Mrunali A Chavan
Prajakta Harle
Aachal Kurutkar
Parmeshwar
Raj A Maratkar
Sayli Fulzede
Rashmi V Lokhande
Akash Shankarpale
Sheetal Ramteke
Kajal D Kharole
Kapil Sahu
Shreya A Udan
Divya P Pawar
Chakradhar G Rajegore
Vyankatesh S Bhavar
Savita P Bhagatkar

Nandkishor Katre
Shubham S Balpande
Sahil V Vaidhya
Prashant D Kendre
Moin Salam Shaikh
Tejas K Nagmote
Pranju S Mohitkar
Rajnandini Mahato
Harshad T Jambhulkar
Balaji P Jadhav
Shilpa M Chakate
Sumit D Hajare
Dipak H Bhardwaj
Tushar K Dhobale
Aditya Patil
Devanshi Patel
Liladher D Barde
Rajat D Shrirame
Sanjaydeep R Chahade
Jay V Dhakate
Sajeshwari S Bhagat
Manisha S Pardhi
Shivam N Mishra
Samir Shaikh
Ashish Kadu
Nikhil H Telrandhe
Sarang Milmile
Gaurav D Bhange
Pravin Chandewar
Jaspal S Rathod
Anup S Tambe
Om Mange
Rajesh P Anparti

Manish Dolas
Pramod S Bhure
Madhav G Kosulkar
Bhushan Y Bambhole
Sushant H Harinkhede
Bankesh Sarkar
Saurabh Kawale
Pradeep G Harinkhede
Nikhil R Urkude
Binay M Chakravorty
Mahesh B Sawant
Indrajeet S Verma
Pratik R Jarile
Nitin L Dhote
Vibhu M Rahangdale
Rohit G Patle
Vishal E Devhate
Akash Dhuldhule
Rohit Tembhurne
Nikita P Bhalme
Pranali K Barapatre
Avinash Khotele
Abhishek J Gajbhiye
Komal H Meshram
Shreyas Pohankar
Bhagyashree H Kore
Rameshwar B Maske
Kalyani V Patle
Achal Sonewane
Rutik Bhagat
Prathamesh Bobade
Kanchan V Rathod
Aboli M Babhare

ACADEMIC TOPPERS

IV -SEM TOPPERS

Rank	Name of Student	Roll No	Marks Obtained out of 800	SGPA
I	Prajwal Sanjay Sapat	403879	776	10
II	Sachine Harichandra Jambhekar	403887	753	9.54
III	Pritam Shankar Kondapratiwar	403882	742	9.46

VI -SEM TOPPERS

Rank	Name of Student	Roll No	Marks Obtained out of 700	SGPA
I	Amit Nilkantha Dhakate	388831	664	9.83
II	Jagannath Prankrishna Banik	388844	660	9.69
III	Chaitanya Yuvraj Neware	388835	659	9.66

VII -SEM TOPPERS

Rank	Name of Student	Roll No	Marks Obtained out of 700	SGPA
I	Amit Nilkantha Dhakate	388831	664	9.83
II	Jagannath Prankrishna Banik	388844	660	9.69
III	Chaitanya Yuvraj Neware	388835	659	9.66

III -SEM AUTONOMOUS TOPPERS

Rank	Name of Student	Marks Obtained out of 800	Percentage (%)
I	Lina Jageshwar Ukey	564	70.50
II	Adarsh Ramlu Nallalwar	535	66.87
III	Ruchita Ganesh Bante	530	66.25

ACHIEVEMENTS

NPTEL MOTIVATED LEARNER

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NPTEL Online Certification

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This certificate is awarded to

VAISHALI SHRIDHARRAO MALEKAR

for successfully completing the course

Effective Writing

with a consolidated score of **78** %

Online Assignments	25/25	Proctored Exam	52.5/75

Total number of candidates certified in this course: **7837**

Prof. Kaushik Ghosh,
Professor(Chemistry)
Coordinator CEC

Jan-Feb 2024
(4 week course)

Prof. Ranjana Pathania,
Professor (BSBE)
Coordinator (NPTEL)

Indian Institute of Technology Roorkee

Roll No: NPTEL24HS23S450402761 To verify the certificate No. of credits recommended: 1 or 2

Elite

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for successfully completing the course

Roadmap for Patent Creation

with a consolidated score of **66** %

Online Assignments	20.83/25	Proctored Exam	45/75

Total number of candidates certified in this course: **1117**

Prof. Haimanti Banerji
Coordinator, NPTEL
IIT Kharagpur

Jan-Mar 2024
(8 week course)

Indian Institute of Technology Kharagpur

Roll No: NPTEL24GE29S550400628 To verify the certificate No. of credits recommended: 2 or 3

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This certificate is awarded to

CHETAN ASHOKRAO JAMBHULKAR

for successfully completing the course

Python for Data Science

with a consolidated score of **57** %

Online Assignments	24.17/25	Proctored Exam	32.39/75

Total number of candidates certified in this course: **11953**

Devendra Jalihal

Prof. Devendra Jalihal
Chairperson,
Centre for Outreach and Digital Education, IITM

Jan-Feb 2024
(4 week course)

Prof. Andrew Thangaraj
NPTEL, Coordinator
IIT Madras

Indian Institute of Technology Madras

Roll No: NPTEL24CS54S650401648 To verify the certificate No. of credits recommended: 1 or 2

NPTEL Online Certification

(Funded by the MoE, Govt. of India)

This certificate is awarded to

KISHOR DHORE

for successfully completing the course

Roadmap for Patent Creation

with a consolidated score of **49** %

Online Assignments	14.88/25	Proctored Exam	34.5/75

Total number of candidates certified in this course: **1117**

Prof. Haimanti Banerji
Coordinator, NPTEL
IIT Kharagpur

Jan-Mar 2024
(8 week course)

Indian Institute of Technology Kharagpur

Roll No: NPTEL24GE29S650401138 To verify the certificate No. of credits recommended: 2 or 3

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Certificate

This is to certify that

Pratik Ghutke

has Presented a paper entitled

Advanced Power Control Techniques and a Homogeneous Novel Concept of AC-DC Micro Grids

in *IEEE Conference* on *Engineering Informatics (ICEI) 2023*
organised in collaboration with *Swinburne University of Technology* under *Victorian Section, Australia* held on 25th & 26th November 2023 at *Sanjay Ghodawat University, Kolhapur, Maharashtra, India*.

Dr. Rajin M. Linus
Chair (India)

Dr. A. D. Sawant
Dean Research

Dr. Vivek Kayande
Registrar

Elite

NPTEL Online Certification

(Funded by the MoE, Govt. of India)

This certificate is awarded to

DR PRATIK C GHUTKE

for successfully completing the course

Entrepreneurship and IP Strategy

with a consolidated score of **69** %

Online Assignments	15/25	Proctored Exam	54/75

Total number of candidates certified in this course: **795**

Jul-Sep 2023

(8 week course)

Prof. Haimanti Banerji
Coordinator, NPTEL
IIT Kharagpur

Indian Institute of Technology Kharagpur

swayam

Roll No: NPTEL23HS144S45020812 To verify the certificate No. of credits recommended: 2 or 3

THANK YOU

for

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