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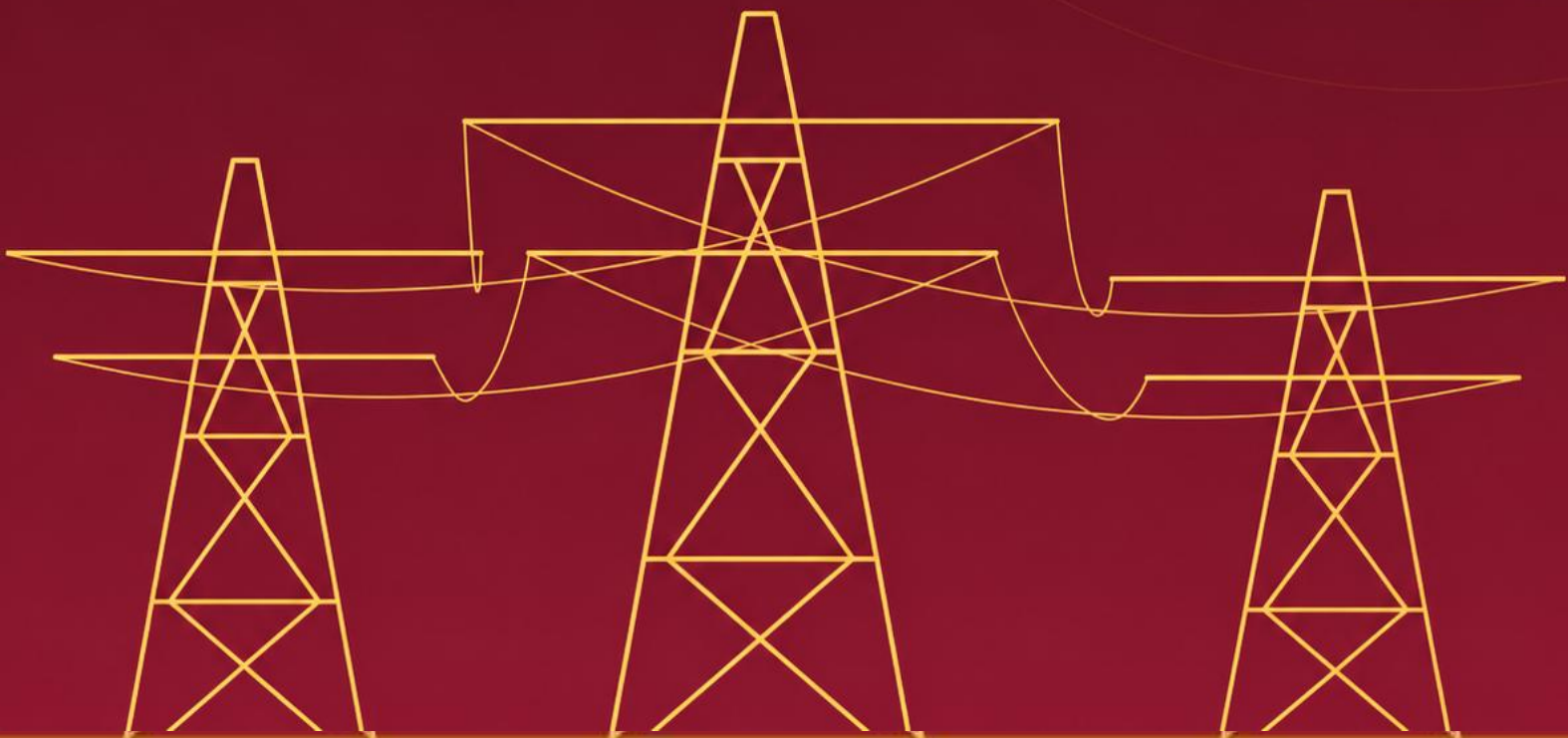
SCHOOL OF ELECTRICAL AND COMMUNICATION

**DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING**

Spark Magazine

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Foreword



Col. Prof. Vel. Dr. R. Rangarajan
Founder President & Chancellor



Dr. Mrs. Sagunthala Rangarajan
Foundress President

We remain committed to building an educational environment that nurtures knowledge, character, innovation, and excellence. Our institution continues to encourage students and faculty to pursue meaningful academic, research, and technological endeavors, supported by modern infrastructure, well-equipped laboratories, and a dedicated faculty. The Department of Electrical and Electronics Engineering reflects this vision through its academic achievements, research initiatives, funded projects, industry collaborations, and the accomplishments of its students and faculty.

LEADERSHIP



Dr. Rangarajan Mahalakshmi Kishore
Chairperson & Managing Trustee

I am delighted to present this vibrant edition of SPARK, the magazine of the Department of Electrical and Electronics Engineering. This magazine reflects the department's academic excellence, student contributions, innovative initiatives, and technical achievements. As technology continues to evolve, I encourage students and faculty to embrace lifelong learning, explore emerging technologies, and apply their knowledge to address real-world challenges. I congratulate the editorial team and the entire EEE department for their dedicated efforts in bringing out this edition and showcasing the department's accomplishments and vision.

Wishing SPARK continued success in inspiring innovation, creativity, and excellence!



LEADERSHIP



Prof. S. Salivahanan
Vice Chancellor

I am delighted to present the latest edition of Spark, the flagship magazine of the EEE Department. This magazine reflects our continuous pursuit of research excellence, creativity, co-curricular activity and technical learning of our students. Kudos to the editorial team, faculty, and brilliant students whose hard work and contributions made this edition possible.



Prof. Dr. E. Kannan
Registrar

I warmly congratulate the EEE Department on launching this vibrant edition of Spark. This platform beautifully captures the dynamic activities, student achievements, and academic excellence of the department. I wish the EEE team continued success in inspiring our community through such creative and meaningful initiatives.



Message from Dean and Head of the Department

Dr. V. Jayasankar

Professor & Dean
School Of Electrical and Communication



Driven by our faculty, students, and staff, the School continues to make remarkable progress in cutting-edge research, academic excellence, and industry collaboration. Spark, the EEE department magazine, beautifully highlights this journey—showcasing our commitment to innovation, hands-on learning, and community impact. I commend the team for their dedication to shaping future-ready professionals and bringing these key milestones to light.

Dr. P.Chandrasekar

Professor & Head
Department of Electrical and Electronics Engineering



It is with great pleasure and pride that I present SPARK, the official magazine of the Department of Electrical and Electronics Engineering. I invite you to explore these pages to discover the remarkable achievements and initiatives within our department. Together, we look forward to a bright future defined by groundbreaking research, transformative education, and impactful contributions to the field.

VISION OF THE DEPARTMENT

To provide intellectual curiosity in the field of Electrical and Electronics engineering that produces skilled interdisciplinary engineers to serve the society.

MISSION OF THE DEPARTMENT

M1: To inculcate knowledge among the students through comprehensive curriculum.

M2: To enrich the academic experience in terms of flexibility, teamwork, design skills, practice and industrial trainings.

M3: To produce competent graduates suitable for a successful career in Industry and Research.

PROGRAMME EDUCATIONAL OBJECTIVE

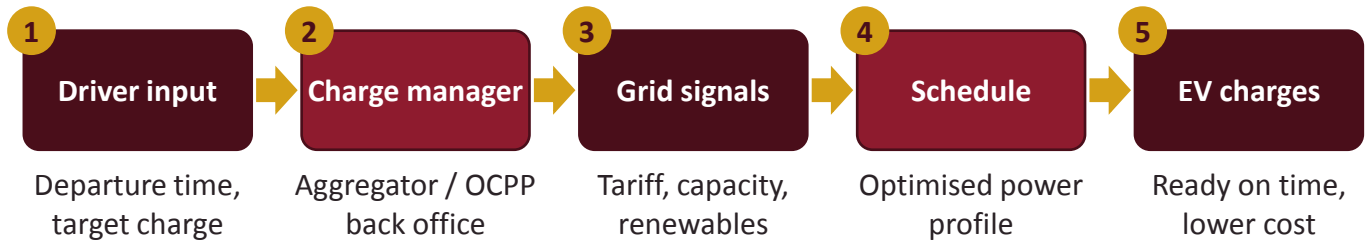
PEO1: Design and analyse electrical and electronic systems by applying the knowledge of mathematics and engineering.

PEO2: Provide practical solution to multidisciplinary societal problems through innovative ideas.

PEO3: Secure positions and continue as valued, creative and proficient employees in a wide variety of fields and industries for a rewarding career.



Smart Charging of Electric Vehicles



If every driver plugs in on returning home, charging piles onto the evening peak and can overload local transformers. Smart charging (also called V1G) shifts and modulates charging power so vehicles still leave with the energy their owners need, while the grid sees a smoother load. The charger or an aggregator receives signals such as time-of-use tariffs, site capacity limits or renewable availability, and builds a schedule around the driver's departure time and required state of charge. Open standards such as OCPP (charger to back office) and ISO 15118 (vehicle to charger) keep the system interoperable. The result is lower bills, fewer network upgrades and better use of clean energy.

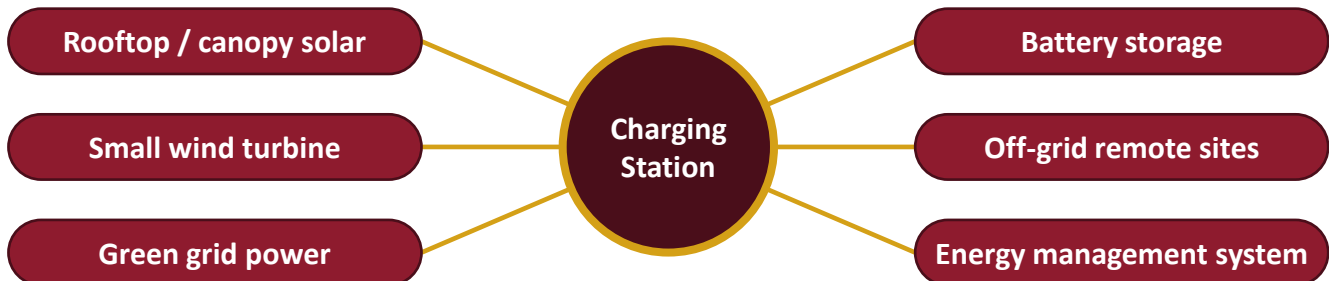
KEY POINTS

- ❖ Shifts load away from the evening peak
- ❖ Respects departure time and battery needs
- ❖ Built on open standards: OCPP, ISO 15118

CONCEPT · V1G VS V2G

V1G only controls when and how fast a car charges. V2G also lets it send energy back to the grid.

Renewable Energy Powered EV Charging Stations



A charging station is only as clean as the electricity behind it. Renewable-powered stations draw energy from rooftop or canopy solar, small wind turbines, or grid supply matched with certified green power. Where the grid is weak or absent, such as remote highways and rural areas, solar with battery storage can even run a station off-grid. An energy management system decides how PV output, storage and grid import are shared among the chargers, while smart charging moves vehicle demand towards sunny hours. Key design questions are sizing, available land or roof area, and the variability of solar and wind, which is why storage and a grid connection usually work together.

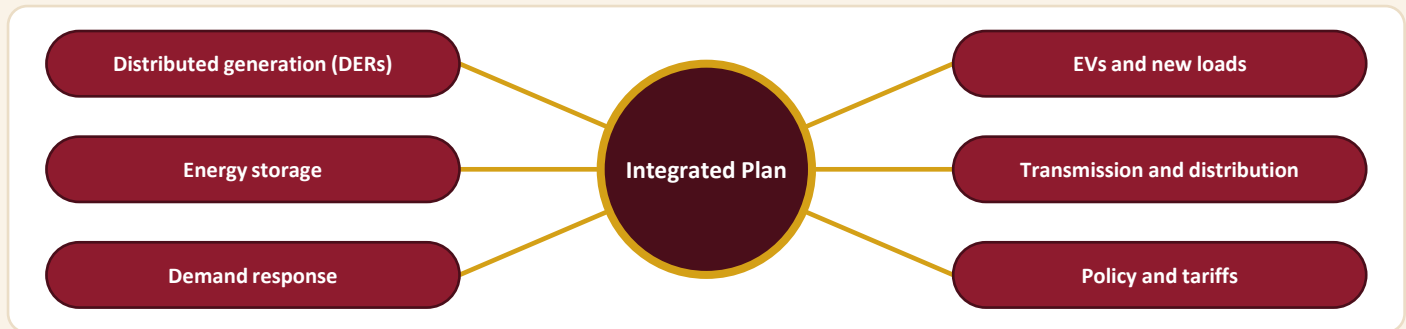
KEY POINTS

- Solar, wind or certified green grid power
- Off-grid option for remote locations
- EMS balances sources,

CONCEPT · MATCHING DEMAND TO SUN

Charging in sunny hours uses solar energy locally instead of letting it go unused.

Integrated Planning of Future Power Grids



Traditionally, generation, transmission and distribution were planned separately around a forecast peak. That approach struggles when rooftop solar, batteries, demand response, EV chargers, heat pumps and data centres all change how and where power flows. Integrated planning treats these as one system: it compares wires, storage, flexible demand and local generation on cost and reliability, tests many future scenarios rather than one forecast, and studies transmission and distribution together. Tools such as LEAP for energy scenarios and HOMER for microgrid sizing, both used in a recent workshop hosted by our department, support parts of this process. Coordination between utilities, regulators and developers is just as important as software.

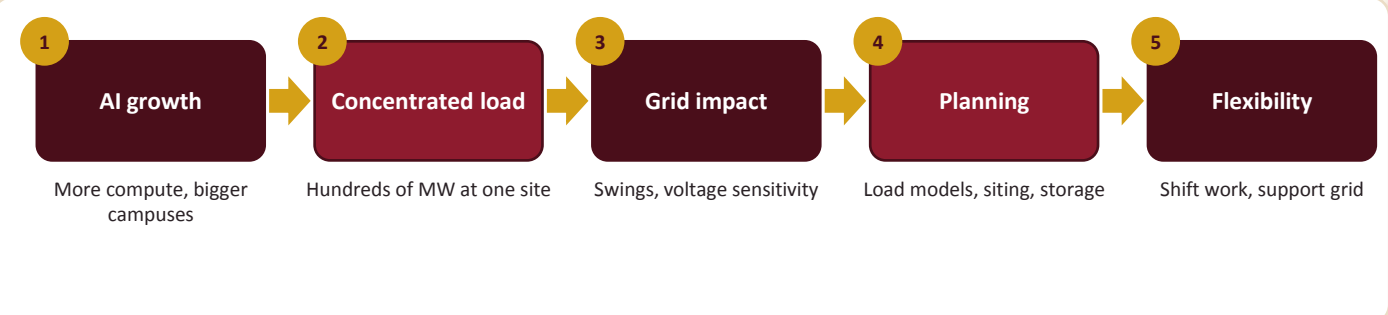
KEY POINTS

- Plans generation, grids and flexible demand together
- Tests many scenarios, not one forecast
- Compares wires with storage and flexibility

CONCEPT · NON-WIRE ALTERNATIVE

Sometimes a battery or demand response can defer a costly line or transformer upgrade.

AI Data Centres and Their Impact on Electrical Power Systems



Training and running AI models needs dense clusters of processors, so data-centre campuses are becoming very large, concentrated electrical loads. Utilities are receiving connection requests far larger than those of typical commercial customers, and demand can grow faster than new lines and generation can be built. The load is also different: computing demand can change quickly, creating power swings, and sensitive electronics react to voltage disturbances. Cooling adds further demand. Planners respond with better load models, on-site storage and generation, flexible operation that shifts work in time, and closer coordination between grid operators and developers.

KEY POINTS

- Large, concentrated loads that grow quickly
- Fast power swings and disturbance sensitivity
- Answers: flexibility, storage, coordination

CONCEPT · FLEXIBLE LOAD

If a data centre can shift or slow some tasks at peak times, it behaves like a grid resource, not only a burden.

Digital Substations and Intelligent Electronic Devices (IEDs)

Station level: SCADA, gateway, HMI (station bus)

Bay level: IEDs for protection, control and metering

Process level: merging units, sensors, switchgear (process bus)

Time synchronisation: IEEE 1588 PTP

In a conventional substation, hundreds of copper cables carry analogue signals from instrument transformers to relays and meters. A digital substation replaces most of them with fibre and the IEC 61850 standard. Merging units at the switchyard convert measurements into digital sampled values on a process bus. Intelligent electronic devices (IEDs), microprocessor-based units that combine protection, control, monitoring and communication, exchange fast GOOSE messages for interlocking and tripping, and a station bus links them to SCADA. Benefits include less copper, safer testing and vendor interoperability. Challenges include precise time synchronisation, cybersecurity and new skills for maintenance teams.

KEY POINTS

- Fibre replaces most copper wiring
- IEDs combine protection, control and monitoring
- IEC 61850: interoperable, fast GOOSE messaging

CONCEPT · GOOSE

A fast, event-driven message that lets one IED tell another, within milliseconds, that a breaker has tripped.

Smart Protection Systems for Modern Power Grids

Conventional protection

- One-way power flow assumed
- Fixed relay settings
- Local measurements only
- Designed for high fault currents



Smart protection

- Two-way flows and DERs handled
- Adaptive setting groups
- Communication-assisted (GOOSE)
- Works with low inverter fault current

Traditional protection assumes power flows one way from large generators to consumers, so relay settings are fixed. With solar, batteries, EVs and microgrids, flows can reverse and fault currents vary with the number of inverters connected. Smart protection adapts. Adaptive schemes change setting groups when topology or operating mode changes, for example between grid-connected and islanded microgrid operation. Communication-assisted schemes such as differential and directional comparison use fast links, often IEC 61850 GOOSE, to locate a fault precisely. Wide-area protection looks beyond one substation, and AI can support fault classification, but security and cyber-resilience remain essential.

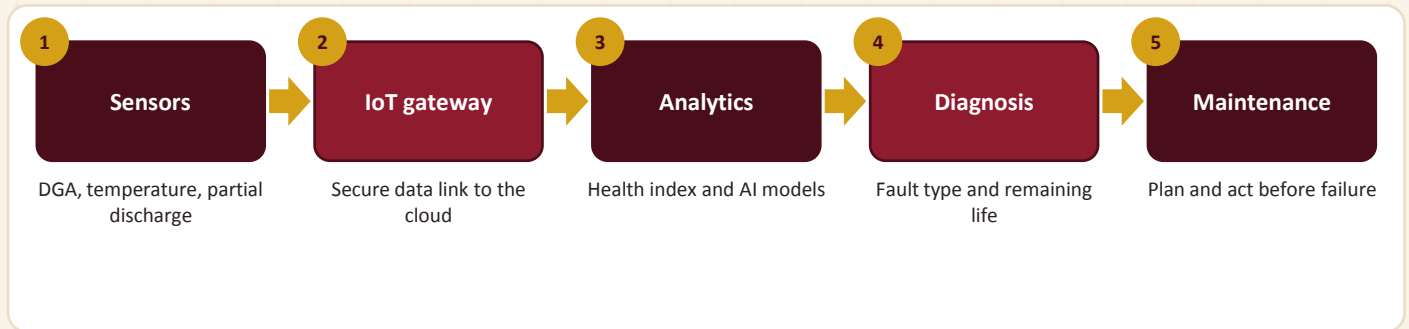
KEY POINTS

- Settings adapt to topology and operating mode
- Fast communication improves fault location
- Must stay secure and cyber-resilient

CONCEPT · ADAPTIVE PROTECTION

The relay changes its own settings when the network changes, instead of relying on one fixed setting for every case.

Condition Monitoring and Predictive Maintenance of Transformers



What is measured	What it reveals
Dissolved gas analysis (DGA) of oil	Overheating, arcing and partial discharge inside the unit
Top-oil and winding hot-spot temperature	Thermal stress and insulation ageing
Partial discharge	Weak spots and defects in the insulation
Bushing capacitance and tan δ	Bushing condition, a common failure source
Moisture in oil and paper	Dryness of the insulation, a key ageing factor
Loading and tap-changer operations	Stress history and wear of moving parts

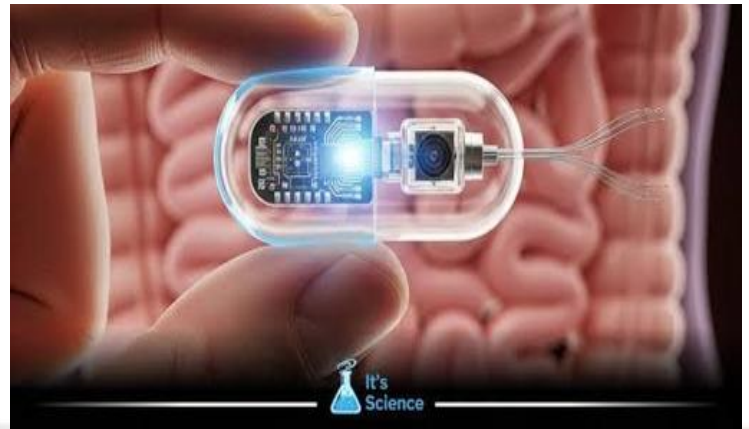
Power transformers are costly, long-lead-time assets. Traditional time-based maintenance either services healthy units too early or misses a developing fault. Condition monitoring measures the transformer's health directly and lets maintenance follow the evidence, much like a regular health check for a patient.

Online sensors send data through IoT gateways to analytics that compute a health index and, with AI, estimate remaining life. Faults such as overheating and arcing create characteristic gases in the oil, so analysing them works like a blood test for the transformer. The outcome is fewer unplanned outages, longer asset life and better use of maintenance budgets.

VTU21247 SAI TEJASWINI

Era of Edible Electronics

Dr. P. Chandrasekar, Professor – EEE



The rise of edible electronics combines biocompatible materials with advanced engineering to create electronic devices that can be safely consumed, perform specific functions, and eventually dissolve naturally. Researchers are exploring materials such as magnesium, gold and silver, gelatin, cellulose, and seaweed-derived agar to develop edible circuits, sensors, and batteries. These devices are being investigated for applications across healthcare, food safety, and agriculture. In healthcare, edible pills and electronic devices can monitor conditions such as temperature, pH, pressure, and other changes inside the digestive system. Such monitoring can support disease detection and provide information that may assist targeted drug delivery. Because these devices are designed to function within the body and then dissolve, edible electronics offer an interesting approach to combining electronic functionality with biocompatible materials.

Beyond healthcare, edible electronics can also support food safety and agricultural applications. Edible sensors can be used to track food freshness and identify conditions associated with contamination, while similar sensing approaches can support monitoring of livestock health. These applications demonstrate how electronic systems can be designed for environments where conventional electronic devices may not be suitable. However, the technology still faces important challenges, including limited computing power, controlled dissolution, material selection, reliable operation, and regulatory approval. Researchers therefore continue to work on improving the performance and practical use of edible electronic devices. With continued advances in materials, sensors, circuits, and device design, edible electronics could develop into a valuable technology for healthcare, food safety, agriculture, and sustainability, creating new possibilities at the intersection of electronics, materials science, and engineering.

Lemongrass: The Fragrant Grass



Lemongrass (*Cymbopogon citratus*) is a perennial grass belonging to the family Poaceae and is widely grown for its fragrant leaves and stalks, which are commonly used as a flavouring. It grows in dense clumps with stiff stems and slender, blade-like leaves that droop towards their tips. When the plant is damaged, it releases a strong and distinctive lemon fragrance. Lemongrass can reach a height of about 1.8 metres (6 feet) and is likely to have originated from Sri Lanka or Malaysia. Its characteristic aroma and useful stalks and leaves have made it an important plant in culinary and everyday applications.

The stalks of lemongrass are widely used to flavour dishes in Southeast Asian cooking, adding a distinctive lemon-like taste and fragrance to food. The tender heart of young shoots can also be eaten as a vegetable, while the leaves are used to prepare lemongrass tea. Beyond its culinary uses, lemongrass is also valued for its essential oil, which is widely used in products such as insect repellents, perfumes, and soaps. The combination of its fragrant properties, edible parts, and versatile essential oil makes lemongrass a useful plant with applications ranging from food and beverages to household and personal-care products.

VTU 11938 Naga Swetha

The Quiet Giant

Silent in the switchyard, steady through the night,

A giant hums a lullaby of copper, oil and light.

It steps the voltage down so a village can be warm,

*And carries every classroom through the lightning
and the storm.*

*So here's to all the quiet things that keep the world
in flow –*

*The ones we only notice when they're gone: the ones
that glow.*

VTU21247 SAI TEJASWINI



Tamil Nadu GI Tags

தமிழ்நாட்டின் புவிசார் குறியீடு பெற்ற பொருட்கள்

கும்பகோணம் வெற்றிலை
 தோவாளை மாணிக்க மாலை
 மலபார் மிளகு
 தஞ்சாவூர் நெட்டி வேலைப்பாடு
 ராமநாதபுரம் குண்டு மிளகாய்
 வேலூர் கத்தரிக்காய்
 நரசிங்கம்பேட்டை நாதஸ்வரம்
 கன்னியாகுமரி கிராம்பு
 கள்ளக்குறிச்சி மரச்சிற்பம்
 கருப்பூர் கலம்காரி ஓவியங்கள்
 அரும்பாவூர் மர வேலைப்பாடுகள்
 கோவில்பட்டி கடலை மிட்டாய்
 கண்டாங்கி சேலை
 திண்டுக்கல் பூட்டு
 பூம்பாறை மலைப் பூண்டு
 திருபுவனம் பட்டு
 தோடா எம்பராய்டரி
 பழனி பஞ்சாமிர்தம்
 நாகர்கோவில் நகை
 மகாபலிபுரம் கற்சிற்பம்
 ஸ்ரீவில்லிபுத்தூர் பால்கோவா
 மதுரை மல்லிகைப்பூ
 ஈரோடு மஞ்சள்
 தஞ்சாவூர் வீணை
 செட்டிநாடு கொட்டான்
 பத்தமடை பாய்
 சிறுமலை வாழைப்பழம்
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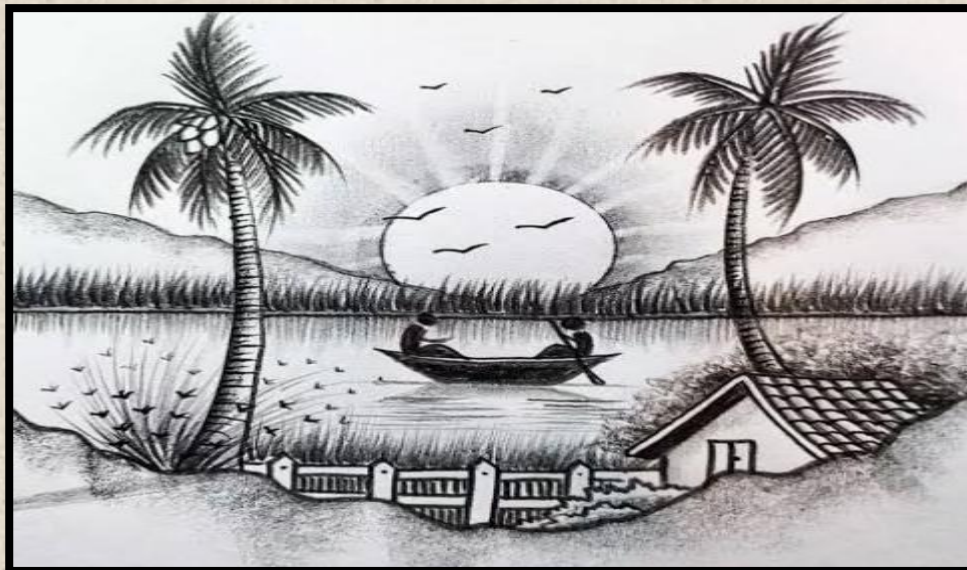
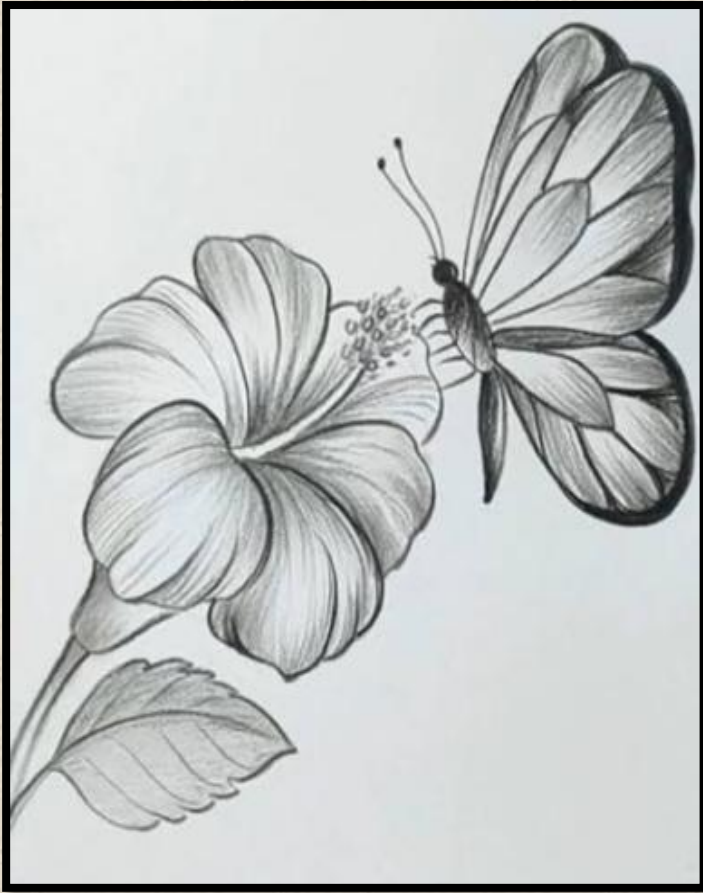
VTU11999 R S ASWIN KUMAR

Rangoli: Dots, Dust, Delight...



VTU 11938 Naga Swetha

Art: Shading Some Real Truth!



VTU18180 Jashuva

PUZZLES

PUZZLE

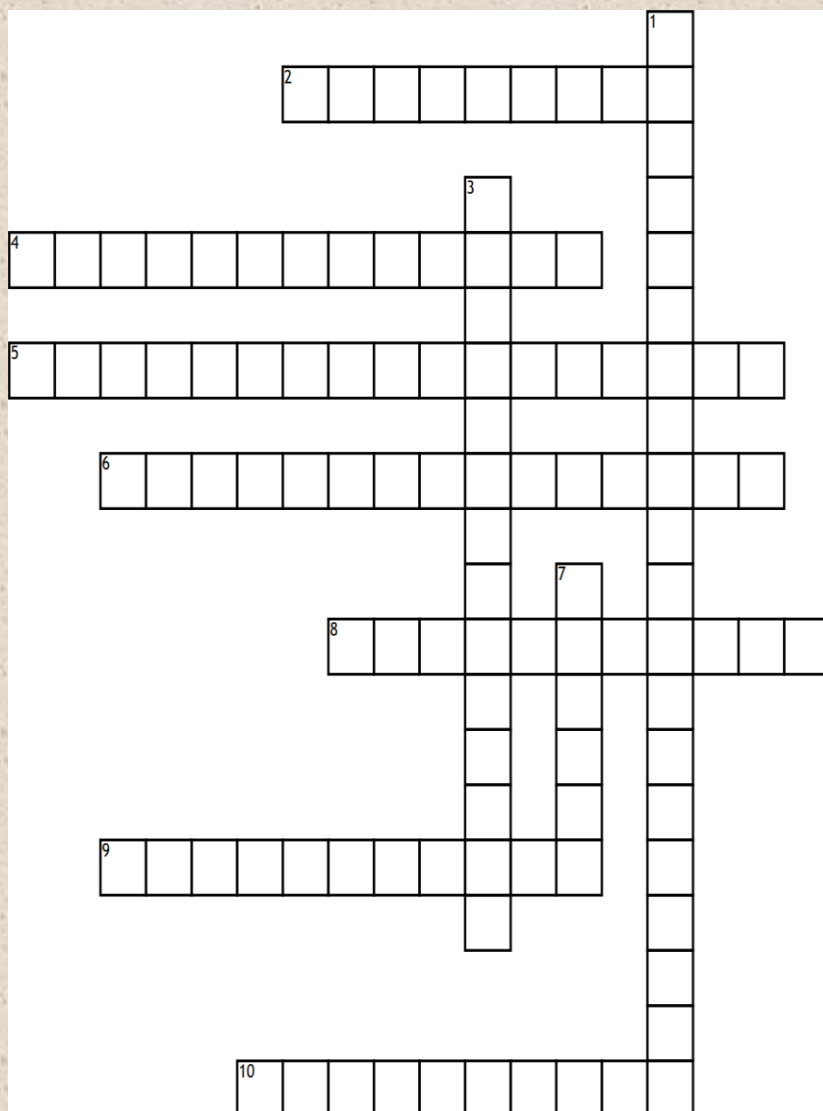
Across

2. process of generating an electric current from the motion of a conductor in a magnetic field
4. What is produced when there is a current in the primary coil of a transformer?
5. Which of the following motor will have a relatively higher power factor
6. The armature of DC motor is laminated to reduce

8. Torque weight ratio will be least in instruments
9. material that can be magnetized
10. In a split-phase motor, the running winding should have high

Down

1. Megger is used to measure
3. In a DC machine fractional pitch winding is used to
7. You insert an electric plug into this to connect to the source of energy



Across	
Clue No.	Answer
2	Electromagnetic Induction
4	Magnetic Flux
5	Synchronous Motor
6	Eddy Current Loss
8	Moving Iron
9	Ferromagnetic
10	Resistance
Down	
Clue No.	Answer
1	Insulation Resistance
3	Reduce Harmonics
7	Socket

VTU17929 PRANAV KUMAR ROWLA

Riddles

1. What goes round the house and in the house but never touches the house?
2. What comes once in a minute, twice in a moment, but never in a thousand years?
3. I am taken from a mine, and shut up in a wooden case, from which I am never released, and yet I am used by almost everybody.
4. Brothers and sisters have I none but that man's father is my father's son.
5. There are four brothers in this world that were all born together. The first runs and never wearies. The second eats and is never full. The third drinks and is always thirsty. The fourth sings a song that is never good.
6. What belongs to you but others use it more than you do?
7. I am the beginning of sorrow, and the end of sickness. You cannot express happiness without me, yet I am in the midst of crosses. I am always in risk, yet never in danger. You may find me in the sun, but I am never out of darkness.
8. A cloud was my mother, the wind is my father, my son is the cool stream, and my daughter is the fruit of the land. A rainbow is my bed, the earth my final resting place, and I'm the torment of man.
9. What is it the more you take away the larger it becomes?
10. I have a little house in which I live all alone. It has no doors or windows, and if I want to go out I must break through the wall.

Answer

- | | |
|----------------------------|------------------------|
| 1)The sun | 6)Your name |
| 2)The letter M | 7)The letter S |
| 3)Pencil lead | 8)Rain |
| 4)My son | 9)A hole |
| 5)Water, fire, earth, wind | 10)A chicken in an egg |

Quiz: Brain On Fire

Electrical Engineering Quiz – 10 Questions with Answers

1. What is the ideal value of power factor in an AC electrical system?

- A) 0 B) 0.5 C) 1.0 D) -1.0

Answer: C) 1.0

2. Which instrument is used to measure electrical energy consumed over a period of time?

- A) Voltmeter B) Ammeter C) Energy meter D) Wattmeter

Answer: C) Energy meter

3. Why is the core of a power transformer laminated?

- A) To increase copper loss B) To reduce eddy current loss
C) To increase mechanical strength D) To prevent open circuits

Answer: B) To reduce eddy current loss

4. Fleming's Left-Hand Rule is primarily used to determine the direction of force in which device?

- A) Generator B) Transformer C) Electric motor D) Rectifier

Answer: C) Electric motor

5. What is the SI unit of magnetic flux?

- A) Tesla B) Weber C) Henry D) Gauss

Answer: B) Weber

6. Which of the following is a conventional (non-renewable) source of electrical power generation?

- A) Solar photovoltaic B) Wind turbine
C) Coal thermal power plant D) Run-of-river hydroelectricity

Answer: C) Coal thermal power plant

7. What is the standard formula for slip in a 3-phase induction motor?

- A) $(N_s - N) / N$ B) $(N - N_s) / N_s$ C) $(N_s - N) / N_s$ D) $(N + N_s) / N_s$

Answer: C) $(N_s - N) / N_s$

8. In a purely inductive AC circuit, how does the current behave relative to the voltage?

- A) Leads voltage by 90° B) Lags voltage by 90°
C) Remains in phase with voltage D) Lags voltage by 180°

Answer: B) Lags voltage by 90°

9. What is the form factor of a pure sinusoidal AC waveform?

- A) 1.0 B) 1.11 C) 1.414 D) 1.57

Answer: B) 1.11

10. Which type of relay is predominantly used for the protection of long high-voltage transmission lines?

- A) Thermal relay B) Distance relay C) Overcurrent relay D) Buchholz relay

Answer: B) Distance relay

TTS 2652 Mr.R.Sreedhar

◆ CREDITS

Editorial Team & Acknowledgements**ACKNOWLEDGEMENTS**

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