VIMAL JYOTHI ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

NEWS LETTER

ELECTRICAL GNOSYS

VOLUME 14 ISSUE 5
OCTOBER 2024

VISION

To evolve as a centre of excellence, to train students in contemporary technologies, to meet the needs of global industry and to develop them into skillful engineers instilled with human values and professional ethics.

MISSION

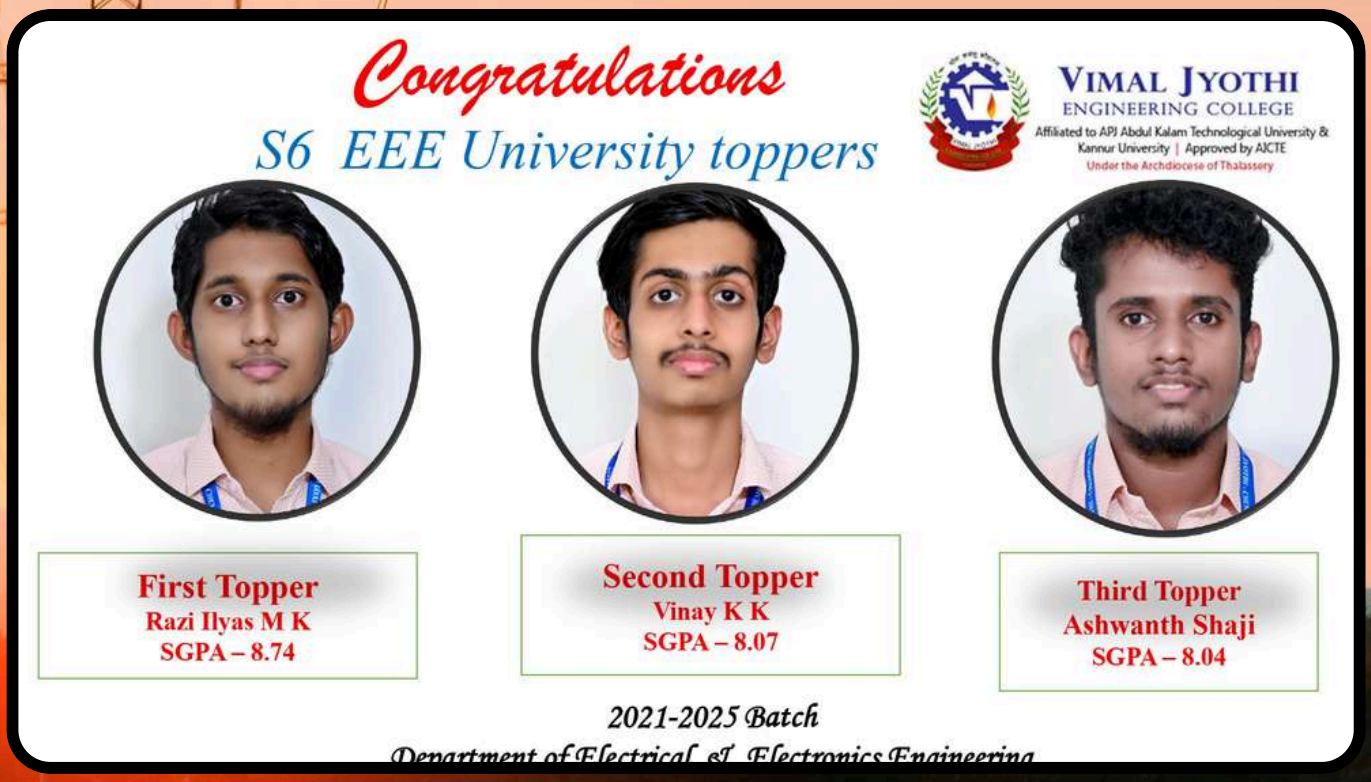
To produce competent and disciplined Electrical & Electronics Engineers through delivery of quality education to meet the ongoing global challenges in alignment with technical education system and society.

INSIDE THE ISSUE

EXPERT SESSION ON ANN

IIC VJEC conducted an expert session on ANN and Robotics for S5EEE students. Dr Rakesh Warier R, AP Dept of EEE, NITC handled the session.

Congratulations S6 University Toppers!



KSEB ENERGY QUIZ - 1

Energy quiz conductedby KSEB engineers association

Energy quiz conducted by KSEB officers association

Congratulations S4 University Toppers!

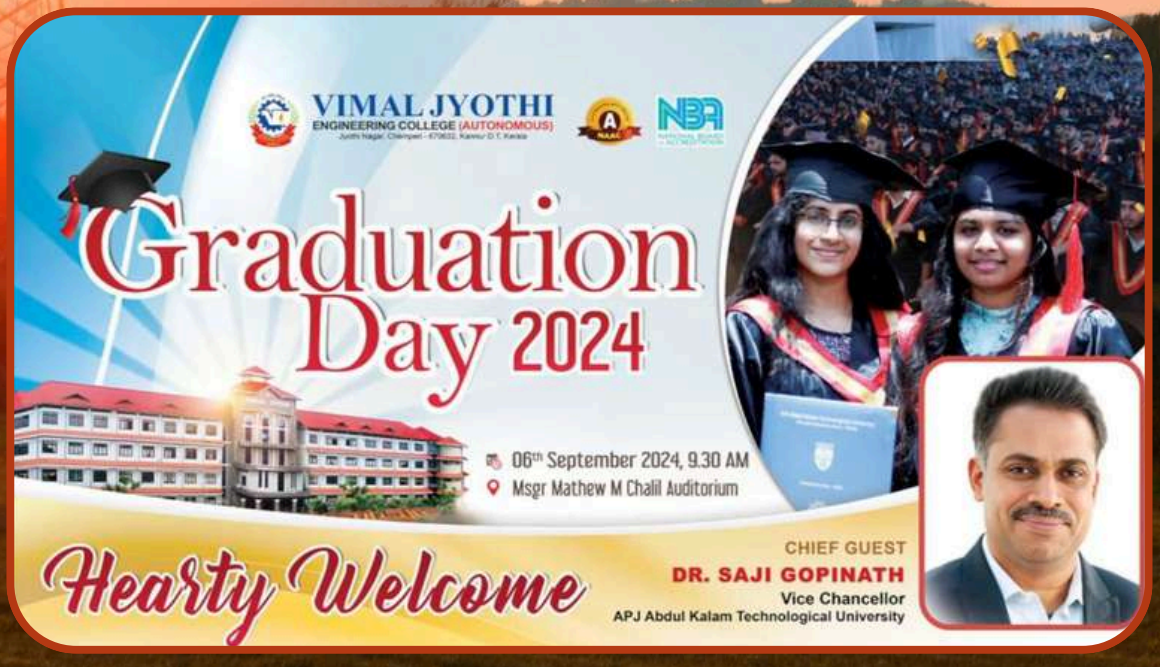
S5 TOPPERS

Congratulations all S5 University Toppers!

HAPPY TEACHER'S DAY!

GRADUATION DAY - 2024

On September 6th, 2024, the college celebrated its Graduation Day with a grand ceremony with Dr. Saji Gopinath, the Vice Chancellor of APJ Abdul Kalam Technological University as Chief guest.



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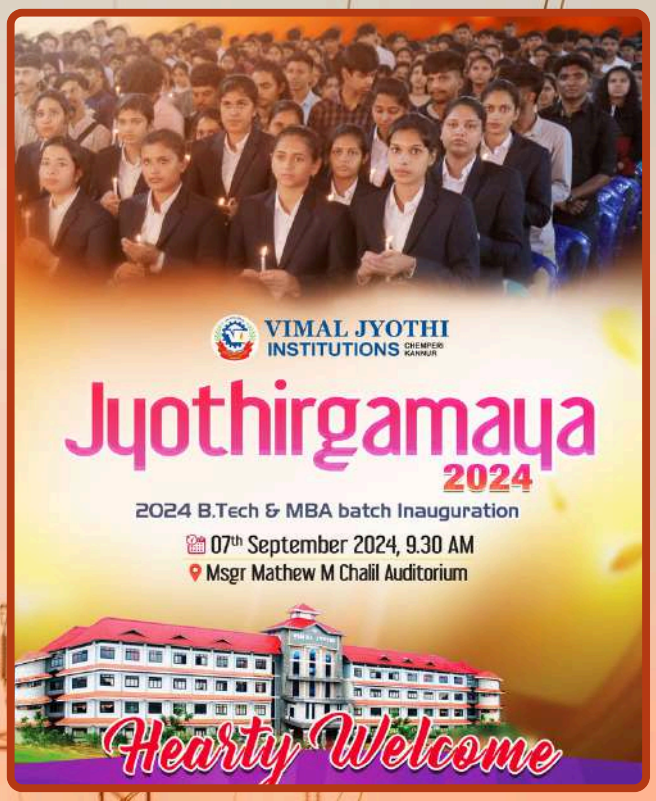
VIMAL JYOTHI
INSTITUTIONS CHEMPERI KANNUR
Jyothirgamaya
2024
2024 B.Tech & MBA batch Inauguration
07th September 2024, 9.30 AM
Msgr Mathew M Chalil Auditorium
Hearty Welcome


Jyothirgamaya

Congratulations to all Toppers!


ENGINEERING COLLEGE (AUTONOMOUS)
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Congratulations


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Congratulations
ELIZABETH T. MANI


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ONAM-2024

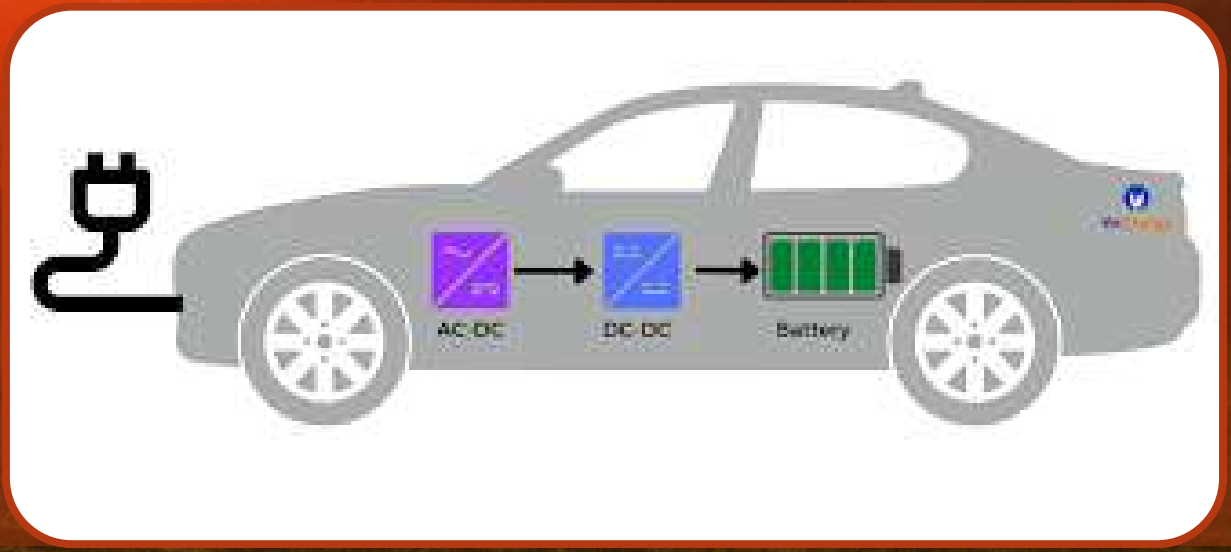
TECHNICAL NOTE- ON-BOARD CHARGERS: THE BACKBONE OF ELECTRIC VEHICLE CHARGING

Electric vehicles (EVs) have rapidly emerged as the cornerstone of sustainable transportation, with on-board chargers (OBCs) playing a crucial role in their operation. The OBC is a critical component that ensures the vehicle's battery is charged efficiently from standard electrical outlets, making the EV independent of charging stations. This article explores the workings, components, and evolution of OBCs, as well as current advancements and future trends in the technology. An on-board charger (OBC) is an essential power electronics system that converts alternating current (AC) from the grid into direct current (DC) to charge the battery of an electric vehicle. Its function is akin to a mobile charging system that resides inside the car, making the vehicle self-reliant for charging at home or public outlets. The OBC eliminates the need for dedicated high-power DC charging stations and allows users to charge EVs using AC outlets found in homes, offices, or parking lots. OBCs typically range between 3.3 kW to 22 kW depending on the model and application, which affects the charging time. Higher power ratings generally translate to faster charging but may require specialized infrastructure, such as a three-phase power supply. An OBC is a sophisticated electronic device consisting of several interconnected subsystems designed to handle energy efficiently and safely. Key components include:

1. AC-DC Converter: This is the first stage of the OBC. It converts the alternating current (AC) from the grid into direct current (DC) suitable for battery charging. It usually incorporates rectifiers and filters to ensure smooth DC output and reduce electrical noise.

2. Power Factor Correction (PFC): To improve efficiency and reduce losses, modern OBCs include PFC circuits. These circuits optimize the power drawn from the grid, ensuring a near-unity power factor, which is essential for regulatory compliance and grid stability.

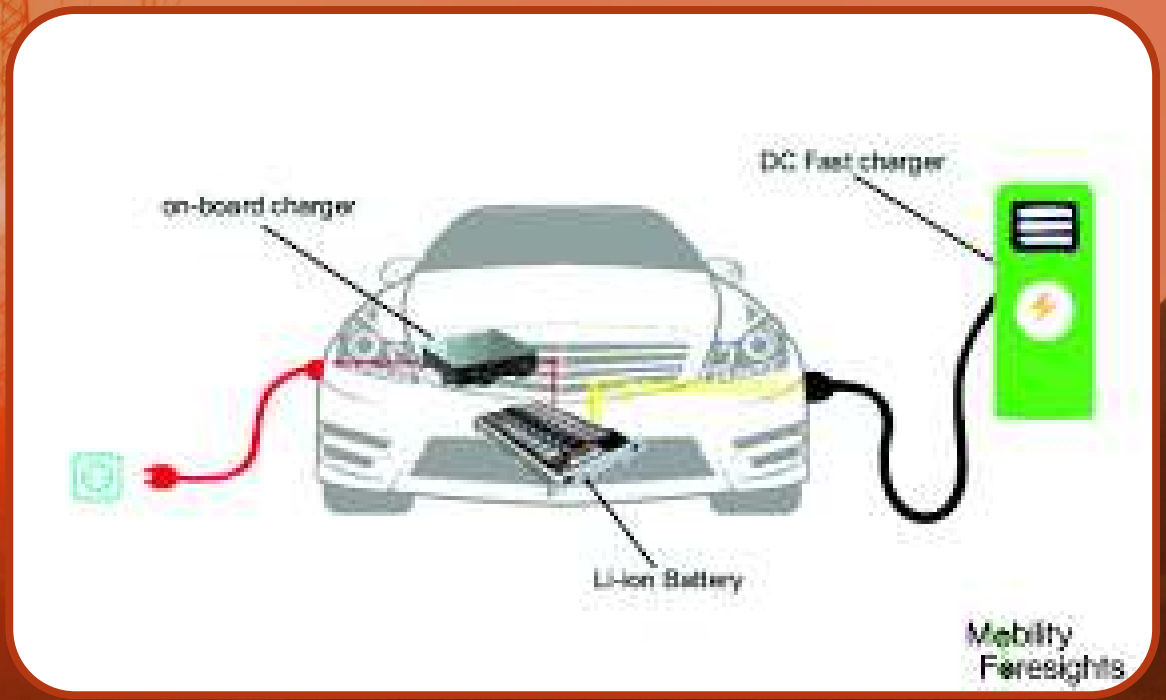
3. DC-DC Converter: After the AC-DC conversion, a DC-DC converter adjusts the voltage to match the battery's charging requirements. This step ensures that the battery is charged within its operating range, maximizing efficiency and battery life. Common topologies used here include isolated designs like LLC resonant converters or non-isolated buck converters.



4. Control Unit: The brain of the OBC is the control unit, which monitors and manages the charging process. It ensures that charging happens within safe temperature and voltage limits, prevents overcharging, and communicates with the vehicle's Battery Management System (BMS) for optimal charge management.

5. Thermal Management: Since OBCs handle significant power conversion, they generate heat. Advanced thermal management systems, including heat sinks, fans, and in some cases, liquid cooling, ensure that the OBC remains within operational temperature limits.

6. Protection and Safety Circuits: To prevent damage and ensure user safety, OBCs are equipped with numerous protection circuits. These protect against over-voltage, over-current, short-circuits, and thermal overload.



There are different types of OBCs based on the voltage they support and the type of AC input they can handle.

1. Single-phase OBC: This is the most common type found in residential applications. It operates on a standard single-phase AC input (typically 120V or 230V) and is ideal for overnight charging at home. The charging speed, however, is slower compared to three-phase systems.

2. Three-phase OBC: These are high-power chargers used in regions with a three-phase electrical grid, commonly found in industrial or commercial settings. They offer significantly faster charging times, supporting up to 22 kW in some cases.

3. Bidirectional OBC: This emerging technology not only charges the battery but also allows the vehicle to send power back to the grid or another load. This Vehicle-to-Grid (V2G) capability turns EVs into mobile energy storage units, enabling them to play a role in grid stabilization and energy arbitrage.

Mr. Jithin Nair, S7 EEE

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

-GRADUATES WILL ACHIEVE BROAD AND IN-DEPTH KNOWLEDGE OF ELECTRICAL & ELECTRONICS ENGINEERING RELATING TO INDUSTRIAL PRACTICES AND RESEARCH TO ANALYZE THE PRACTICAL PROBLEMS AND THINK CREATIVELY TO GENERATE INNOVATIVE SOLUTIONS USING APPROPRIATE TECHNOLOGIES.

-GRADUATES WILL MAKE VALID JUDGMENT, SYNTHESIZE INFORMATION FROM A RANGE OF SOURCES AND COMMUNICATE THEM IN SOUND WAYS APPROPRIATE TO THE DISCIPLINE.

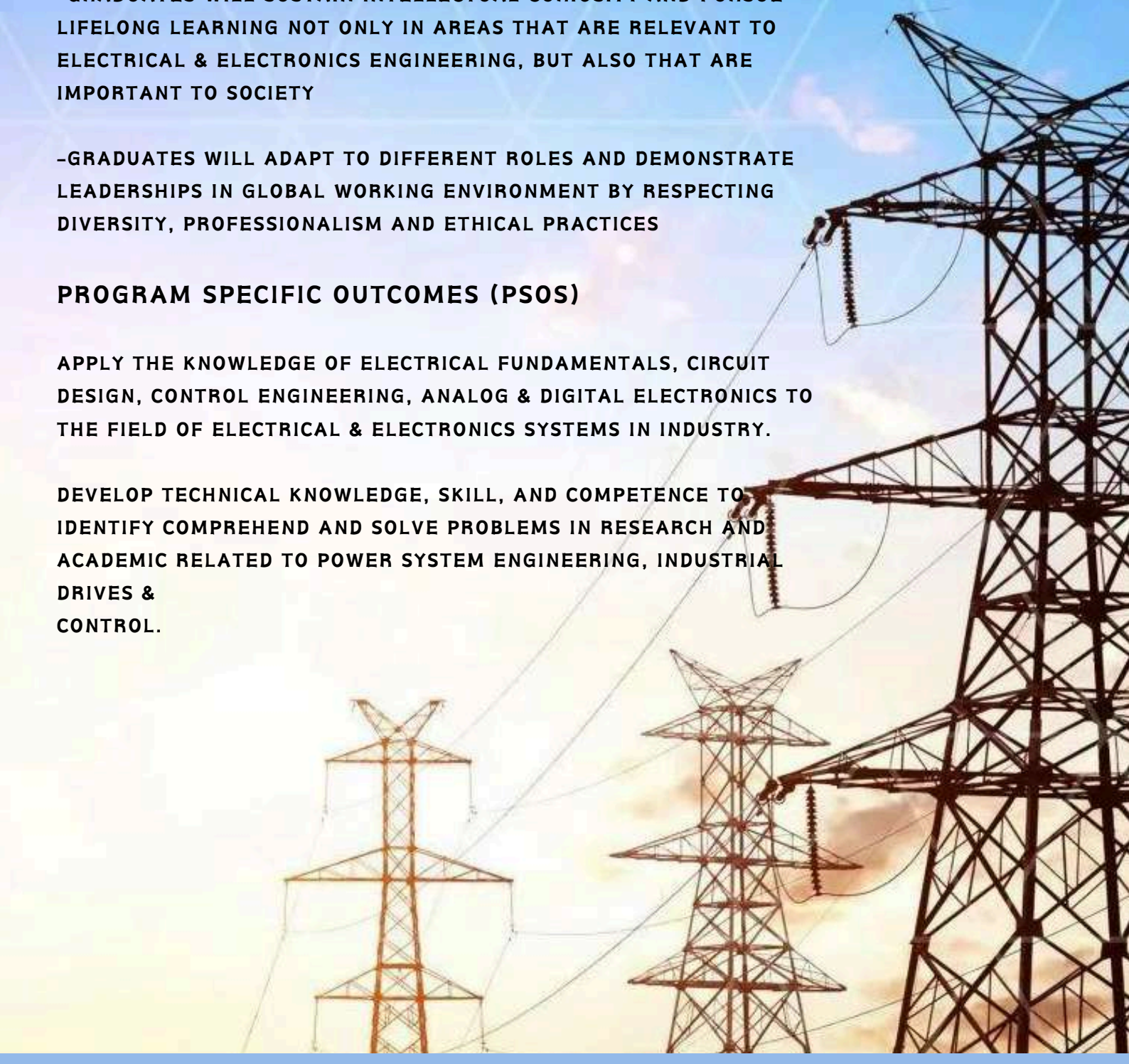
-GRADUATES WILL SUSTAIN INTELLECTUAL CURIOSITY AND PURSUE LIFELONG LEARNING NOT ONLY IN AREAS THAT ARE RELEVANT TO ELECTRICAL & ELECTRONICS ENGINEERING, BUT ALSO THAT ARE IMPORTANT TO SOCIETY

-GRADUATES WILL ADAPT TO DIFFERENT ROLES AND DEMONSTRATE LEADERSHIPS IN GLOBAL WORKING ENVIRONMENT BY RESPECTING DIVERSITY, PROFESSIONALISM AND ETHICAL PRACTICES

PROGRAM SPECIFIC OUTCOMES (PSOS)

APPLY THE KNOWLEDGE OF ELECTRICAL FUNDAMENTALS, CIRCUIT DESIGN, CONTROL ENGINEERING, ANALOG & DIGITAL ELECTRONICS TO THE FIELD OF ELECTRICAL & ELECTRONICS SYSTEMS IN INDUSTRY.

DEVELOP TECHNICAL KNOWLEDGE, SKILL, AND COMPETENCE TO IDENTIFY COMPREHEND AND SOLVE PROBLEMS IN RESEARCH AND ACADEMIC RELATED TO POWER SYSTEM ENGINEERING, INDUSTRIAL DRIVES &
CONTROL.



PROGRAM OUTCOMES (POS)

1.ENGINEERING KNOWLEDGE

2.PROBLEM ANALYSIS

3.DESIGN/ DEVELOPMENT OF SOLUTIONS

4.CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS

5.MODERN TOOL USAGE

6.THE ENGINEER AND SOCIETY

7.ENVIRONMENT AND SUSTAINABILITY

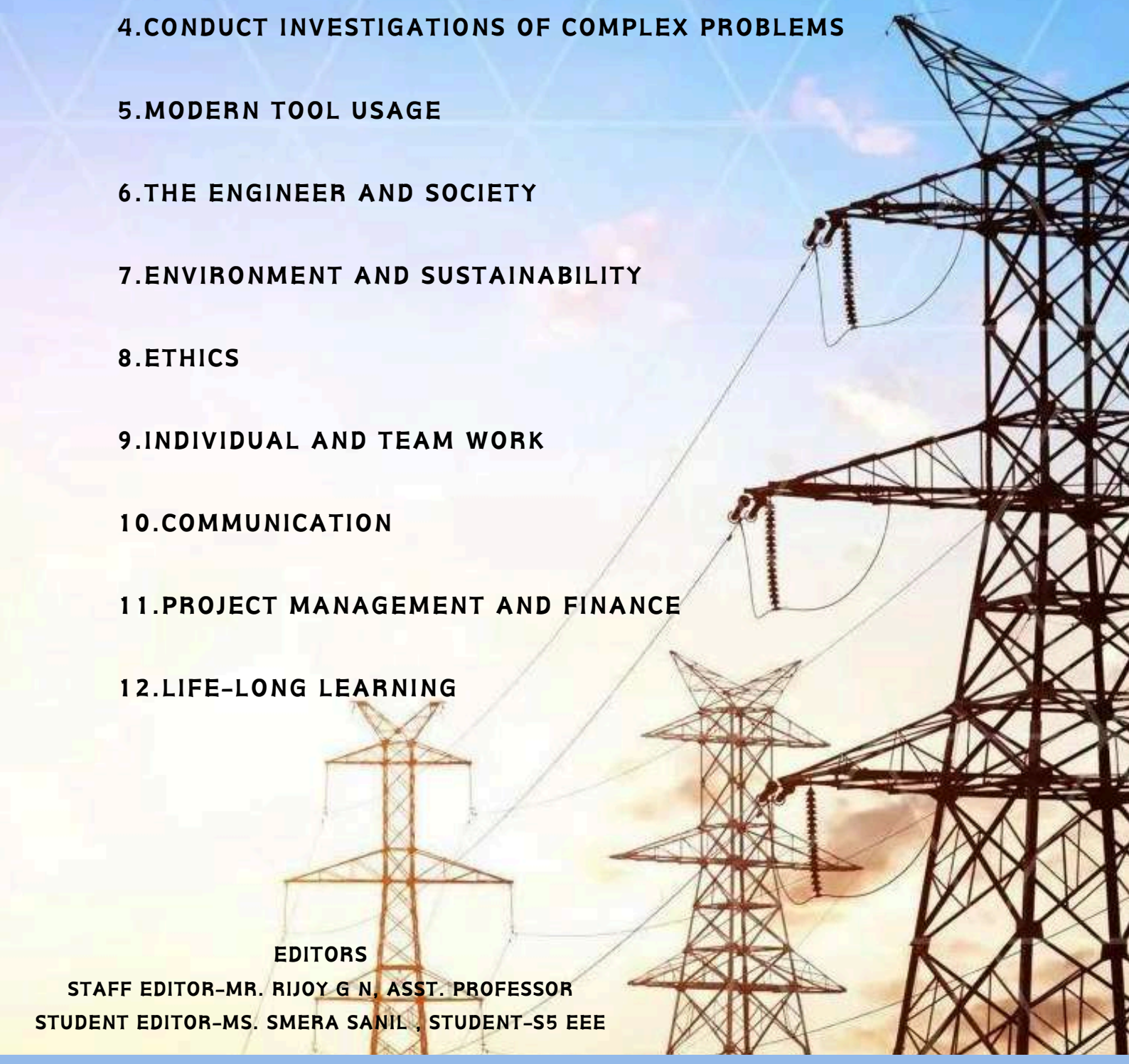
8.ETHICS

9.INDIVIDUAL AND TEAM WORK

10.COMMUNICATION

11.PROJECT MANAGEMENT AND FINANCE

12.LIFE-LONG LEARNING



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