KARPAGAM
COLLEGE OF ENGINEERING
Rediscover | Refine | Redefine

Accredited by NAAC with 'A+' grade
Autonomous | Affiliated to Anna University

(An ISO 9001:2015 and ISO 14001:2015 Certified Institution)

IMPULSE 23K

EEE
ELECTRICAL AND ELECTRONIC ENGINEERING

MAGAZINE 2023-2024

EDITORIAL COMMITTEE

INDEX PAGE

Department @ Glance

The Department of Electrical and Electronics Engineering was established in the year 2002 with an intake of 60 students. The intake is increased to 120 and 180 in the year 2007 and 2012 respectively. The program is accredited by NBA in the year 2009 and reaccredited in the year 2016. The Department is also recognized as research Centre by Anna University. This department has dedicated talented, qualified and experienced team as teaching faculty members.

Vision

To provide students with sound knowledge of Electrical and Electronics Engineering, that they become capable of facing the current and impending challenges to extend their expertise in the global arena

Mission

- Impart high quality education and training to the students in the field of Electrical and Electronics Engineering.
- Transforming our students into enterprising technologists by giving them excellent facilities by qualified, committed members of faculty.
- Motivating them to contribute immensely for the benefit of the entire humanity.

Program Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Educational Objectives (PEOs)

PEO1: Graduates will synthesize mathematics, science, engineering fundamentals, laboratory and work-based experiences to formulate and solve problems in Electrical and Electronics engineering and the related domains and will develop proficiency in Computer-based engineering and the use of computational tools.

PEO2: Graduates will communicate and work team-based on the multidisciplinary engineering projects in the allied fields of Electrical Science and will practice the ethics of their profession.

PEO3: Graduates will realize the importance of self-learning and engage in lifelong learning to become experts either as an entrepreneur or an employee so as to broaden their knowledge in the domain.

Programme Specific Outcomes (PSOs)

PSO 1: Apply the knowledge in the field of electrical and electronics engineering to analyze, design and develop solutions for real world problems.

PSO 2: Demonstrate the skill in core and allied domain to work in interdisciplinary teams.

STUDENTS ARTICLE

Magnetometer with field shock recovery

A magnetometer with field shock recovery is an advanced type of magnetometer that can continue to function accurately after experiencing a sudden magnetic or physical shock. Here's an overview of what this involves:

What is a Magnetometer?

A magnetometer is a device used to measure the strength and, often, the direction of a magnetic field. They are widely used in:

Geophysics: For mineral exploration and archaeological studies.

Navigation: In aircraft, submarines, and spacecraft.

Environmental Monitoring: To detect magnetic field changes, which can be indicators of tectonic activity or other phenomena.

Electronics: In smartphones, laptops, and other devices for orientation and location services.

Field Shock Recovery

Field shock recovery refers to a magnetometer's ability to stabilize and resume accurate readings quickly after experiencing:

Magnetic Shocks: A sudden, intense change in the surrounding magnetic field, such as from a nearby electromagnetic pulse (EMP).

Mechanical Shocks: Physical shocks due to impact or vibration, which can disrupt sensitive measurement equipment.

Magnetometer

Magnetometers with field shock recovery are designed with resilience to these sudden disturbances. This is often achieved through specific design features, such as:

Shock-Resistant Sensors: Some magnetometers incorporate ruggedized sensors and housings to withstand physical shocks without sustaining damage.

Signal Filtering and Stabilization Algorithms: Advanced filtering methods help the magnetometer distinguish true magnetic field measurements from "spikes" or anomalies caused by shocks. Algorithms adjust readings quickly after a disturbance to restore accurate measurements

Magnetic Shielding: Shielding can help mitigate the impact of external electromagnetic interference, which can cause magnetic shocks.

G. LOHITHA
717822E224

High-Performance PMIC for Self-Powered IoT Devices

A high-performance Power Management Integrated Circuit (PMIC) designed for self-powered Internet of Things (IoT) devices is critical for efficiently managing power in environments with limited energy sources. Self-powered IoT devices, often deployed in remote or low-maintenance areas, rely on energy harvesting from sources like light, motion, temperature, or RF signals, making power management essential to maximize device lifespan and operational effectiveness.

Key Features of High-Performance PMICs for Self-Powered IoT

1. Energy Harvesting Support

- Multi-Source Compatibility: PMICs must support various energy sources, such as solar, thermal, piezoelectric, or RF harvesting, and dynamically switch between sources as available.
- Low Power Consumption: The PMIC itself should consume minimal power to avoid draining the harvested energy, often operating in the micro- or nano-amp range when idle.
- Maximum Power Point Tracking (MPPT): MPPT optimizes power transfer from energy sources by adjusting input impedance to maximize the harvested energy, especially in variable environmental conditions.

PMIC for Self-Powered IoT Devices

2. Efficient Energy Storage Management

- Battery and Supercapacitor Charging: PMICs often manage both rechargeable batteries and supercapacitors, balancing charge distribution and monitoring voltage levels to prevent overcharge or deep discharge.
- Ultra-Low Quiescent Current: To minimize energy loss, PMICs for self-powered IoT devices often have ultra-low quiescent currents, enabling longer operational life on stored energy.
- Self-Discharge Prevention: Prevents leakage and self-discharge in supercapacitors or rechargeable batteries, maximizing the stored energy over time.

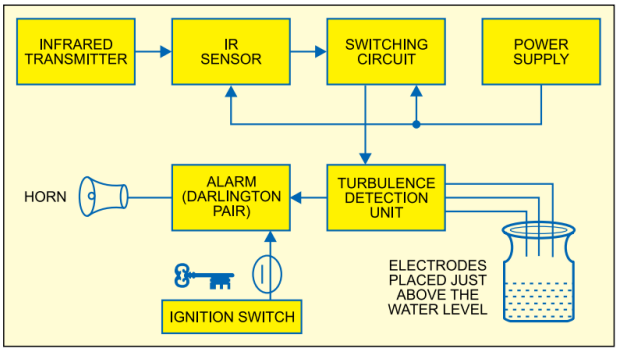
G. MOHANAKRISHNAN
717822E226

Two-Wheeler Security System

Two-Wheeler Security System:

India is the world's largest market for two-wheelers. Newer models with improved fuel efficiency and power ratings keep hitting the market off and on. Sadly, the security aspect of two-wheelers remains neglected. This fallibility inspired us to devise a foolproof yet cost-effective security system to safeguard bikes against theft. Any attempt to move the bike or force the ignition key to start the bike will set off the bike's horn.

The two-wheeler security system comprises a handheld infrared (IR) transmitter, IR receiver/sensor, switching circuit, power supply, turbulence detection unit, alarm and ignition switch. You have to keep the handheld IR transmitter with you and hide the receiver module at a secure place in your bike. Whenever you leave the bike, switch on the security circuit by pressing the transmitter switch while directing the transmitter towards the sensor module such that the transmitted IR rays fall on it directly. The received signal activates the security circuit to blow the horn when subsequently someone tries to steal your bike by moving the bike or by using a duplicate key. When you return back, switch off the sensor mechanism before starting the bike. Else, you may be caught off guard as this again will trigger the alarm.



Alarm. The alarm section comprises a high-current gain Darlington pair of transistors pumping current into the bike's horn. The emitter of transistor T4 is directly connected to the positive terminal of 12V horn. A heat-sink is used to dissipate the excessive heat generated by NPN power transistor TIP122.

Other applications

1. Turbulence detection.
2. The circuit can be modified to function as an Overflow indicator in water tanks.
3. The receiver unit itself can be used as an Infrared toggle switch.

P. NANDHEES
717822E230

AI-Based Smart Lighting System

AI-Based Smart Lighting System:

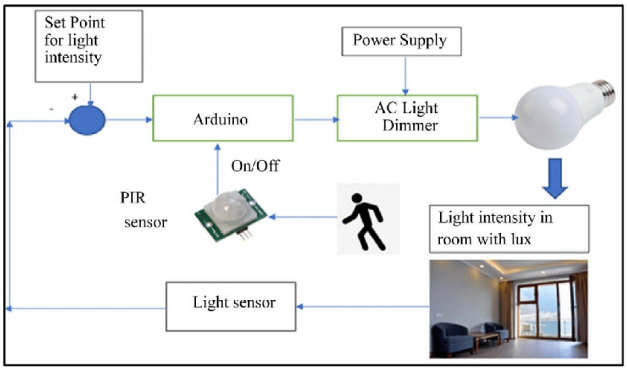
Lighting plays a crucial role in modern life, illuminating homes, offices, streets, and industries. However, traditional lighting systems are often energy-intensive and lack the intelligence to adapt to real-time needs. This is where an AI-based Smart Lighting System comes into play, leveraging artificial intelligence (AI) to optimize energy consumption, improve user convenience, and contribute to a sustainable future.

An AI-based smart lighting system is an advanced lighting solution that uses artificial intelligence, sensors, and automation to control lighting in an efficient and adaptive way. It analyzes environmental conditions, user behavior, and occupancy patterns to adjust light intensity, color, and operation automatically, ensuring optimal illumination while minimizing energy waste.

The system functions through a combination of hardware and software components, including sensors, microcontrollers, and AI algorithms. Here's a step-by-step breakdown:

Data Collection:

Sensors, such as light sensors (LDR) and motion detectors (PIR sensors), collect data on ambient light levels and room occupancy.



AI Analysis and Decision-Making:

AI algorithms process the sensor data and user behavior patterns. Based on these inputs, the system decides whether to turn lights on/off, adjust brightness, or even change the light color for a specific mood or activity.

Light Control:

Using relays or pulse-width modulation (PWM), the system controls LED lights to achieve the desired brightness and energy efficiency.

Learning and Adaptation:

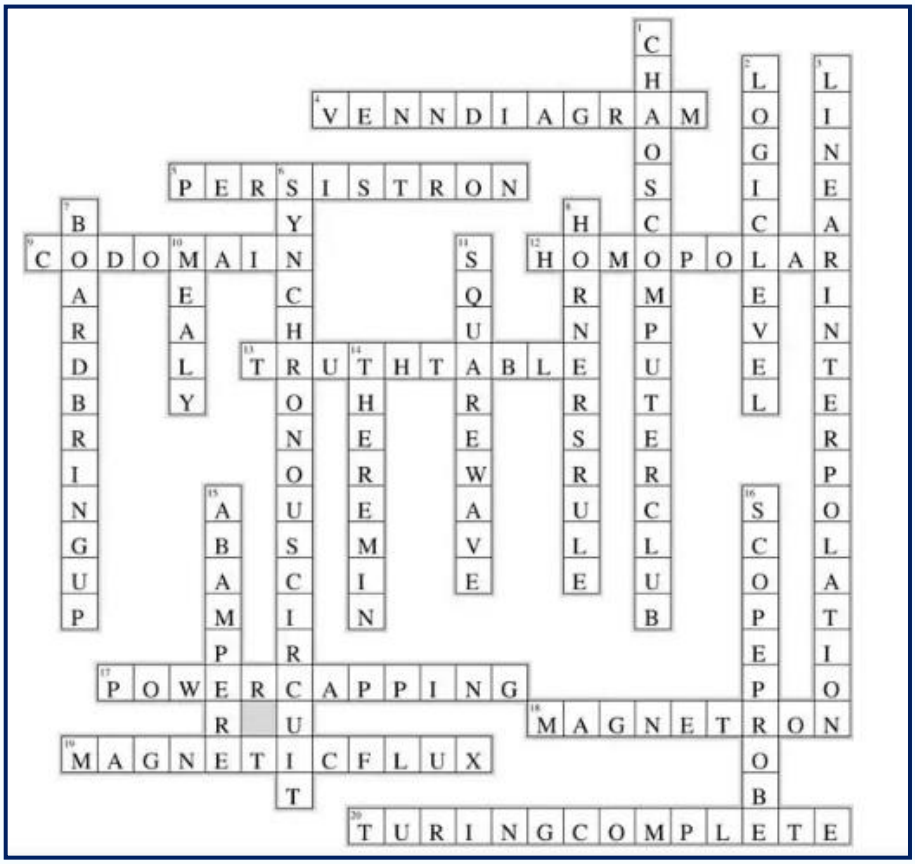
The AI system continuously learns from user interactions, refining its behavior over time to better match user preferences and schedules.

AI-based smart lighting systems represent a significant leap forward in energy efficiency and automation.

Dr. C. S. SUNDAR GANESH
AP / EEE

ELECTRICAL-THEMED PUZZLES

ELECTRICAL ENGINEERING CROSSWORD



Across

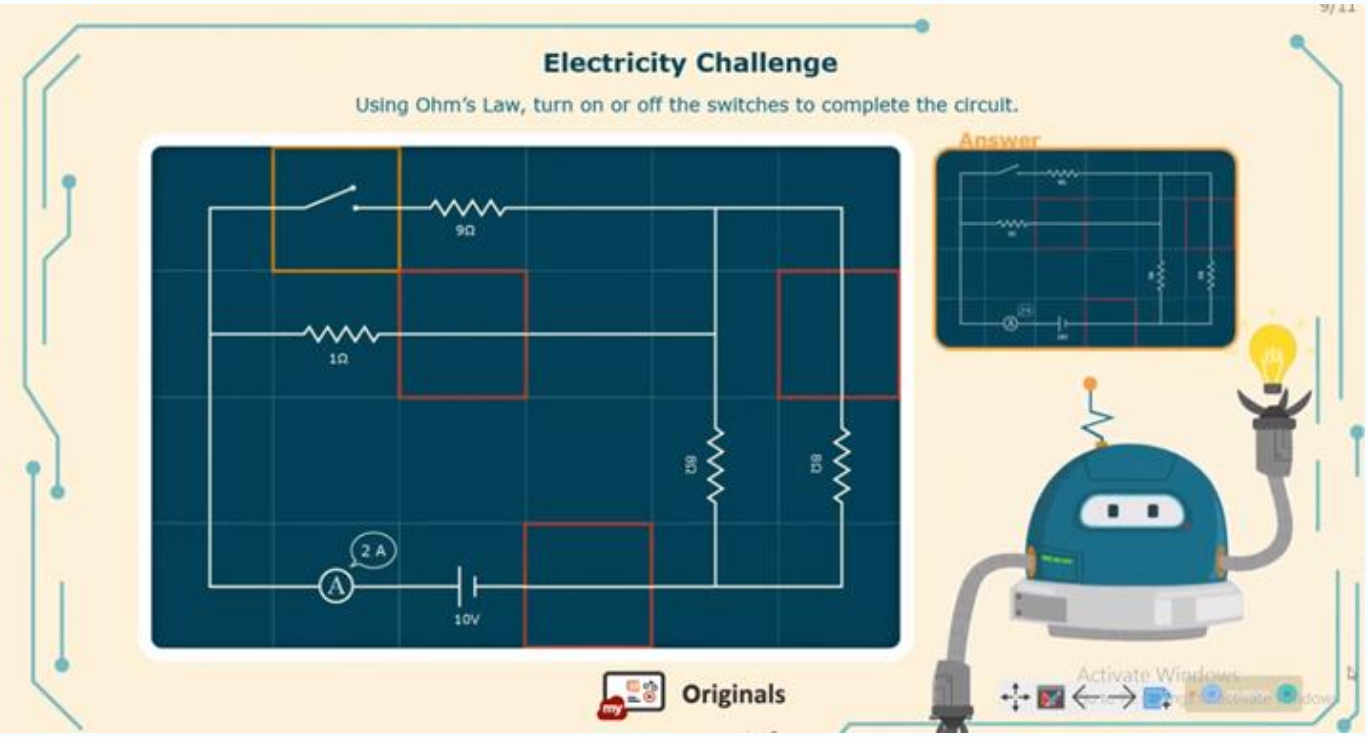
4. **VENNDIAGRAM**—Represents many relation possibilities [two words] 5. **PERSISTRON**—Produces a persistent display
9. **CODOMAIN**—A set that includes attainable values
12. **HOMOPOLAR**—Electrically symmetrical
13. **TRUTHTABLE**—Determines a complicated statement's validity [two words] 17. **POWERCAPPING**—Controls either the instant or the average power consumption [two words]
18. **MAGNETRON**—The first form, invented in 1920, was a split-anode type
19. **MAGNETICFLUX**—F
20. **TURINGCOMPLETE**—The Z3 functional program-controlled computer, for example [two words]

Down

1. **CHAOSCOMPUTERCLUB**—Well-known European hacker association [three words] 2. **LOGICLEVEL**—When binary, it is high and low [two words] 3. **LINEARINTERPOLATION**—A simple, but inaccurate, way to convert A/D values into engineering units [two words] 6. **SYNCHRONOUSCIRCUIT**—A clock signal ensures this device's parts are in parallel [two words]
7. **BOARDBRINGUP**—Design validation process [three words] 8. **HORNERSRULE**—An algorithm for any polynomial order [two words] 10. **MEALY**—This machine's current state and inputs dictate its output values
11. **SQUAREWAVE**—It is produced by a binary logic device [two words] 14. **THI** electronic signals can be amplified and sent to a loudspeaker
15. **ABAMPERE**—10 A
16. **SCOPEPROBE**—Connects test equipment to a DUT [two words]

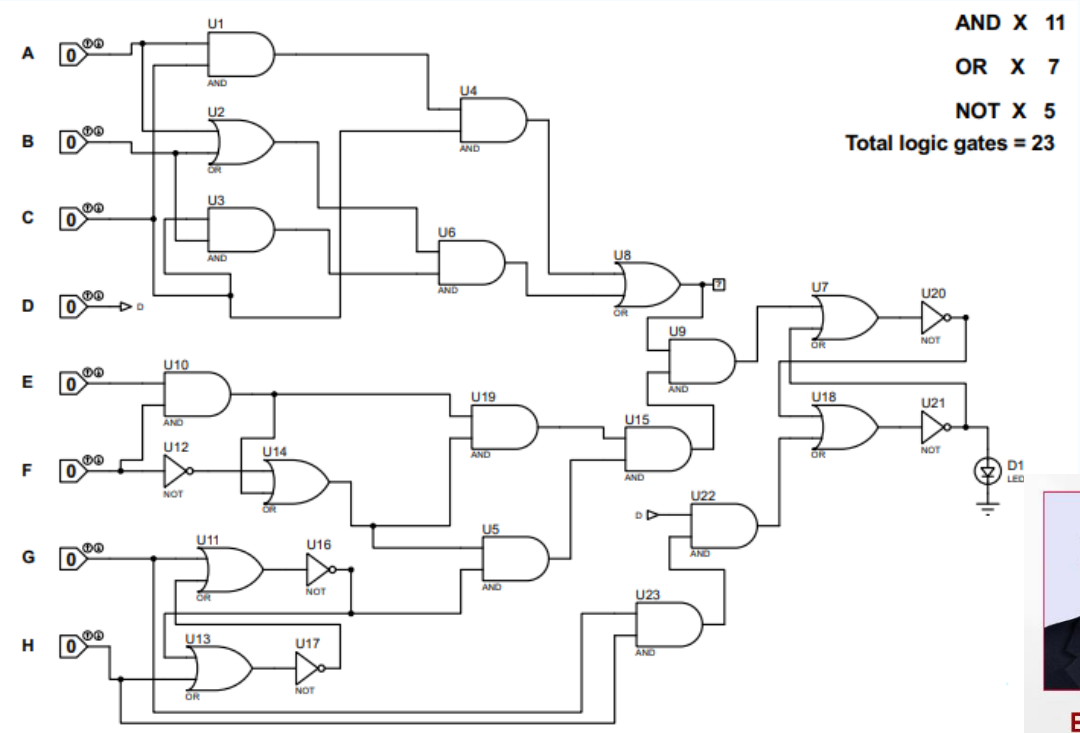
S. REEMA MANSOORA
717821E143

OHM'S LAW CHALLENGE



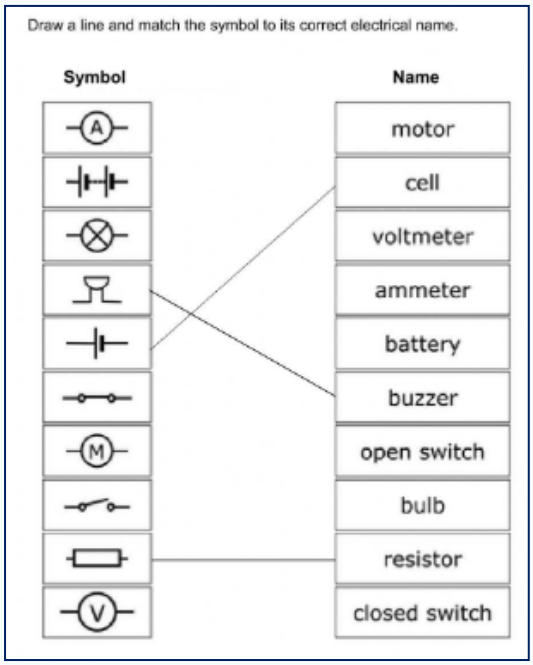
LOGIC GATE PUZZLE

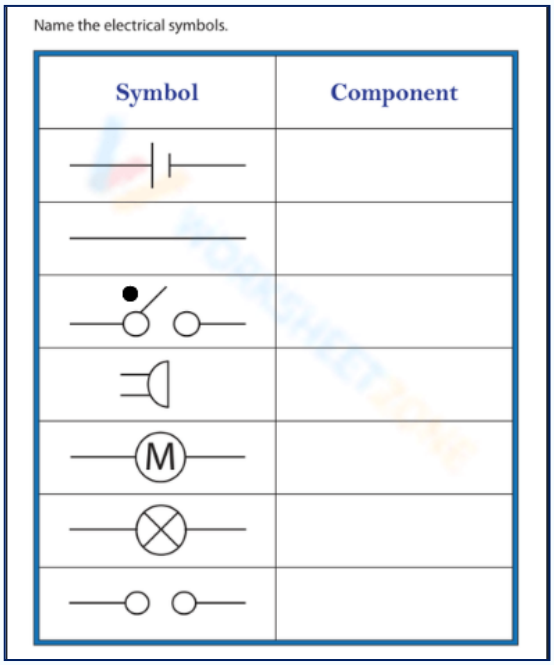
What Is The Output For This Logic Diagram?



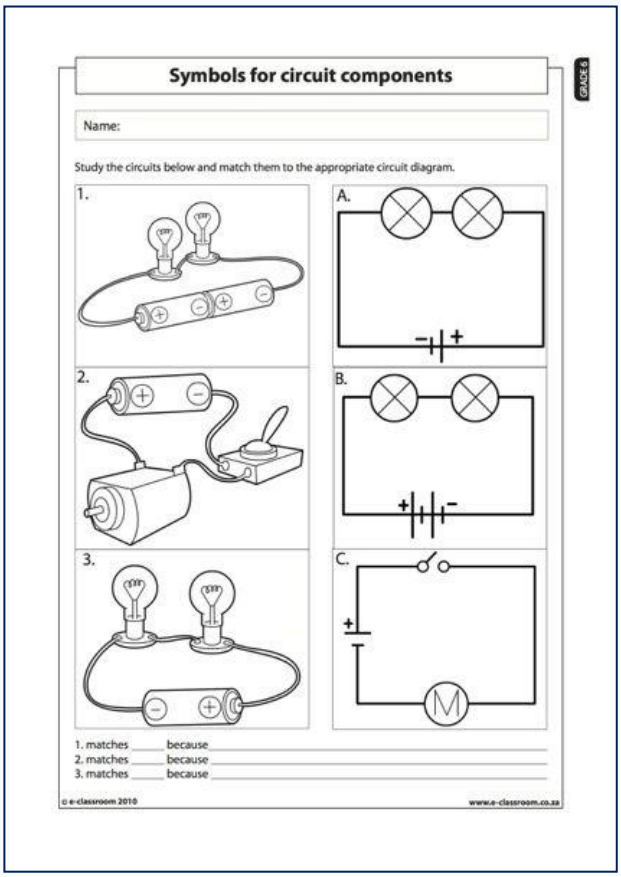
E. BHUVAN
717821E209

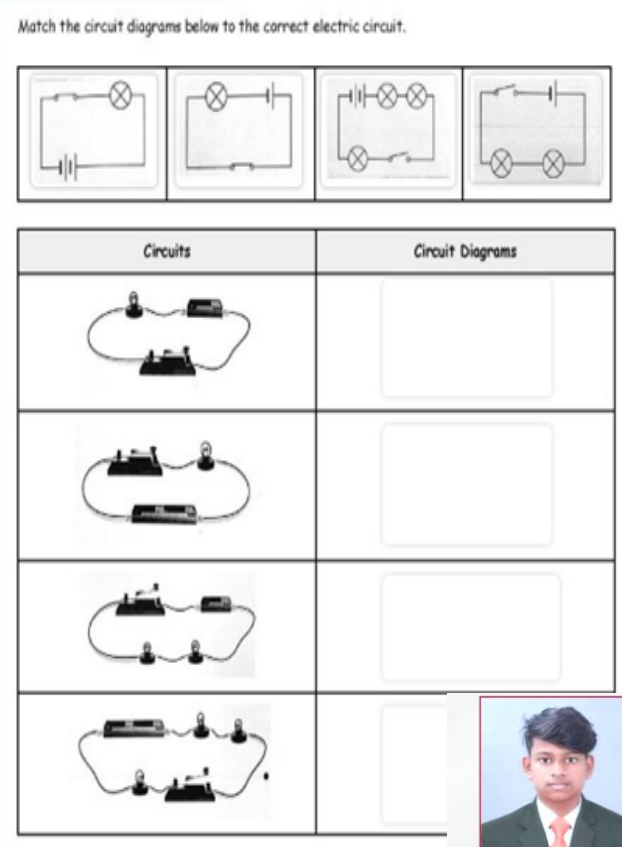
MATCH THE SYMBOLS





-K.L.Gopika (717821E119)





N. R. JANARTHANAN
717821E223

FILL IN THE CIRCUIT

Circuits

Fill in the missing words

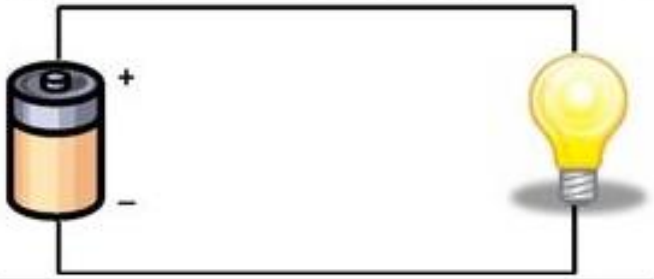
loop | complete | energy | path | negative | positive | electricity

A circuit is a _ _ _ _ that allows _ _ _ _ _ _ _ _ _ _ _ to pass through it.

Electricity always travels from the _ _ _ _ _ _ _ _ to the _ _ _ _ _ _ _ _.

A circuit will only work if it is _ _ _ _ _ _ _ _. This means it must make a complete _ _ _ _, otherwise the electrical _ _ _ _ _ _ cannot flow.

Draw arrows on the diagram to show which way round the electricity is flowing.



Fill in the blank by typing the correct answer based on your observation

lights up | more | brighter | brightest | brighter | electricity

1. I make a complete circuit using a battery, wires, a lightbulb and a switch.
   The lightbulb _____.
2. I add one more battery to the circuit and turn on the switch.
   The lightbulb becomes _____.
3. I have four batteries. Now, I connected all the batteries in the circuit.
   The lightbulb is the _____.
4. From this activity, I found out that the lightbulb becomes _____
   When we add _____ batteries because there is more _____.

What happens when we change the number of bulbs in a circuit?

Fill in the blank by typing the correct answer based on your observation.

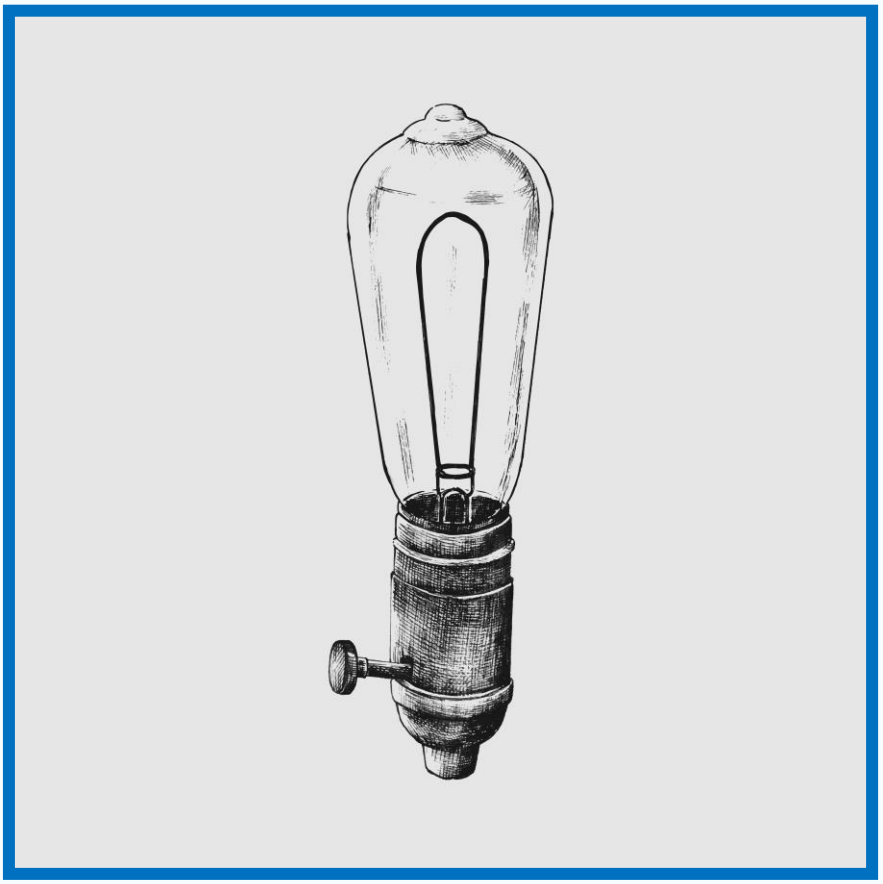
lights up | more | dimmer | dimmer | dimmest

1. I make a complete circuit using two batteries, wires, a lightbulb and a switch.
   The lightbulb _____.
2. I add one more lightbulb to the circuit and turn on the switch.
   The lightbulbs become _____.
3. I add another lightbulb to the circuit.
   The lightbulbs are now the _____.
4. From this activity, I found out that lightbulbs become _____ when we add _____ lightbulbs to a circuit.

S. NAVEEN
717822E605

STUDENT'S ART

A. HARIHARAN
20E109



U. PRETHASHREE
20E133

V. VARUN
20E148

PHOTO GALLERY

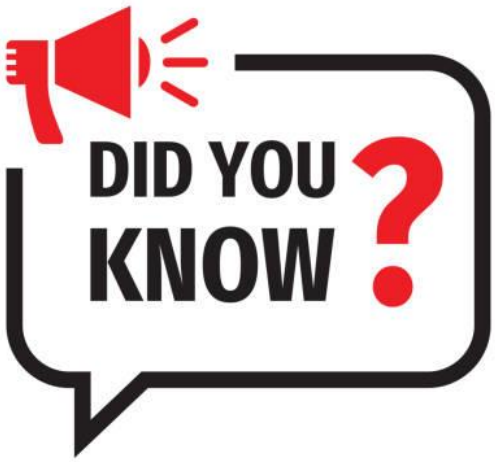
The picture was taken by Ms. G. Archana [717822E203], a second-year EEE student, during the photography event at Dhuruva-24.

G. ARCHANA
717822E203

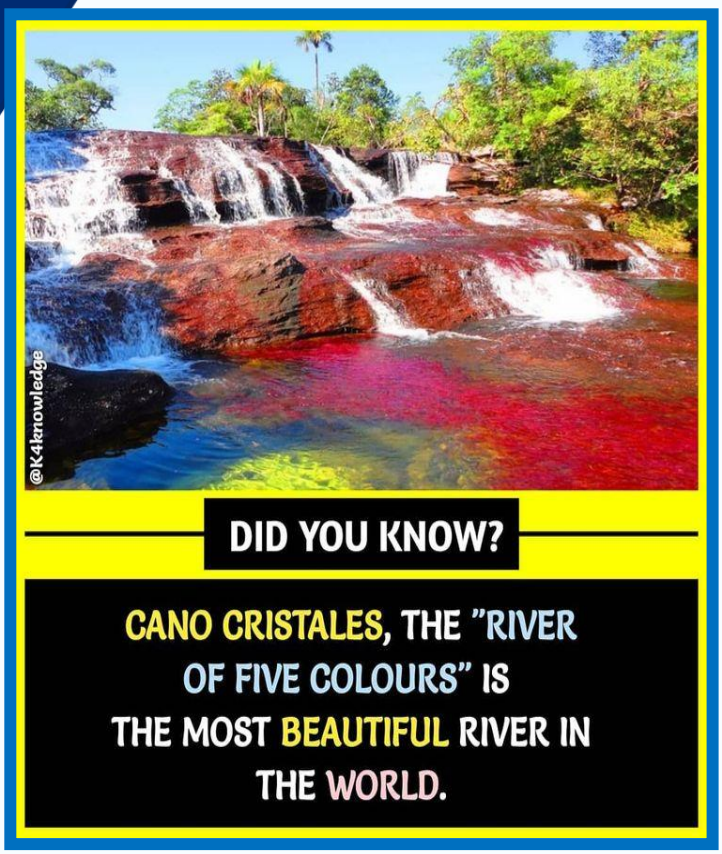
The picture was taken by Mr.P.B.Arun Pandiyan [717821E107], a third-year EEE student, during the photography event at Dhuruva-24.

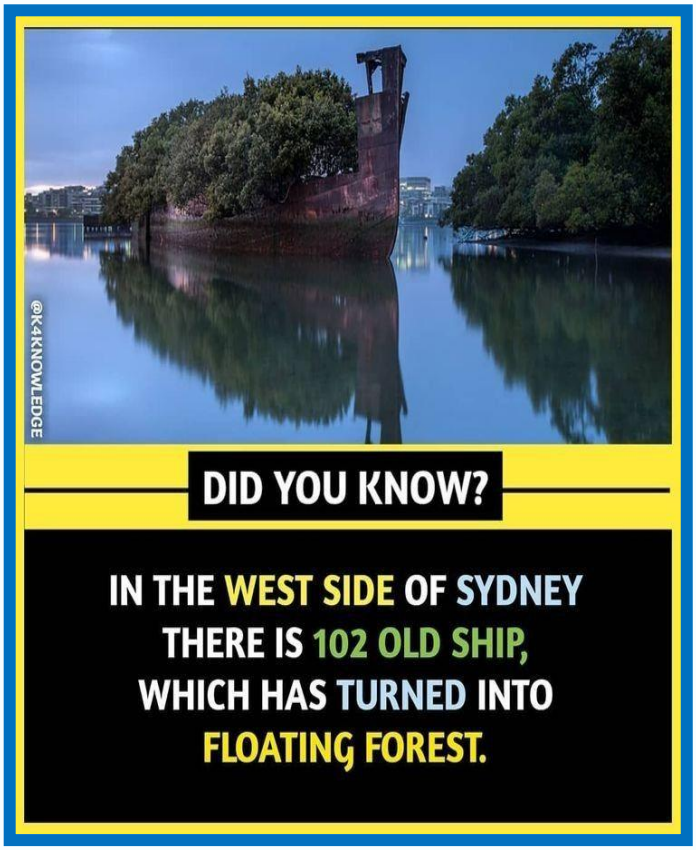
P. B. ARUN PANDIYAN
717821E107

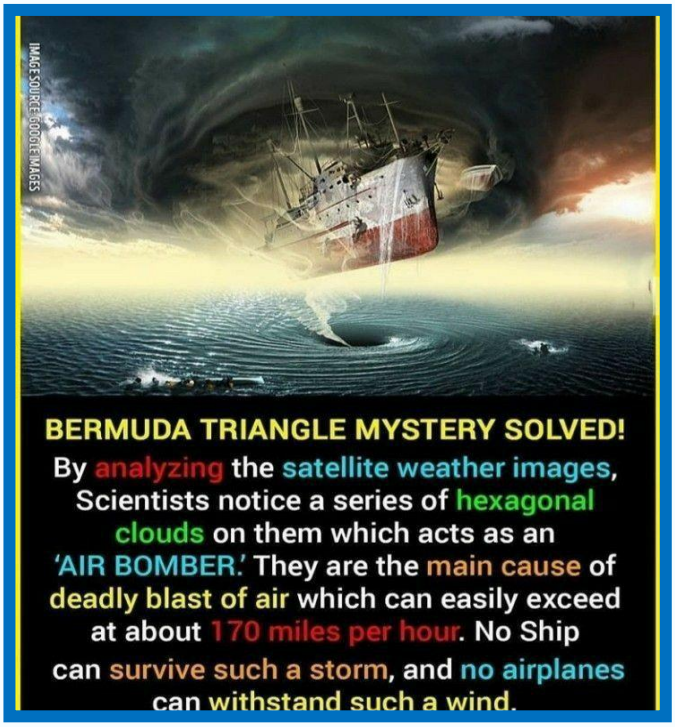
The picture was taken by Mr. S. Jagadeeshwaran [717822E120], a second-year EEE student, while the EEE department collaborated with NSS during the Voters' Pledge on October 1, 2024.



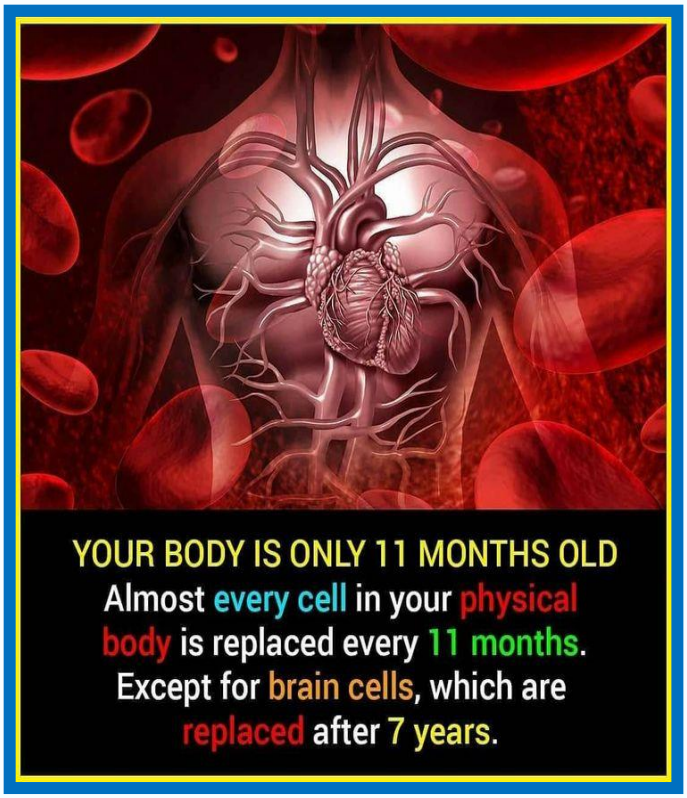
DID YOU KNOW?



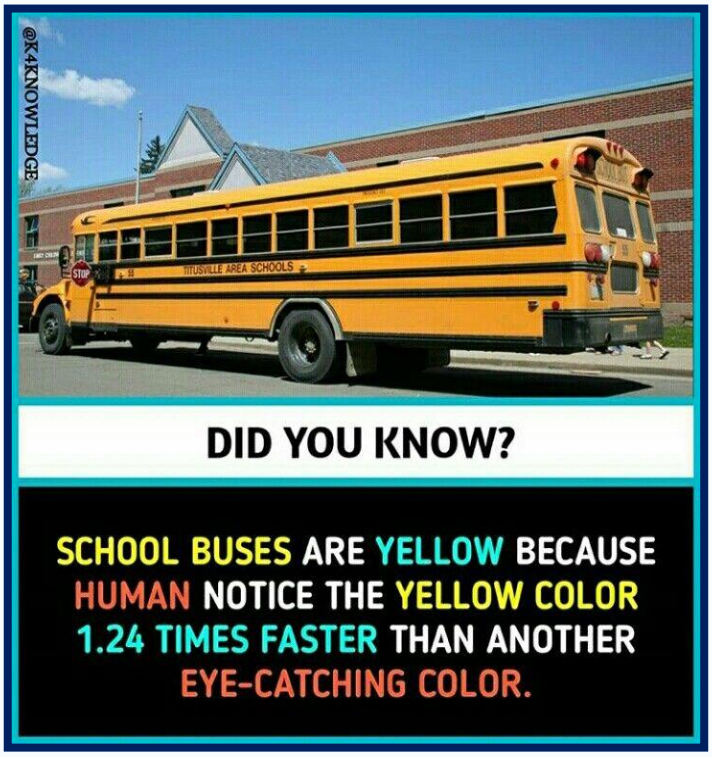


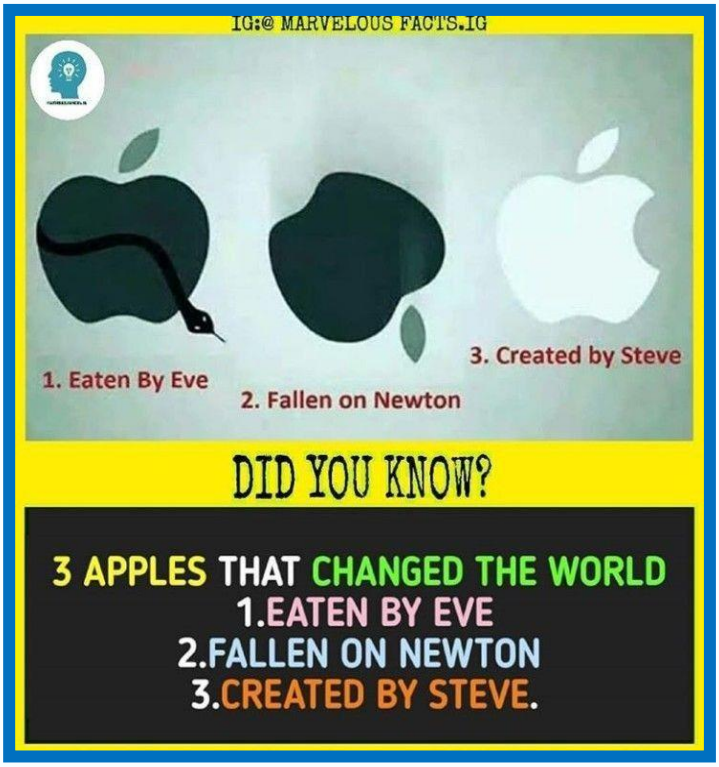


P. BHUVANESHWARAN
717821E111



Y. DIVYASHREE
717821E116





M. PAVITHRA
20E229

POETRY

அம்மா

என் முகம் பார்க்கும் முன்பு
என் குரல்கேட்கும் முன்பு
என் குணம் அறியும் முன்பு
என்னை நேசித்த ஓர் இதயம் அம்மா

ஆயிரம் விடுமுறை வந்தாலும்
அவள் அலுவலகத்திற்கு
மட்டும் விடுமுறையில்லை
அம்மா சமயலறை

நீ திட்டி நான் அழுததில்லை
நீ அடித்தும் வலித்ததில்லை
வலிக்காமல் அடிப்பதை எங்கு
தான் நீ கற்றாயோ என் மனதை
உடைக்காத ஓர் உயிரும் நீயே

பிறக்கும் போது உன்
வலியை உணர்ந்து தான்
அழுது நான் பிறந்தேனோ தாயே

K. A. BHARANIDHARAN
717821E110

நட்பு

நட்பு என்ற வார்த்தை
இந்த உலகில் உலவும் வரை
இங்கு யாரும் அனாதை இல்லை

நண்பர்கள் தவறு செய்தால்
மன்னித்து விடாதே
மறந்து விடு
ஏனெனில் அவர்கள் உணர்வுகள்
உன் உறவுகள் அல்ல

பல நேரங்களில் விட்டு கொடுப்பது மட்டுமல்ல
சில நேரங்களில் தட்டிகொடுப்பதும் தான் நட்பு!
என் அழுகையின் பின்னால்
ஆயிரம் பேர் இருக்கலாம்
ஆனால் என் சிரிப்பின் பின்னால்
நிச்சயம் என் நண்பனே இருப்பான்

தடும்மாறும் போது
தாங்கிப் பிடிப்பவனும்
தடம்மாறும் போது
தட்டி கேட்பவனும்
உண்மையான நண்பண்

V. HARIHARAN
717822E212

கல்லூரி பயணம்

கல்லூரி வாசலில் கனவுகள் மழையாய்,
காலடி சுவடுகளில் எதிர்காலம் எழுத்தாய்.
பதினேழின் புன்னகை, பாசத்தின் பொக்கிஷம்,
புத்தகத்தில் மட்டுமல்ல, நட்பில் உயிர் சேர்க்கும்.

கற்றல் மட்டுமல்ல, வாழ்வின் பாடங்கள்,
நட்பு நூலாய் பின்னும் நெஞ்சம் நொடிகளில்.
கற்கை இளமையின் காதல் கவிதை,
கனவுகளுக்கு உயிரூட்டி வளர்க்கும் மிதவை.

கிரிக்கெட் மைதானமும், கூட்ட அரங்கமும்,
நகைச்சுவை சாலையும், காபி டேபிள் கதைகளும்.
அறை தோறும் ஓசைகள் கதைகள் மாறும்,
அழுகையும் சிரிப்பும் தோழமையில் ஆடும்.

பள்ளிவாசலின் பயணம் நெடிதானது,
முடிவில் நினைவுகள் நிறைந்த சுகமானது.
கல்லூரி வாழ்கை, கவிதை பாக்கள்,
என்றும் மனதிலே ஒளிரும் ஓவியங்கள்.

S. KEERTHANA
717822E220

கல்லூரி வாழ்க்கை...!!!

அறியா முகமாய் அறிமுகம்!...

யாவரும் அறியும் முகமாகும் எண்ணம்கொண்டு
அறியாத முகங்களோடு காணும் - அறிமுகம்!

இலட்சியம் மழையாய் பொழிய,
கற்பனைகள் பெருக்கெடுத்தோட,
புத்துணர்ச்சிக் கடலில் மூழ்கிதினம்
புதுமைகள் காண விழையும் - புதுமுகம்!

கல்லூரி

எதிர்காலத்தின் பிறப்பிடம்!
எதார்த்தங்கள் வாழுமிடம்!
நீங்காத இனிய நினைவுகளின்
நினைவிடம்!

முதிராக் காதல், முடிவுறா நட்பு,
தொடரும் கல்வி, தொய்வுறா மகிழ்ச்சி ...
தொன்றுதொட்டு தோன்றுமிடம்!
பெற்றோர் சிலர்தம் கனவுகள் பலிக்குமிடம்!!!

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