# MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

## Autonomous Institution – UGC, Govt. of India

Accredited by NBA & NAAC with 'A' Grade

NIRF Indian Ranking, Accepted by MHRD, Govt. of India | Band – Excellent, National Ranking by ARIIA

Maisammaguda, Dhulapally, Secunderabad – 500 010, Telangana

**A.Y : 2021-22** **VOL.2**

Under

Student Chapter IEEE, IETE & Technical Association Electropheenix

# ELEKTOR

**HALF YEARLY TECHNICAL MAGAZINE**

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

# E E E

www.mallareddyecw.com

## DEPARTMENT VISION

- To develop competitive industry ready electrical engineers by establishing traditions, which will foster creativity and growth of excellence to effectively meet the technological requirements..

Vision

## DEPARTMENT MISION

- To develop proficiency by imparting application oriented knowledge and inculcate analytical thinking to solve the technological problems associated with analyzing, designing and testing electrical systems.

Mission

## ABOUT THE DEPARTMENT

The Department of Electrical & Electronics Engineering is accredited by NBA, with an intake of 60 students. The Dept. has state of the art laboratories with latest softwares like MATLAB, ORCAD, SCI LAB, PSPICE and Multisim. We have well qualified faculty members. Several faculty members have received their best teacher awards from institutions of International repute and have been working on research and development projects and regularly publish their work in international journals and conferences. EEE department faculty teams attained patent rights for their technological innovations. The Dept. established IEEE, ISTE student chapters under which it organizes National Level Technical Symposium -FUTURE SASTRA & State Level Technical Symposium- MEDHA every academic year. The Dept. organized National conference on "Emerging Trends in Electrical Systems & Engineering" NCETESE, International Conference on "Emerging Trends in Electrical Systems & Engineering"(ICETESE) every year since 2014, The Dept. organizes Faculty Development Programmes, Refresher courses and workshops in different streams and Student Development Programmes like Workshops, intra college conferences, Industrial visits , Guest lectures and our students actively participate in hackathon programmes conduct at state and National level. Our students are actively participated and won prizes in curricular activities organized by other colleges. The Dept. also organizes regular student seminar sessions of two hours per week for I to IV B.Tech student to enhance their all round performance.

The Dept. also offers value added certification Courses on oxford, Microsoft, CISCO certification through Oxford University, Microsoft Innovation Centre and CISCO Networking Academy respectively. The College Offers Campus Recruitment Training Programmes in collaboration with TIME and FACE Institutions. The Department also publishes the Registered Journal "International Journal of Research in Signal Processing, Computing and Communication-System Design (IJRSCSD) with an ISSN: 2395-3187.

## PO'S

| | | |
|---|---|---|
| PO1 | Engineering knowledge | An ability to apply knowledge of mathematics (including probability, statistics and discrete mathematics), science, and engineering for solving Engineering problems and modeling |
| PO2 | Problem analysis | An ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components |
| PO3 | Design / development of solutions | An ability to design a complex electronic system or process to meet desired specifications and needs |
| PO4 | Conduct investigations of complex problems | An ability to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions. |
| PO5 | Modern tool usage | An ability to use the techniques, skills and modern engineering tools necessary for engineering practice |
| PO6 | The engineer and society | An understanding of professional, health, safety, legal, cultural and social responsibilities |
| PO7 | Environment and sustainability | The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development. |
| PO8 | Ethics | Apply ethical principles, responsibility and norms of the engineering practice |
| PO9 | Individual and team work | An ability to function on multi-disciplinary teams. |
| PO10 | Communication | An ability to communicate and present effectively |
| PO11 | Project management and finance | An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments |
| PO12 | Life-long learning | A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning |

## PSO'S

**The graduates of the department will attain:**

**PSO1:** Analyze, Design and Implement application specific electrical system for complex engineering problems, Electrical And Electronics Circuits, Power Electronics and Power Systems by applying the knowledge of basic science, Engineering mathematics and engineering fundamentals

**PSO2:** Apply modern software tools for design, simulation and analysis of electrical systems to engage in life- long learning and to successfully adapt in multi disciplinary environments

**PSO3:** Solve ethically and professionally various Electrical Engineering problems in societal and environmental context and communicate effectively

## PEO'S

**PEO1-PROFESSIONAL DEVELOPMENT**

To develop in the students the ability to acquire knowledge of Mathematics, Science & Engineering and apply it professionally within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability with due ethical responsibility.

**PEO2-CORE PROFICIENCY**

To provide ability to identify, formulate and solve engineering problems with hands on experience in various technologies using modern tools necessary for engineering practice to satisfy the needs of society and the industry.

**PEO3- TECHNICAL ACCOMPLISHMENTS**

To equip the students with the ability to design, experiment, analyze and interpret in their core applications through multi disciplinary concepts and contemporary learning to build them into industry ready graduates.

**PEO4- PROFESSIONALISM**

To provide training, exposure and awareness on importance of soft skills for better career and holistic personality development as well as professional attitude towards ethical issues, team work, multidisciplinary approach and capability to relate engineering issues to broader social context.

**PEO5- LEARNING ENVIRONMENT**

To provide students with an academic environment and make them aware of excellence, leadership, written ethical codes and guidelines and the life-long learning to become a successful professional in Electrical and Electronics Engineering

# MESSAGES

## Founder Chairman's Message

**Ch. Malla Reddy**

Founder Chairman, MRGI
Hon'ble Minister, Govt. of Telangana State

MRECW has made tremendous progress in all areas and now crossing several milestones within a very short span of time and now I feel very happy to know that the students and faculty of the EEE department of MRECW are bringing out the volume-2 of the Technical magazine Elektor in A.Y 2021-22. As I understand this magazine is intended to bring out the inherent literary talents in the students and the teachers and also to inculcate leadership skills among them. I am confident that this issue will send a positive signal to the staff, students and the persons who are interested in the educational and literary activities

## Principal's Message

I congratulate the department of EEE, MRECW for bringing out the second issue of the prestigious half yearly department technical Magazine Elektor under A.Y: 2021-22, I am sure that the magazine will provide a platform to the students and faculty members to expand their technical knowledge and sharpen their hidden literary talent and will also strengthen the all round development of the students. I am hopeful that this small piece of literary work shall not only develop the taste for reading among students but also develop a sense of belonging to the institution as well. My congratulations to the editorial board who took the responsibility for the arduous task most effectively. I extend best wishes for the success of this endeavor.

**Dr. Y. Madhavee Latha**

Principal

## HOD'S MESSAGE

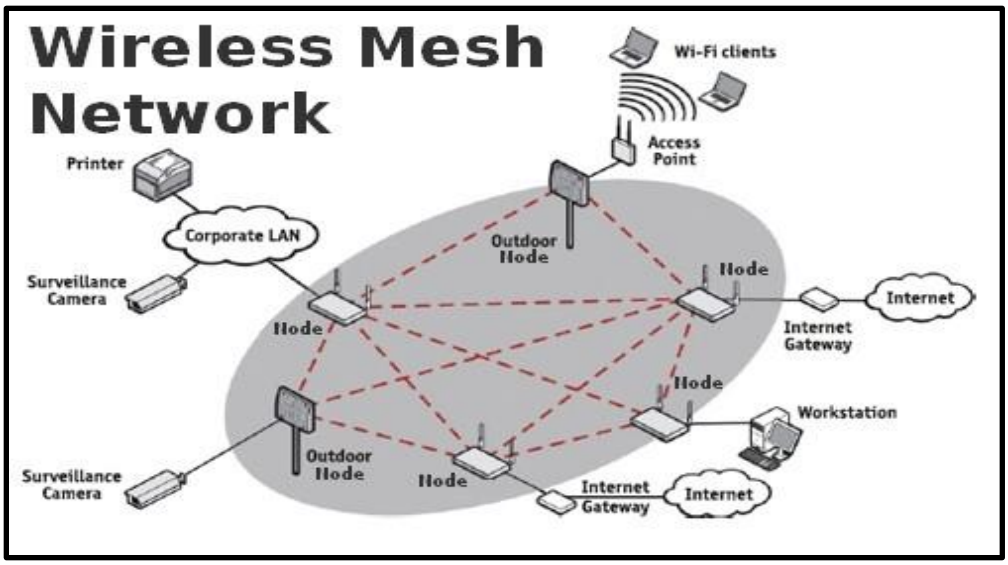
It is an occasion of great pride and satisfaction for the department of EEE, MRECW to bring out the second issue of the half yearly of the Technical magazine Elektor under A.Y:2021-22, it gives me immense pleasure to note that the response to the magazine has been over whelming. The wide spectrum of articles gives us a sense of pride that our students and faculties possess creative potential and original thinking in ample measures. Each article is entertaining interesting and absorbing. I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them.

**Dr. N. Vengadachalam**

HOD

## FACULTY ARTICLES

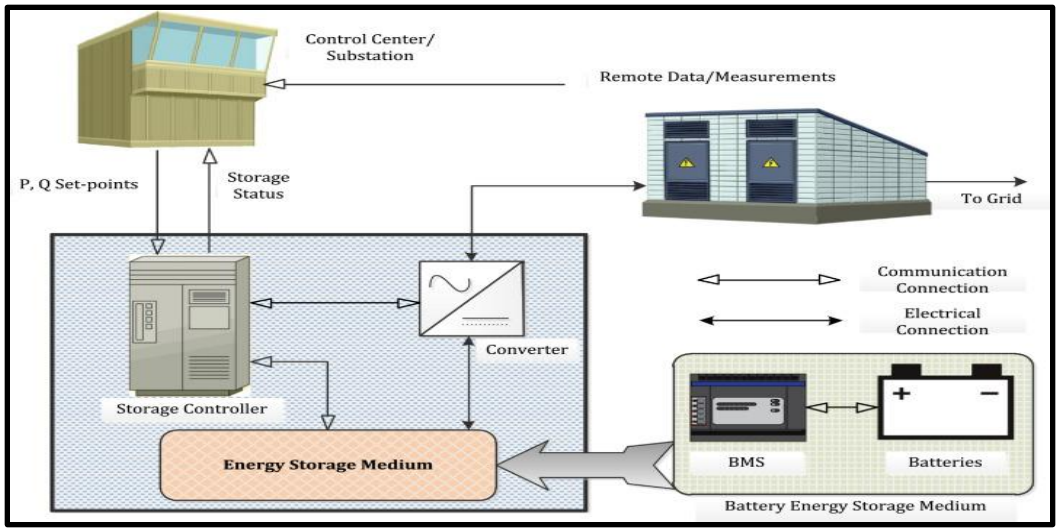
# WIRELESS MESH NETWORK




A wireless mesh network (WMN) is a mesh network created through the connection of wireless access point (WAP) nodes installed at each network user's locale. The networking infrastructure is decentralized and simplified because each node need only transmit as far as the next node. WMNs may or may not be connected to the internet. Each node in a WMN has at least one, but often multiple, paths to other nodes, creating multiple routes of information for pairs of users. This makes the network more resilient, and in the event of a WAP or connection failure, information can still access other nodes.The network topology of a wireless mesh network may be full or partial mesh. A full mesh network means every node communicates with every other node. In a partial mesh topology, nodes only communicate with nearby nodes. When data is transmitted between two nodes that do not communicate with each other, data hops from one node to the next until it reaches the client. The nodes are programmed to use adaptive routing algorithms to constantly determine the optimal route between nodes for data transmission.In a wireless mesh network, each node receives data from one node while forwarding data to the next node. The resulting network between connected devices is often called a *mesh cloud*. Having more nodes increases the range of the network that the mesh client devices can connect to for internet. Only one node will need to act as a gateway to and from the internet for connectivity.

**N. RAVEENDRA**
**Associate Professor, EEE**

# ENERGY STORAGE SYSTEM DESIGN FOR LARGE-SCALE SOLAR PV




Large-scale solar is a non-reversible trend in the energy mix of Malaysia. Due to the mismatch between the peak of solar energy generation and the peak demand, energy storage projects are essential and crucial to optimize the use of this renewable resource. Although the technical and environmental benefits of such transition have been examined, the profitability of energy storage systems combined with large-scale solar PV has not been studied in Malaysia. This project aims to determine the most profitable business model of power systems, in terms of PV installed capacity, and energy storage capacity, and power system components. A comparative study has been done to compare the economic outcomes from different types of projects, with different scales and multiple configurations of large-scale solar PV combined with energy storage. The lowest values of LCOE are guaranteed with energy storage output to LSS output ratio, $A = 5\%$. In this case, 30-MW projects have the cheapest electricity, equal to RM 0.2484/kWh. On the other hand, increasing the energy storage output to LSS output ratio, $A$ to 60% results in the increase of LCOE, exceeding RM 0.47/kWh. On the economical side, with a difference of 0.06 kWh/m$^2$/day for the analysis carried out in Pahang and Perak, the difference in net present worth is more than 7.5% of the net present cost. The difference between the two locations is comparatively higher for 50-MW projects. It is equal to RM 11.67 Million for $A = 60\%$, while it is equal to RM 13.5 Million with $A = 5\%$. Due to the energy prices in Malaysia, the projects that include large-scale solar only are more profitable technically and financially than those including large-scale solar and energy storage. It is found that adding storage to a large-scale solar project is more profitable technically and financially with greater large-scale solar capacities and smaller storage capacities.

**V . Brahmam yadav**
Asst.Professor, EEE

STUDENT ARTICLES

# ELECTRICITY LOAD FORECASTING

Electricity is the pivot in upholding highly technologically advanced industrialization in every economy. Almost every activity done in this modern era hinges on electricity. The demand and usage of electric energy increase globally as the years past. however, the process of generating, transmitting, and distributing electrical energy remains complicated and costly. Hence, effective grid management is an essential role in reducing the cost of energy production and increased in generating the capacity to meet the growing demand in electric energy. Accordingly, effective grid management involves proper load demand planning, adequate maintenance schedule for generating, transmission and distribution lines, and efficient load distribution through the supply lines. Therefore, an accurate load forecasting will go a long way to maximize the efficiency of the planning process in the power generation industries. As a means to improve the accuracy of Electrical Energy Demand (EED) forecasting, several computational and statistical techniques have been applied to enhance forecast models.EED forecasting techniques can be clustered into three (3), namely correlation, extrapolation, and a combination of both. The Extrapolation techniques (Trend analysis) involve fitting trend curves to primary historical data of electrical energy demand in a way to mirror the growth trend itself.

**R . SRUJANA**
**18RH1A0249**

# TOWARDS MODELING OF HUMAN SKILLING FOR ELECTRICAL CIRCUITRY USING AUGMENTED REALITY APPLICATIONS

Augmented reality (AR) is a unique, hands-on tool to deliver information. However, its educational value has been mainly demonstrated empirically so far. In this paper, we present a modeling approach to provide users with mastery of a skill, using AR learning content to implement an educational curriculum. We illustrate the potential of this approach by applying this to an important but pervasively misunderstood area of STEM learning, electrical circuitry. Unlike previous cognitive assessment models, we break down the area into micro skills—the smallest segmentation of this knowledge—and concrete learning outcomes for each. This model empowers the user to perform a variety of tasks that are conducive to the acquisition of the skill. We also provide a classification of micro skills and how to design them in an AR environment. Our results demonstrated that aligning the AR technology to specific learning objectives paves the way for high quality assessment, teaching, and learning. New technologies, such as augmented reality (AR), which superimposes virtual information into the physical world, provide unique hands-on capabilities to deliver educational content. In the last decade, there has been a surge of interest in acquiring knowledge through a minds-on and hands-on approach (Council, 2012; Williams et al., 2019). An AR display (e.g., a headset, a tablet or a mobile phone) provides the user with an interface to the virtual world, which enables interactions with physical objects.

**MAMIDI MOUNIKA**
**19RH1A0235**

# CHALLENGES AND TRENDS IN ANALYSES OF ELECTRIC POWER QUALITY

Power quality monitoring has expanded from a means to investigate customer complaints to an integral part of power system performance assessments. Besides special purpose power quality monitors, power quality data are collected from many other monitoring devices on the system (intelligent relays, revenue meters, digital fault recorders, etc.). The result is a tremendous volume of measurement data that is being collected continuously and must be analyzed to determine if there are important conclusions that can be drawn from the data. It is a significant challenge due to the wide range of characteristics involved, ranging from very slow variations in the steady state voltage to microsecond transients and high frequency distortion. This paper describes some of the problems that can be evaluated with both offline and online analyses of power quality measurement data. These applications can dramatically increase the value of power quality monitoring systems and provide the basis for ongoing research into new analysis and characterization methods and signal processing techniques. Electric power quality problems encompass a wide range of different phenomena with time scales range from tens of nanoseconds to steady state. Each of these phenomena may have a variety of different causes and, thus, require different solutions that can be used to improve the power quality and equipment performance. Many power quality (PQ) problems arise from the incompatibility in the electrical environment between the utility supply system and the equipment it serves.

**S ROHITHA REDDY**
**18RH1A0255**

# ENERGY EFFICIENCY TRADE-OFFS IN SMALL TO LARGE ELECTRIC VEHICLES


Efficiency trade-offs in electric vehicles differ from those in conventional cars—the latter showing a strong dependency of fuel consumption on rated engine power. Mass-related efficiency trade-offs in electric vehicles are large and could be tapped by stimulating mode shift from passenger cars to light electric road vehicles. Electric passenger cars still offer potentials for further efficiency improvements. These could be exploited through a dedicated energy label with battery capacity as utility parameter. Not only do electric power trains allow operating vehicles without direct $CO_2$ and air pollutant emissions, but also they relax important design constraints of conventional vehicles that need to accommodate a voluminous cylinder block, a crankshaft, and a transmission. Electric power trains can generate high torque and power by multiple small motors placed in versatile configurations on one or multiple axles or directly in the wheel hub. Traction batteries still offer a 50–100 times lower energy density than gasoline and require more space than comparable fuel tanks. However, they allow for flexible integration into the rolling chassis and their size may decrease once occasional charging—at home, work, or in the public space—becomes feasible. Certified and real-world energy consumption of electric vehicles increase by 60% and 40%, respectively, with each doubling of vehicle mass, but only by 5% with each doubling of rated motor power.

T . SUSHMA
18RH1A0222

# BIO-BATTERIES


A **bio-battery** is an energy storing device that is powered by organic compounds, usually being glucose, such as the glucose in human blood. When enzymes in human bodies break down glucose, several electrons and protons are released. Therefore, by using enzymes to break down glucose, bio-batteries directly receive energy from glucose. Then these batteries store this energy for later use. This concept is almost identical to how both plants and many animals use energy from metabolic reactions.Although the batteries are still being tested before being commercially sold, several research teams and engineers are working to further advance the development of these batteries. A significant advantage that bio-batteries have in comparison to other batteries is their ability to allow an instant recharge. In other words, through a constant supply of sugar, or glucose, bio batteries are able to continuously keep themselves charged without an external power supply. Bio batteries are also a source of non-flammable and non-toxic fuel. This provides a clean alternative renewable power source. Although biobatteries are not ready for commercial sale, several research teams and engineers are working to further advance the development of these batteries. Sony has created a bio battery that gives an output power of 50 mW (milliwatts).

**P. SAPRAVALLIKA**
**18RH1A0245**

# METAMORPHIC ROBOTS

This article considers how to enumerate the basic set of all the non-isomorphic configurations of a planar metamorphic robotic system. Metamorphic robotic systems are being widely studied because their shape changing abilities make them potentially useful for a larger set of tasks that conventional robotic systems are unable to develop, for example reconnaissance, exploration, satellite recovery, or operation in constrained environments inaccessible to humans, (e.g., nuclear reactors, space or deep water). A metamorphic robotic system is a collection of mechatronic modules that can dynamically self-reconfigure in a variety of configurations, kinematic chains, to meet different or changing task requirements. However, due to typical symmetries in module design, different assemblies may generate isomorphic robotic structures. To solve this problem, we use group theory tools for the identification of symmetries of metamorphic robotic systems. In particular, we define the concept of binary orbits of the auto orphism group of the graphs associated with the metamorphic robot configurations. Another issue considered in this paper is the motion planning of a metamorphic robot system, i.e., how to determine a sequence of module movements required to go from a given initial configurations to a desired final configuration. The paper solved the fundamental problem which is to determine the set of all possible configurations. Knowing all the possible configurations, the motion planning is solved with algorithms proposed in the literature.

**S ROHITHA REDDY**
**18RH5A0212**

# ATMOSPHERIC WATER GENERATOR


An atmospheric water generator (AWG) is **a device that extracts water from humid ambient air, producing potable water**. Water vapor in the air can be extracted by multiple techniques, including condensation - cooling the air below its dew point, exposing the air to desiccants, or pressurizing the air. Atmospheric water generation (AWG) uses technology to produce potable water from surrounding air. This provides the potential to expand water availability during shortages, contamination events, and other issues that can interrupt drinking water services. Natural disasters, such as hurricanes, and public water infrastructure failures, such as pipe corrosion resulting in contamination issues, have increased the interest in AWG technology as both emergency and long-term supply solutions. Atmospheric water generation (AWG) uses technology to produce potable water from surrounding air. This provides the potential to expand water availability during shortages, contamination events, and other issues that can interrupt drinking water services. Natural disasters, such as hurricanes, and public water infrastructure failures, such as pipe corrosion resulting in contamination issues, have increased the interest in AWG technology as both emergency and long-term supply solutions.

**B. KEERTHANA**
**19RH1A0210**

# A HOUSE THAT WALKS

Walking house is a mobile and modular dwelling system created by the Danish architecture studio . The concept is a small home which slowly walks allowing its inhabitants to live a slow nomadic life. the dwelling collects rainwater for reuse and also uses solar energy to heat hot water. Inside, a small composting toilet is used along with a wood-burning fireplace for heating. the home consists of a main room that can be added onto including a greenhouse addition that would enable the user to grow much of their own food. the unit can also be joined with other to create walking villages. Each unit holds up to 4 inhabitants and can be infinitely expanded. the home maneuvers on six legs that are pneumatically powered, allowing it to walk on all sorts of terrains. the unit is a hexagonal prism that has large windows on each end and small platforms inside to split the home into levels. the home travels at a top speed of 60 meters/hour. Houses are normally fairly stationary objects, and that's not considered a bad thing. But innovation never stands still, and a new prototype house that can walk on six legs has been built . The house is ten feet high, powered by solar panels, and is outfitted with a kitchen, toilet, bed, and wood stove. Last week, the house, a collaboration between MIT and the Danish design collective N55, took a journey through Cambridge shire in England as part of an art project at the Wising Art Center. Designed to move at the muscle speed of a human, the house walked at about five kilometers an hour around the 11-acre campus.

**K. SAI SOWBHAGYA**
**18RH1A0241**

# STREETLIGHT MONITORING SYSTEM

Streetlights are a significant source of energy consumption. Often, streetlights continue to remain on even when there's no one in the street. With the help of this IOT-based streetlight monitoring system, we can efficiently monitor and optimize the energy consumption of streetlights. In this IOT-based project, street lights are fitted with LDR sensors that can monitor the movement of humans or vehicles in the street. If the sensor can catch any movement in the street, it signals the microcontroller, which then turns on the street light. Similarly, if there's movement in the street, the microcontroller switches the lights off. This way, a substantial amount of energy can be saved. The Internet Of Things These Days Is Quite Popular In The Development Of Different Low-Cost Systems With The Help Of A Microcontroller. Main Aim Of The Internet Of Things Is To Conserve Energy By Reducing Wastage Of Electricity And Also To Reduce Labor Force Or Manpower. Streetlights Are Quite An Important Part Of A City Because It Helps In Giving Better Vision Of Roads And Streets At Night Time. These Street Lights Are Switched ON In The Evening And Are Switched OFF In The Morning. Between This Time, These Street Lights Are Used At Maximum Intensity Even When Adequate Light Is Available. In Order To Reduce This Wastage Of Electricity, We Need An Automated Street Light Monitoring System Using IoT

**V. MADHUNITHA**
**18RH1A0258**

# GRAVITY LIGHT

**Gravity Light** was a gravity-powered lamp manufactured until 2019. It was designed by the company Deciwatt for use in developing or third-world nations, as a replacement for kerosene lamps. It uses a bag filled with rocks or earth, attached to a cord, which slowly descends similar to the weight drive in a cuckoo clock. This action powers the light for up to twenty minutes. There are no operating costs after the initial purchase of the appliance. A standard Gravity Light kit comes with an adjustable lamp and a ballast bag. The light can be turned on by filling the bag with approximately 20 pounds (9.1 kg) of weight and lifting it up to the base of the device; the weight falls over a period of 25 minutes, pulling a cord/strap that spins gears and drives an electric generator, which continuously powers an LED. his creates enough energy to last 25 minutes whenever it is needed. The second model, GL02, also includes two Sat Lights and connecting cables. These are separate lights that are wired in series from the main Gravity Light unit. Each Sat Light can be turned on or off separately. When used with Sat Lights, the light on the main unit can be turned on or off. Up to four Sat Lights can be connected, giving extra light to other locations in the house. The rate of the bag drop is almost not affected by the number of Sat Lights attached. The original Gravity Light used a strap for pulling up the weight. The improved GL02 used a plastic-bead chain on a pulley system. The pulley system requires less strength to pull up. The theoretical efficiency of the device is limited by taking the simple potential energy generated by raising a mass to a specified height, and then dividing it by the desired time that the lamp is to stay lit.

**P. VENKATA LAKSHMI**
**19RH1A0251**

## IMPORTANT WEBSITES

www.ieee.org/india

www.engineering.careers360

www.technologyreview.com

www.mathworks.in/products/matlab/

www.microwaves101.com/

www.eee.utoronto.ca/student-life-links

https://www.eee.org/

Science Commons.org

MathGV.com:

http://www.engineeringchallenges.org/

http://engineering.stanford.edu/announcement/stanford-announces-16-online-courses-fall-quart

http://www.tryengineering.org/

http://www.engineergirl.org/

http://www.discoverengineering.org/

http://www.eng-tips.com/

http://electricalbaba.com

http://efymagonline.com/

http://circuitglobe.com

www.techdoct.com

www.howstuffworks.com

http://nptel.iitm.ac.in

http://www.opencircuitdesign.com/

http://www.futuresinengineering.com/

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**EAMCET CODE** **MRCW**

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